

# **INTEGRATION OF ENVIRONMENTAL PLANNING INTO COMMUNAL GRAZING SYSTEMS IN THE FREE STATE**

by

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**BLOEMFONTEIN  
MARCH 2004**

## DECLARATION OF INDEPENDENT WORK

I, Takisi Janki Masiteng, hereby declare that this research project submitted to the Technikon Free State for the awarding of the Degree DOCTOR TECHNOLOGIAE: AGRICULTURE, is my own independent work that has not previously been submitted to any institution, by me or any other person, for the awarding of a qualification.



.....

**Signature of student**

30-03-04

**Date**

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## SUMMARY

### **INTEGRATION OF ENVIRONMENTAL PLANNING INTO COMMUNAL GRAZING SYSTEMS IN THE FREE STATE**

This study evaluated the integration of environmental planning into communal grazing systems in the Free State. The study focused particularly on communal grazing systems in Qwaqwa, Thaba-Nchu and Botshabelo, as well as certain areas in the Free State where communal grazing systems are run by small-scale farmers. Currently the Free State province is divided into 5 district areas and 20 local municipal areas, which include 78 towns. There are communal grazing areas near each town, assigned specifically for livestock production in the province. To date, few formal assessments of the condition of these lands have been made. Stratified random sampling was employed throughout the survey to select the respondents. Questionnaires were completed with 70 farmers.

In this study the needs and aspirations of the farmers are related to the integration of environmental planning into communal grazing systems in the Free State, as well as security of tenure, working capital, knowledge, adequate extension services, training and water supply, timely veld fires, and co-operation amongst farmers. The needs and aspirations of livestock owners in the communal rangelands of the Free State are constrained by small farm size, population pressure, land tenure problems, distance from markets, poor transport and infrastructure. Facilities such as marketing, processing and quality control are not promoted on communal grazing areas.

In the Free State the basic entitlement of every rural household to three types of land ownership or use, has acted as an essential safety net for the poor and a valuable resource for the more entrepreneurial. The three types of land ownership are residential land for building purposes, fields for crop production and access to commonage land for grazing purposes. It was found that sustainable grazing management is not based on grazing potential and stocking rates. The formalisation of grazing rights and increased responsibility for communal grazing management are still absent or lacking in most communal grazing

areas. In most communal grazing areas livestock numbers exceed the grazing capacity. Selection and breeding on communal grazing areas affect the herd quality. The nutrition status of livestock is not improved, due to lack of access to feed resources and supplementary feeding. Better animal health due to improved disease prevention and animal health care services, is still lacking in most communal grazing areas. The training of livestock owners in communal grazing areas regarding grazing management is crucial. Cattle owners and communal grazing committees are not participating adequately in the planning and decision-making regarding livestock development on communal land. The roles and effectiveness of existing institutions is crucial with regard to communal grazing areas and the formulation and implementation of livestock management policy.

In this study, it was recognised that cattle farmers on communal grazing areas are involved in farming, but mostly for their own domestic consumption, and that they are relatively dependent on agriculture and the exploitation of natural resources. However, the communal grazing areas are inadequately managed with a view to sustainable development and production. There are major resource management problems on communal grazing areas, which is widely acknowledged by cattle farmers, but in varying degrees. These problems can be overcome by following a multi-sectoral and interdisciplinary approach, while aspects such as investment, education and training and the adoption of more appropriate technologies should also receive attention. Although policies on natural resource management are currently in place, they are still fragmented among the different sectors, with little integration or co-ordination at ground level.

Environmental protection is not incorporated as an integral part of livestock production in communal areas. The study found that the integration of environmental planning into communal grazing systems in the Free State is essential for obtaining the best cattle performance and optimal use of land resources.

## OPSOMMING

### INTEGRASIE VAN OMGEWINGSBEPLANNING IN KOMMUNALE WEIDINGSTELSELS IN DIE VRYSTAAT

Die studie het die integrasie van omgewingsbeplanning in kommunale weidingstelsels in die Vrystaat geëvalueer. Die studie het veral op kommunale weidingstelsels in die Qwaqwa, Thaba-Nchu en Botshabelo areas gefokus, sowel as op sekere dele in die Vrystaat waar kommunale weidingstelsels deur kleinskaalse boere bedryf word. Die Vrystaat Provinsie is verdeel in 5 distrikte en 20 plaaslike munisipaliteite, wat 78 dorpe omsluit. Daar is kommunale weidingareas by elke dorp wat spesifiek vir die produksie van lewende hawe toegeken is. Tot op datum is weinig formele ondersoeke na die toestand van hierdie gebiede uitgevoer. In hierdie studie is gestratifiseerde steekproefneming toegepas ten einde die respondente te selekteer. Vraelyste is vervolgens by 70 boere voltooi.

In hierdie studie word die behoeftes en aspirasies van boere in verband gebring met die integrasie van omgewingsbeplanning in kommunale weidingstelsels in die Vrystaat, sowel as sekerheid van eienaarskap, bedryfskapitaal, kennis, tydigte veldbrande en die mate van samewerking tussen boere, asook voldoende voorligtingsdienste, opleiding en water. Die behoeftes en aspirasies van die eienaars van lewende hawe op kommunale weidings in die Vrystaat word veral beperk deur die klein oppervlakte van die plase, druk weens huisvestingsbehoefte, probleme t.o.v. grondeienaarskap en die bereikbaarheid van markte, asook swak vervoergeriewe en infrastruktuur. Aksies soos bemarking, verwerking en gehaltebeheer word nie in kommunale weidingsgebiede bevorder nie.

In die Vrystaat word die toekenning of gebruiksreg van een van drie tipes grondeienaarskap aan elke plattelandse huisgesin gesien as 'n veiligheidsnet vir arm mense, terwyl dit ook 'n waardevolle hulpbron vir die entrepreneur is. Die drie tipes grondeienaarskap waarna verwys word is grond vir verblyfdoeleinde, lande vir gewasproduksie en toegang tot kommunale grond vir weidingsdoeleinde. Daar is bevind dat volhoubare weiveldbestuur nie gebaseer word op weikapasiteit en drakrag nie. Die formalisering van weidingsregte en

verhoogde verantwoordelikheid vir kommunale weiveldbestuur is steeds in die meeste kommunale weigebiede afwesig of onvoldoende. Veegetalle oorskry in die meeste kommunale weigebiede die weidingskapasiteit/drakrag. Soos in alle tipes veeboerdery beïnvloed seleksie en teling op kommunale weidings die kwaliteit van die kudde. Die voedingstatus van vee word nie verbeter nie, weens 'n gebrek aan toegang tot voedingshulpbronne en aanvullende voeding. Die bevordering van dieregesondheid d.m.v. verbeterde siektevoorkoming en dieregesondheidsorgdienste is steeds onvoldoende in die meeste kommunale gebiede. Die opleiding van kommunale veeboere in weiveldbestuur is van kritieke belang. Beeseienaars sowel as kommunale weidingskomitees is te min betrokke by die beplanning en besluitneming oor die ontwikkeling van vee op kommunale grond. Die rolle en effektiwiteit van bestaande instansies is van kritieke belang t.o.v. kommunale weigebiede en die formulering en implementering van beleid rakende die bestuur van lewende hawe.

In hierdie studie is bevind dat kommunale beesboere betrokke is by boerdery, maar meestal vir eie huisgebruik, en dat hulle relatief afhanklik is van landbou en die aanwending van natuurlike hulpbronne. Die kommunale weigebiede word ontoereikend bestuur in terme van die strewe na volhoubare ontwikkeling en produksie. Daar is verneme hulpbronbestuursprobleme m.b.t. kommunale weidingsgebiede, en dit word algemeen, maar in verskillende mates, erken deur beesboere. Hierdie probleme kan voorkom word deur 'n multi-sektorale en interdisiplinêre benadering te volg, terwyl aspekte soos beleggings/investering, onderwys en opleiding en die benutting van meer toepaslike tegnologieë ook beklemtoon behoort te word. Beleid rakende natuurlike hulpbronbestuur is tans in plek maar, soos in die verlede, gefragmenteer tussen die verskillende sektore, met min integrasie of koördinasie op grondvlak.

Omgewingsbeskerming is nie ingesluit as integrale gedeelte van veeproduksie in kommunale gebiede nie. Die studie het bevind dat die integrasie van omgewingsbeplanning in kommunale weidingstelsels in die Vrystaat noodsaaklik is ten einde die beste prestasie van beeste te verkry en die optimale gebruik van grondhulpbronne te bewerkstellig.

## CONTENTS

|   |             |
|---|-------------|
| <b>DECLARATION OF INDEPENDENT WORK.....</b> | <b>i</b>    |
| <b>ACKNOWLEDGEMENTS.....</b>                | <b>ii</b>   |
| <b>SUMMARY.....</b>                         | <b>iii</b>  |
| <b>OPSOMMING.....</b>                       | <b>v</b>    |
| <b>CONTENTS .....</b>                       | <b>vii</b>  |
| <b>LIST OF TABLES.....</b>                  | <b>xiii</b> |
| <b>LIST OF FIGURES.....</b>                 | <b>xv</b>   |
| <b>LIST OF PHOTOS.....</b>                  | <b>xvi</b>  |

|  | <u>Page</u> |
|--|-------------|
| <b>CHAPTER 1</b>                                     |             |
| <b>INTRODUCTION REVIEW</b>                           | <b>1</b>    |
| <b>1.1 HISTORICAL BACKGROUND</b>                     | <b>1</b>    |
| <b>1.2 PERSPECTIVE ON SMALL-SCALE FARMERS</b>        | <b>1</b>    |
| <b>1.3 HUMAN NEEDS AND ASPIRATIONS</b>               | <b>5</b>    |
| <b>1.4 COMMUNITY PARTICIPATION</b>                   | <b>7</b>    |
| <b>1.5 EMPOWERMENT AND ENVIRONMENTAL EDUCATION</b>   | <b>7</b>    |
| <b>1.6 BACKGROUND OF THE STUDY AREA</b>              | <b>8</b>    |
| <b>1.6.1 Introduction</b>                            | <b>8</b>    |
| <b>1.6.2 Geographical location of the study area</b> | <b>9</b>    |
| <b>1.6.3 Climate</b>                                 | <b>11</b>   |
| <b>1.6.4 Agricultural sector</b>                     | <b>14</b>   |
| <b>1.6.4.1 Grazing conditions</b>                    | <b>16</b>   |
| <b>1.6.4.2 External agricultural infrastructure</b>  | <b>19</b>   |
| <b>1.7 OBJECTIVES OF THE STUDY</b>                   | <b>20</b>   |
| <b>1.8 STRUCTURE OF THE REPORT</b>                   | <b>21</b>   |

|   |           |
|---|-----------|
| <b>CHAPTER 2</b>  |           |
| <b>LITERATURE REVIEW</b>  | <b>22</b> |
| <b>2.1 PERSPECTIVE ON COMMUNAL GRAZING SYSTEMS</b>                            | <b>22</b> |
| <b>2.2 LIVESTOCK OWNERSHIP</b>  | <b>25</b> |
| 2.2.1 The role of livestock   | 26        |
| 2.2.2 Management of grazing systems   | 28        |
| <b>2.3 MANAGEMENT OF NATURAL RESOURCES</b>                                    | <b>31</b> |
| 2.3.1 Perspective on modern approach to grazing systems and natural resources | 33        |
| 2.3.2 Livestock grazing systems and the environment                           | 37        |
| 2.3.3 Environmental challenges  | 38        |
| <b>2.4 SUSTAINABLE RESOURCE USE AND IMPACT MANAGEMENT</b>                     | <b>39</b> |
| 2.4.1 Land degradation  | 39        |
| <b>2.5 MANAGEMENT OF COMMUNAL GRAZING SYSTEMS</b>                             | <b>42</b> |
| 2.5.1 Grazing systems   | 42        |
| 2.5.2 Grazing systems in the semi-arid and sub-humid tropics                  | 43        |
| 2.5.3 Types of grazing systems  | 43        |
| <b>2.6 VELD BURNING</b>   | <b>44</b> |
| <b>2.7 WATER SOURCES</b>  | <b>45</b> |
| 2.7.1 Providing water for grazing systems                                     | 46        |
| 2.7.2 Sources of water  | 48        |
| <b>2.8 PERSPECTIVE REGARDING THE MONITORING OF COMMUNAL GRAZING AREAS</b>     | <b>49</b> |
| 2.8.1 Monitoring communal grazing areas in Southern Africa                    | 49        |
| 2.8.2 Monitoring communal grazing areas in African Countries                  | 50        |
| 2.8.3 Monitoring of communal grazing areas in Lesotho                         | 52        |
| 2.8.4 Monitoring of communal grazing areas in Zimbabwe                        | 55        |
| 2.8.5 Monitoring of communal grazing areas in Swaziland                       | 59        |
| <b>2.9 CONCLUSION</b>   | <b>59</b> |

|  |           |
|--|-----------|
| <b>CHAPTER 3</b>   |           |
| <b>RESEARCH METHODOLOGY</b>  | <b>63</b> |
| <b>3.1 INTRODUCTION</b>  | <b>63</b> |
| <b>3.1.1 Measuring instruments</b>                                 | <b>65</b> |
| <b>3.1.2 Sampling methods</b>                                      | <b>66</b> |
| <b>3.1.3 Selection of indicators</b>                               | <b>67</b> |
| <b>3.1.3.1 Continuous indicators</b>                               | <b>67</b> |
| <b>3.1.3.2 Categorical indicators</b>                              | <b>68</b> |
| <b>3.1.4 Data collection</b>                                       | <b>68</b> |
| <b>3.1.5 Data capturing</b>  | <b>69</b> |
| <b>3.1.6 Vegetation</b>  | <b>70</b> |
| <b>3.1.7 Data analysis</b>   | <b>73</b> |
| <b>3.1.8 Statistical analysis</b>                                  | <b>73</b> |
| <b>3.2 CONCLUSIONS</b>   | <b>74</b> |
| <br>   |           |
| <b>CHAPTER 4</b>   |           |
| <b>RESULTS AND DISCUSSION</b>                                      | <b>75</b> |
| <br>   |           |
| <b>4.1 INTRODUCTION</b>  | <b>75</b> |
| <b>4.2 GENERAL PROFILE OF RESPONDENTS</b>                          | <b>76</b> |
| <b>4.2.1 Status of male-and female-headed households</b>           | <b>76</b> |
| <b>4.2.2 The age of farmers and distribution of family members</b> | <b>77</b> |
| <b>4.2.3 Competence of respondents</b>                             | <b>79</b> |
| <b>4.2.3.1 Farming experience</b>                                  | <b>79</b> |
| <b>4.2.3.2 Skills, capabilities and education</b>                  | <b>81</b> |
| <b>4.3 ACCESS TO LAND IN THE FREE STATE</b>                        | <b>83</b> |
| <b>4.3.1 Introduction</b>  | <b>83</b> |
| <b>4.3.2 Methods of allocation</b>                                 | <b>84</b> |
| <b>4.3.3 Commonage land usage</b>                                  | <b>87</b> |

|            |   |            |
|------------|---|------------|
| <b>4.4</b> | <b>MANAGEMENT OF COMMUNAL AND COMMONAGE AREAS</b>                     | <b>88</b>  |
| 4.4.1      | Introduction  | 88         |
| 4.4.2      | Grazing land management and utilisation                               | 91         |
| 4.4.2.1    | Types of grass species  | 92         |
| <b>4.5</b> | <b>THE FARMING SYSTEMS ON COMMONAGE AREAS</b>                         | <b>94</b>  |
| 4.5.1      | Introduction  | 94         |
| 4.5.2      | Livestock composition, ownership, role and management                 | 95         |
| 4.5.2.1    | Composition and ownership of livestock breeds                         | 97         |
| 4.5.2.2    | Large stock ownership and usage                                       | 99         |
| 4.5.2.3    | Small-stock ownership and usage                                       | 101        |
| 4.5.3      | Perception of livestock condition in winter and summer months         | 103        |
| 4.5.4      | Record-keeping  | 104        |
| <b>4.6</b> | <b>AVAILABILITY OF INFRASTRUCTURE AND FACILITIES</b>                  | <b>105</b> |
| 4.6.1      | Introduction  | 105        |
| 4.6.2      | Water sources   | 106        |
| 4.6.3      | Perceived problems identified by the farmers                          | 109        |
| 4.6.4      | Management of animal diseases on communal and commonage grazing areas | 111        |
| <b>4.7</b> | <b>FARMERS' NEEDS AND ASPIRATIONS</b>                                 | <b>114</b> |
| 4.7.1      | Introduction  | 114        |
| 4.7.2      | Farmers' future needs and aspirations                                 | 114        |
| 4.7.3      | Agricultural training needs and extension service                     | 117        |
| 4.7.4      | Farmers' opinions regarding the management of commonage land          | 119        |
| 4.7.5      | Preference regarding different roles, responsibilities and management | 120        |
| 4.7.5.1    | The role of the government  | 120        |
| 4.7.5.2    | The role of other farmers and neighbours                              | 122        |
| 4.7.6      | Level of success  | 123        |
| 4.7.7      | Conclusion  | 125        |

|  |            |
|--|------------|
| <b>CHAPTER 5</b>   |            |
| <b>SUMMARY, CONCLUSIONS AND RECOMMENDATIONS</b>                                  | <b>127</b> |
| <b>5.1 SUMMARY</b>   | <b>127</b> |
| <b>5.2 CONCLUSIONS</b>   | <b>128</b> |
| <b>5.2.1 General profile</b>   | <b>128</b> |
| <b>5.2.2 Access to land in the Free State</b>                                    | <b>129</b> |
| <b>5.2.3 Management of communal grazing areas</b>                                | <b>130</b> |
| <b>5.2.4 The core farming activities on commonage areas</b>                      | <b>131</b> |
| <b>5.2.5 Availability of infrastructure and facilities</b>                       | <b>133</b> |
| <b>5.2.6 Farmers' needs and aspirations</b>                                      | <b>135</b> |
| <b>5.3 RECOMMENDATIONS</b>   | <b>137</b> |
| <b>5.3.1 Strategic proposals</b>   | <b>137</b> |
| <b>5.3.1.1 General profile</b>   | <b>137</b> |
| <b>5.3.1.2 Access to land in the Free State</b>                                  | <b>138</b> |
| <b>5.3.1.3 Management of communal grazing areas</b>                              | <b>140</b> |
| <b>5.3.1.4 The core farming activities in commonage areas</b>                    | <b>141</b> |
| <b>5.3.1.5 Availability of infrastructure and facilities</b>                     | <b>143</b> |
| <b>5.3.1.6 Farmers' needs and aspirations</b>                                    | <b>145</b> |
| <b>5.3.2 Policy issues</b>   | <b>152</b> |
| <b>5.3.3 Integration of environmental planning into communal grazing systems</b> | <b>159</b> |
| <b>5.3.4 Further research</b>  | <b>162</b> |
| <b>REFERENCES</b>  | <b>165</b> |

**ANNEXURES:**

**ANNEXURE A: QUESTIONNAIRE ON INTEGRATION OF ENVIRONMENTAL  
PLANNING INTO COMMUNAL GRAZING SYSTEMS IN THE  
FREE STATE**

**ANNEXURE B: CODE LIST**

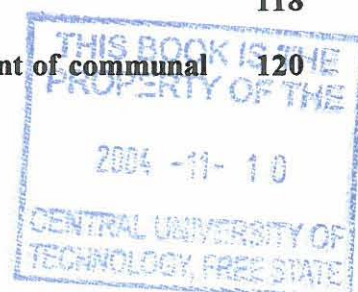
**ANNEXURE C: MODELS USED IN THIS STUDY**

**ANNEXURE D: ENVIRONMENTAL REQUIREMENTS FOR AGRICULTURAL  
LAND USE**

**ANNEXURE E: COMMUNAL AND COMMONAGE FUNCTIONALITY  
ASSESSMENT**

## LIST OF TABLES

|   | <u>Page</u> |
|---|-------------|
| <b>Table 1.1: Composition and size of District Management Areas</b>   | <b>10</b>   |
| <b>Table 1.2: Population distribution per district area</b>   | <b>11</b>   |
| <b>Table 3.3: Agricultural contribution in the five district areas to Gross Geographic Product (R '000)</b>     | <b>15</b>   |
| <b>Table 2.1: A general guideline for the daily water requirements of grazing animals</b>                       | <b>47</b>   |
| <b>Table 2.2: Communal rangeland and livestock ownership in Zimbabwe</b>  | <b>58</b>   |
| <b>Table 3.1: The sample size and percentage of farmers involved in interviews</b>                              | <b>66</b>   |
| <b>Table 4.1: Age structure of the farmers in the sample</b>  | <b>78</b>   |
| <b>Table 4.2: Number of dependants per respondent</b>   | <b>78</b>   |
| <b>Table 4.3: Educational qualification by age of respondents</b>   | <b>82</b>   |
| <b>Table 4.4: Farming options according to allocation of land to respondents</b>                                | <b>85</b>   |
| <b>Table 4.5: Farming options according to allocation of land to respondents</b>                                | <b>86</b>   |
| <b>Table 4.6: Other means of generating income on communal areas</b>  | <b>87</b>   |
| <b>Table 4.7: Steps in the process of establishing committees to manage the communal areas</b>                  | <b>90</b>   |
| <b>Table 4.8: Preferred livestock enterprise among farmers</b>  | <b>98</b>   |
| <b>Table 4.9: Different methods used to keep records</b>  | <b>105</b>  |
| <b>Table 4.10: Different sources of water available to respondents</b>  | <b>107</b>  |
| <b>Table 4.11: Disease control and health management programmes identified by large-and small-stock farmers</b> | <b>112</b>  |
| <b>Table 4.12: Commonage farmers' most important long-term needs/aspirations</b>                                | <b>117</b>  |
| <b>Table 4.13: Agricultural training needs</b>  | <b>118</b>  |
| <b>Table 4.14: Farmers' opinions regarding the management of communal grazing areas</b>                         | <b>120</b>  |



|  |            |
|--|------------|
| <b>Table 4.15: The role of the government as seen by the respondents with regard to their projects</b> | <b>121</b> |
| <b>Table 5.1: Model for establishment of an integrated communal grazing system</b>                     | <b>161</b> |

## LIST OF FIGURES

|   | <u>Page</u> |
|---|-------------|
| <b>Figure 1.1:</b> A model for sustainable livelihoods  | 6           |
| <b>Figure 1.2:</b> Map showing District Municipality areas in the Free State province, and the sample areas   | 9           |
| <b>Figure 1.3:</b> Average Annual Daily Temperatures in the Free State  | 12          |
| <b>Figure 1.4:</b> Average Annual Rainfall in the Free State  | 13          |
| <b>Figure 1.5:</b> Map showing the distribution of the grazing areas  | 18          |
| <b>Figure 2.1:</b> Flowchart indicating the environmental interventions, methods, tools and checklists for ensuring sustainability in the State land disposal process | 25          |
| <b>Figure 2.2:</b> Procedure for adaptive management in preventing veld degradation   | 41          |
| <b>Figure 3.1:</b> Participatory mapping  | 64          |
| <b>Figure 3.2:</b> An example of a transect walk while identifying grass species  | 71          |
| <b>Figure 3.3:</b> Terrain units where grass species were collected   | 72          |
| <b>Figure 4.1:</b> Distribution of male, women and children headed households   | 76          |
| <b>Figure 4.2:</b> Number of years respondents have spent farming on the land   | 80          |
| <b>Figure 4.3:</b> Exposure of farmers to schooling   | 81          |
| <b>Figure 4.4:</b> Allocation of land in the Free State to respondents  | 84          |
| <b>Figure 4.5:</b> Distribution of grass species in selected grazing areas of the Free State  | 92          |
| <b>Figure 4.6:</b> Breeding management  | 97          |
| <b>Figure 4.7:</b> Livestock condition in the winter and summer months  | 103         |
| <b>Figure 4.8:</b> Farmers' perceptions of their own level of success   | 124         |

## LIST OF PHOTOS

|  | <u>Page</u> |
|--|-------------|
| <b>Photo 1:</b> Identification of grass species on communal grazing areas using a transect walk                        | 94          |
| <b>Photo 2:</b> Calves are separated from cows during the day  | 96          |
| <b>Photo 3:</b> Example of how cows are hand-milked in community kraals  | 99          |
| <b>Photo 4:</b> Natural grazing in good condition is the cheapest form of food for grazers                             | 100         |
| <b>Photo 5:</b> Small livestock flock to a kraal each night and are herded during the day                              | 101         |
| <b>Photo 6:</b> Example of an electrical pump used to pump water from a dam for irrigation                             | 108         |
| <b>Photo 7:</b> Backyard kraal and forage stores   | 110         |
| <b>Photo 8:</b> An example of a modern community kraal   | 111         |
| <b>Photo 9:</b> Example of sheep with sheep scab and a newly erected small-stock dipping tank on communal grazing land | 113         |
| <b>Photo 10:</b> Grassland is burned annually in communal areas during the winter months                               | 116         |

# CHAPTER 1

## INTRODUCTION

### 1.1 HISTORICAL BACKGROUND

The pre-1994 government policy of separate development has created development challenges, especially in the previous homelands of Qwaqwa, Kwandebile, Ka-Ngwane, KwaZulu, Lebowa and the TBVC states (Transkei, Bophuthatswana, Venda, Ciskei). The present challenge is to meet the needs and aspirations of an expanding and developing population. The most basic of these requirements is gainful employment. Scogings, De Bruyn and Vetter (1999) reported that many of the people who live in these areas, depend on natural resources for their livelihoods. The homeland areas have a limited natural resource base. It is important that the limited available resources be fully utilised to produce food, create employment opportunities and contribute towards the country's economy. The needs and aspirations of people could be met through the development of sustainable livelihoods, taking into account the available natural, physical, social, financial and human resources. Most of the rural farmers on communal grazing areas in African countries desire to improve their standard of living (Mukhala, 1999). Farmers on communal grazing areas would also like to make a profit, generate income, increase well-being, and improve food security and the sustainability of environmental resources.

Policy-makers generally ignore local capacity for resource management, and rarely make use of local ecological knowledge (Scoones, 1994). Local knowledge is based on intimate interaction with the environment, and on observation. Local knowledge of local conditions is frequently more accurate than the information available to planners. Policy and legislation have, however, made this knowledge redundant. Ecological holism is not a new concept for rural African people. It is simply a concept that their circumstances have not allowed them to apply (Mutisi & Topps, 1995).

The general perception is that grasslands in the independent and self-governing states are generally poorly managed, and consequently overgrazed. This overgrazing is believed to be a direct contributor to the high levels of soil erosion. Possibly of even greater significance is the belief that the productivity and resilience of these grasslands are being irreparably damaged, and it is envisaged that ultimately these grasslands will be but a shadow of their former condition - little more than wastelands (Shackleton, 1993).

## 1.2 PERSPECTIVE ON SMALL-SCALE FARMERS

There are several definitions of small-scale farmers, for example:

Van der Mey (1995) defines a "small-scale" farmer in the new dispensation as "anyone who uses cattle and agricultural resources to derive all or part of their livelihood from cattle." This definition recognises the farming community and its environment as a continuum or a spectrum.

Kirsten & Van Zyl (1998) regard "small-scale farming" in South Africa as often equated with a backyard, non-productive, non-commercial, subsistence type of agriculture that is found in the former homeland areas. It is generally associated with black farmers, creating the perception that black farmers do not have the ability to become large-scale commercial farmers.

According to Kotsokoane (1999), small-scale or smallholder agriculture in Africa has characteristic features that distinguish it from large-scale agriculture. In general, smallholder agriculture, which is not homogeneous, is a low-input and low-output system with wide social dimensions impacting positively or negatively on productivity. Paradoxically, however, small-scale agriculture is the linchpin of rural development in many African communities.

Although there are several definitions of small-scale farmers, a more recent definition groups South African small-scale farmers, mainly according to income, in the following categories:

1. Established commercial farmers, mainly white, with farming as the sole or substantial means of livelihood. Mainly full-time under leasehold or freehold tenure, with good resources.
2. Producers with limited resources, falling into the following subcategories:
  - ◆ Pre-commercial (step-up progressive), with a reasonable income from farming. Mainly black and with limited resources, and under communal, leasehold or freehold tenure. Willing to learn improved farming techniques.
  - ◆ Semi-commercial (step-up), and not earning enough from farming to give up other employment. Severely resource-limited and on communal or other tenure arrangements, including sharecropping.
  - ◆ Subcommercial (subsistence), with a negligible surplus for sale or storage. Extremely small parcels of land under communal tenure, including sharecropping. Land often lies fallow through lack of resources (finance, power, equipment, input and information). Upward mobility is restricted (Dillon, 1998; Kirsten & Van Zyl, 1998 and Kotsokoane, 1999).

Small-scale farmers constitute the bulk of the world's farmers. Small-scale farmers operate in a context of increasing local population pressure, with a very small resource base and a chronically low standard of living (Sirur & Van den Brink, 1995). Small-scale farmers live in the margin rather than in the mainstream of society in terms of political influence and the provision of health, education and other services, and usually live in absolute poverty (Dillon & Hardaker, 1993).

From the available definitions it seems that most farmers, whether small-scale or not, have limited access to land and capital, and have received inadequate or inappropriate research and extension support in the past. For small-scale farmers to be successful, they should be equipped with good management practices, technical skills and comprehensive financial, management and

extension support. Supporting the needs of these new entrants is important, and in accordance with the policy of the Provincial and National Department of Agriculture. An appropriate definition of small-scale farmers may enable the government to implement various support measures for black farmers, which would improve their access to resources and would also redress the inequalities created by past apartheid policies. The problem is that black farmers are not a homogeneous group and not all of them can be defined as small-scale farmers, whether 'small' refers to land size, income or labour utilisation (Ministry for Agriculture and Land Affairs, 1998).

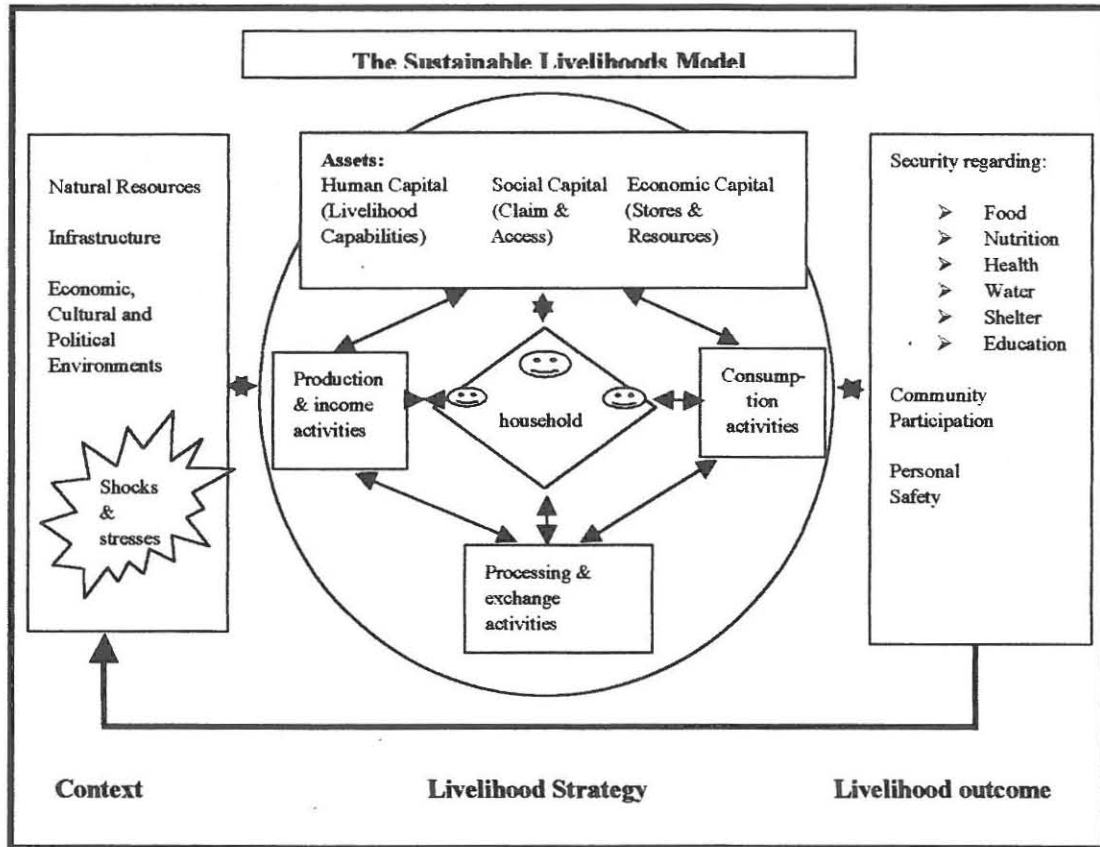
Smallholder type farming played a significant role in the supply of food to the diamond and gold mines at the end of the previous century (Van Rooyen & Botha, 1994). The Tomlinson Commission in the 1950s was the first to seriously promote the concept of small-scale farming as a development strategy. The small-scale farming approach advocated by Tomlinson was based on the observation that agriculture in "traditional black areas" had the potential to produce surplus agricultural commodities, and to create the basis for economic development in the country. The concept of small-scale farming has been promoted, *inter alia*, by the Department of Development Aid (in its various forms) since the late fifties (Van Rooyen & Botha, 1994). Van Rooyen and Botha (1994) state that Tomlinson's vision also promoted the concept of "economic unit" farm sizes, which made it possible for farmers to produce a reasonable income that would enable them to make a living through full-time farming.

Small-scale agrarian structure and relatively equitable land distribution is an important asset, both for agricultural growth and as a social safety net. Despite what is often asserted, small-scale farming is no less efficient than large-scale farming. Decades of international agricultural research have failed to demonstrate economies of scale beyond what a family can manage comfortably on its own. The most productive agricultural sectors in the world are dominated by small-scale, part-time family farming. The small-to-average farm size should therefore be seen as an asset, not as an impediment to future agricultural growth. The secure right to land is one of the most important social safety nets imaginable (Sirur & Van den Brink, 1995).

### 1.3 HUMAN NEEDS AND ASPIRATIONS

Brundtland, Khalid and Agnelli (1986) reported that the fulfilment of human needs and aspirations is the major objective of both developing and developed countries. Sustainable development requires meeting the basic needs of all (Figure 1.1) and extending to all the opportunity to attain their dreams for a better life. Carney (1998) explains that a livelihood comprises the capabilities, assets (both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets, both now and in the future, while not undermining the natural resource base. Scogings *et al.* (1999) believe that, in order to achieve sustainable agriculture in the communal grazing areas, land use must be ecologically sound, economically viable, socially acceptable and politically supported. Sustainable agricultural production and the conservation of natural resources should be emphasised in the agricultural policies of South Africa.





**Figure 1.1** A model for sustainable livelihoods (Carney, 1998; Drinkwater & Frankenberger, 1999).

The basic needs for food, clothing, shelter and jobs are not being met, but beyond their basic needs, these people have legitimate aspirations for an improved quality of life.

#### 1.4 COMMUNITY PARTICIPATION

Clear and basic tenure rights and responsibilities with regard to shared natural resources at the lowest level of community organisation, combined with incentives focused on that proprietorial group, are required. South African legislation should comprehensively recognise customary community land rights at village and ward levels, linked to the statutory

authorities at district level. Uphoff (1986), Ivy (1992), Carney (1998), Adams, Cousins, and Manona (1999) and Scogings *et al.* (1999) are seemingly of the opinion that this would address the discrepancy between the CAMPFIRE policy, which is aimed at empowering communities, and the law, which effectively empowers local authorities. It would also provide the much-needed enabling framework within which all environmental regulatory legislation could operate. Authority over the "bundle" of tenure rights would be clear, and access to tenure resource use niches could be legitimately negotiated. The complex relationship between communities, the government, the natural resources base and the economic market is being addressed in an ongoing policy reform process. It still has a long way to go. Formulating a good policy is easier than implementing it, but at least it is a very positive start. CAMPFIRE is more than a community-based wildlife marketing project. It is a central part of the evolution of sustainable community-based natural resource property regimes: institutions with clear resource entitlements and internalised cost/benefit management decision-making at ecological and economic levels.

## 1.5 EMPOWERMENT AND ENVIRONMENTAL EDUCATION

Ivy (1992), Carney (1998), Adams *et al.* (1999) and Scogings *et al.* (1999) seem to agree that a continuing need exists for people formally educated in range management to play a major role in decisions regarding the management of rangelands. Society promotes education to develop expertise regarding human needs and the utilisation of natural resources in the climate-soil-plant-animal complex.

This study examined the need for integrating environmental planning into the communal grazing systems in the Free State, with particular reference to the demonstration project in the Eastern Free State, where land reform beneficiaries are settled. By means of this project, rural villagers practising communal grazing in the Free State province seek to build their capacity in the management of their local resource base. The research was undertaken in response to the farmers' own interpretation of, and priorities for, their farming activities.

The holistic approach adopted in this research attempts to identify the main constraints farmers have to contend with, as well as the promising opportunities open to farmers on commonage grazing areas.

This study will build upon farmers' own definitions of these constraints and opportunities. The research attempts to gain a realistic understanding of the underlying structure of farming on commonage grazing areas, and how environmental planning can be adjusted to this structure to produce more beneficial outcomes. It also attempts to reflect the activities, needs and constraints of communal grazing areas, and to provide planners, implementers and policy-makers with up-to-date information on commonage farming. The study will outline some of the regulations stipulated in the Conservation of Agricultural Resources Act, No. 43 of 1983, and the National Veld and Forest Fire Act, No. 101 of 1998. The last-mentioned Act provides for the control, management and prevention of mountain, forest and veld fires, while enabling Fire Control Committees to be more effective and providing training and support to rural communities regarding the management and control of veld fires.

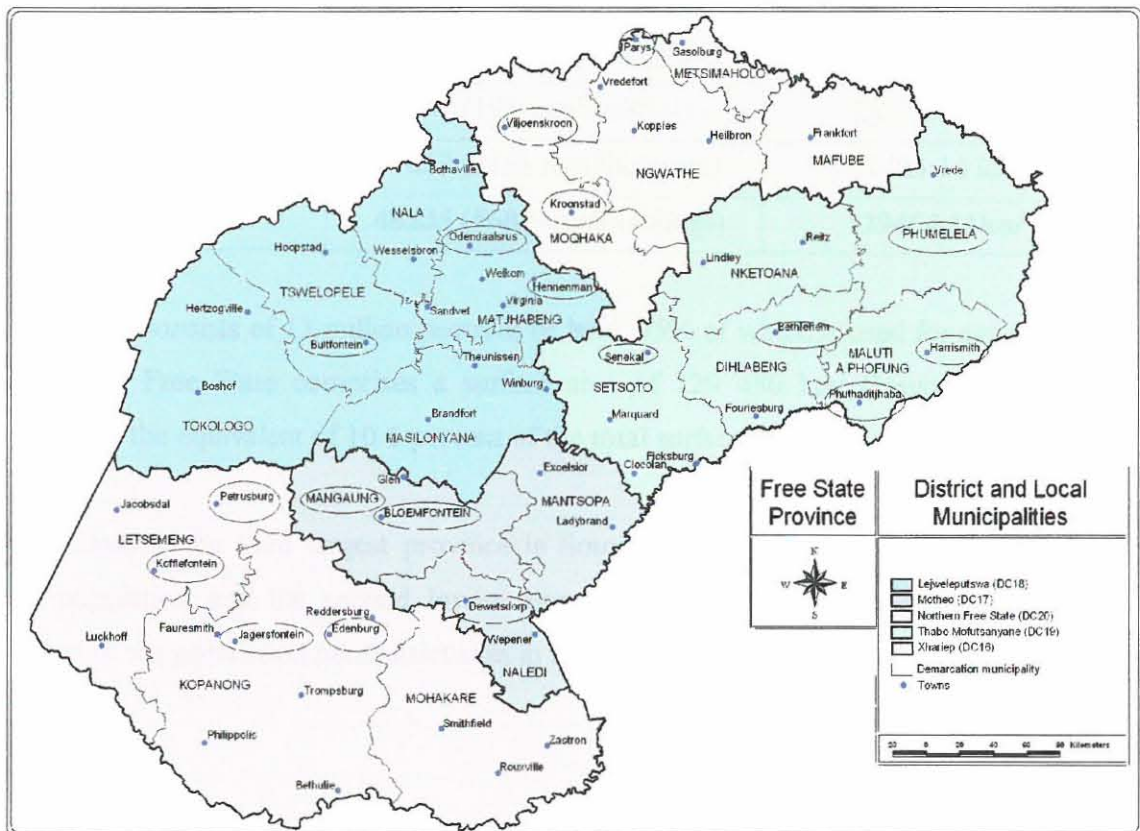
## **1.6 BACKGROUND OF THE STUDY AREA**

### **1.6.1 Introduction**

The study area's topography is characterised by its mountainous landscape. This relates to the geology of the area, with the Drakensberg range to the south as the most prominent relief aspect. Well-defined drainage patterns have also been established through erosion. These drainage patterns mainly run in a northerly direction, and many rivers or streams originate within the study area. This area falls within the catchment area of the Vaal River and there are no major water schemes within the Qwaqwa area, except for the Fika Patso and the Metsi-matsho dams. The dominating characteristic of the topography is an uneven landscape with complex drainage systems. Large parts of the area are inhabitable and fall within flood line areas. The Lesotho Highlands, which form the southern boundary of the area, have a definite influence on both the climate and the drainage pattern (Free State Department of Agriculture, 1998).

### 1.6.2 Geographical location of the study area

This study was conducted in the Free State province. The province consists of five District Municipal areas, namely Xhariep, Motheo, Lejweleputswa, Thabo Mofutsanyane and the Northern Free State, as shown in Figure 1.2. The study covers a research area comprising 14 villages and 21 small towns (circled in Figure 1.2) all over the Free State province. Although only the major towns are shown, local municipalities with villages and small towns not appearing in Figure 1.2 are marked. Research was conducted in the 35 areas where commonage has a central role to play regarding the economic development of the local small town or village.



**Figure 1.2** Map showing District Municipality areas in the Free State province, and the sample areas (Free State Department of Agriculture, 2003)

All the data in this figure was abstracted from the Demarcation Board 2001, Surveyor General, and compiled by the Farming Information Section, Department of Agriculture, Free State province. The size of the districts (in square km) as well as the location of the farms, are indicated in Table 1.1.

**Table 1.1**      **Composition and size of District Management Areas (Free State Development Plan, 2001)**

| <b>District Area</b> | <b>Number of Farms</b>            | <b>Area in km<sup>2</sup></b>  |
|----------------------|-----------------------------------|--------------------------------|
| Xhariep              | 7429 (197 smallholdings)          | 34131.55 km <sup>2</sup>       |
| Motheo               | 6403 (2924 smallholdings)         | 13950.18 km <sup>2</sup>       |
| Lejweleputswa        | 11137 (99 smallholdings)          | 31686.38 km <sup>2</sup>       |
| Thabo Mofutsanyane   | 12234 (196 smallholdings)         | 28272.86 km <sup>2</sup>       |
| Northern Free State  | 11032 (2191 smallholdings)        | 21423.14 km <sup>2</sup>       |
| <b>Total</b>         | <b>48235 (5607 smallholdings)</b> | <b>129464.11km<sup>2</sup></b> |

The Free State consists of 13 million hectares of land, 95% of which is used for agricultural purposes. The Free State comprises a surface area of 129 480 km<sup>2</sup> (Heyns, 1996). Its surface area is the equivalent of 10.6 percent of the total surface area of the country.

The Free State is the third largest province in South Africa. However, it has the second smallest population and the second lowest population density. Table 1.2 illustrates the distribution of the population per district area in the Free State.

**Table 1.2 Population distribution per district area (Free State Development Plan, 2001)**

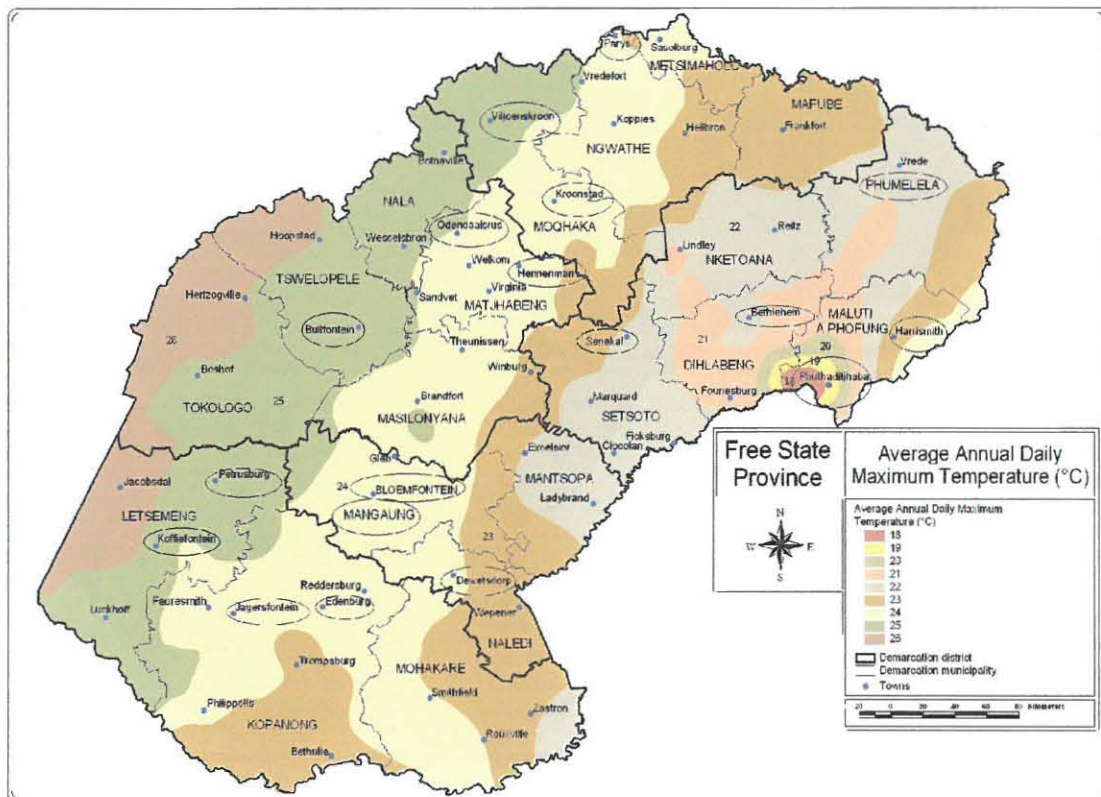
| District area        | Urban         | Rural         | Total         | Population Density (km <sup>2</sup> ) |
|----------------------|---------------|---------------|---------------|---------------------------------------|
| Xhariep              | 90679         | 37830         | 128509        | 3.77                                  |
| Motheo               | 662463        | 71991         | 734454        | 52.65                                 |
| Lejweleputswa        | 559520        | 181421        | 740941        | 23.38                                 |
| Thabo Mofutsanyana   | 310601        | 417804        | 728405        | 25.76                                 |
| Northern Free State  | 372458        | 100460        | 472918        | 22.08                                 |
| <b>Total/Average</b> | <b>399144</b> | <b>161901</b> | <b>561045</b> | <b>25.53</b>                          |

According to the statistics of the 1994 census, the Free State houses 2.8 million people on 129 480 km<sup>2</sup> of land. Of the population, 55.9% live in towns and cities. The main languages spoken are Sesotho and Afrikaans (Ntsane, 1999). Qwaqwa is one of the few rural areas that shows a resemblance to an urban area. Influx has been experienced since 1994, although the urbanisation rate might have decreased in recent years due to fewer job opportunities in the area. However, the unemployment rate for this area is still estimated at 42% (Van Zyl, 1998). Table 1.2 illustrates the population distribution within the newly established local municipality and district boundaries in the Free State province according to the most recent census, conducted in 2001.

### 1.6.3 Climate

Climatological extremes are largely responsible for the combined farming practices in the eastern, northern and northwestern parts of the Free State. The average maximum summer temperature is around 26°C, with the minimum winter temperature between -3°C and -6°C. Snow also occurs during the winter months. Research has shown that the climate in the North-Eastern Free State is not regarded as an obstacle to any agricultural or industrial development. This area has a flourishing industrial sector and exceptionally good agricultural potential. There are no prominent prevailing winds in the region, but katabatic and anabatic flows from the higher-lying Lesotho area may be present, causing a temperature drop which may be aggravated when snow has fallen on the Drakensberg mountains. The latest statistics

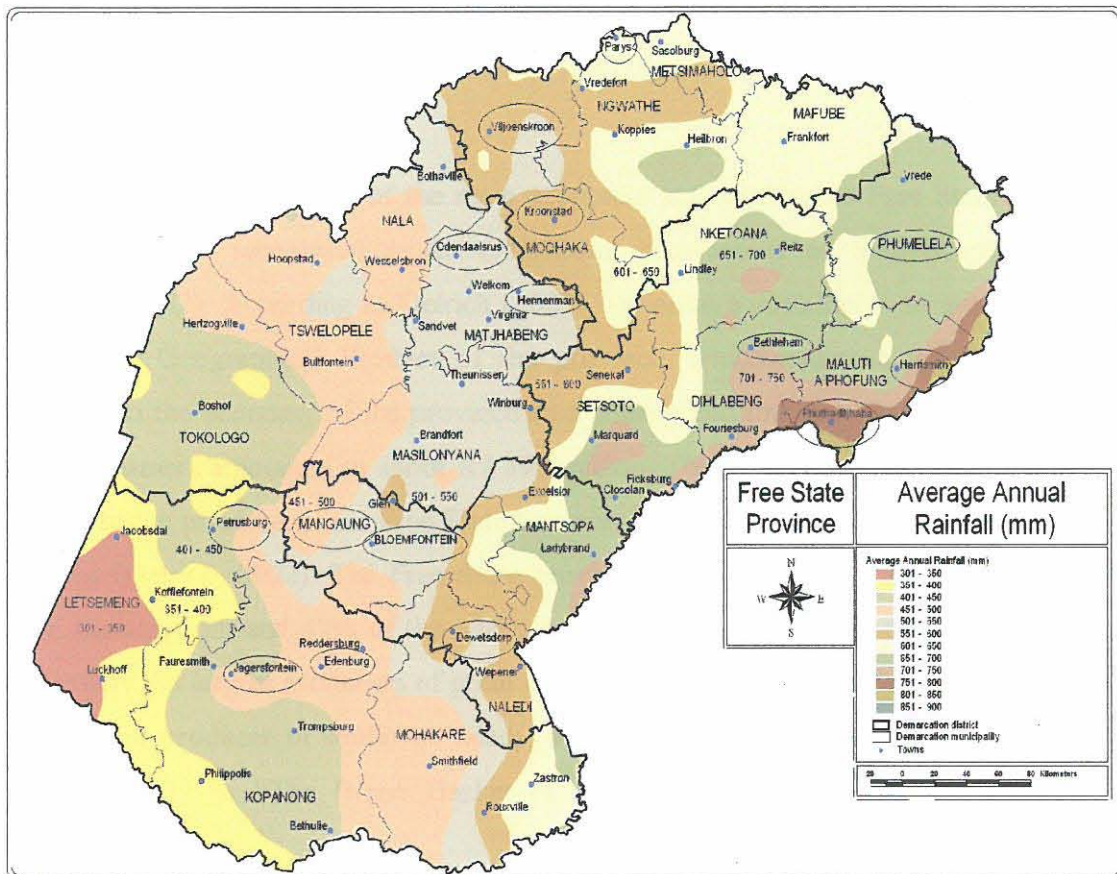
regarding the direction and speed of winds in Qwaqwa, as supplied by the Weather Bureau Office of the Department of Environmental Affairs, show that the highest average speed is 4.3 metres per second. The highest direction frequency (15.7%) is from the west, with an average speed of 4 metres per second (Free State Department of Agriculture, 1998). Since this area lies between 1000m and 2500m above sea level, frost and adverse conditions occur frequently. Hail is also a real danger to production and the quality of produce. Figure 1.3 illustrates the average annual daily maximum temperature of the Free State province.



**Figure 1.3** Average Annual Daily Temperatures in the Free State (Free State Department of Agriculture, 2003)

All available climate data in this figure was extracted from the “Spatial Climate Statistics for Free State province of South Africa” by Enviro Vision CC, March 2003. The macroclimate of the study area is determined by large-scale factors such as mountain ranges, altitude, distance from the sea and latitude. Microscale climate is determined by more localised factors such as slope, aspect, soil colour, soil texture, vegetation type and height. Because of

the relatively high rainfall and leached soil of the southern and eastern parts of the Free State (the Zastron, Wepener, and Thaba Nchu magisterial districts) the subtype of veld occurring in the area is relatively sour (Claassen, 1999). Figure 1.4 illustrates the average annual rainfall of the Free State province.



**Figure 1.4** Average Annual Rainfall in the Free State (Free State Department of Agriculture, 2003)

All available climate data in this figure was extracted from the “Spatial Climate Statistics for Free State province of South Africa” by Enviro Vision CC, March 2003. The annual rainfall of the province varies from 300 mm in the west to as much as 900 mm in the east. The topography varies from a level or rolling landscape in the west to relatively mountainous areas in the east, with undulating plains in the central areas and flat plains in the west. Soil

depth varies throughout the province, from less than 300 mm to more than 1500 mm. The Free State is subject to a variable climate with high extremes, restricting sustainable production to a great extent. Rainfall is the most restricting factor for dry land production. The year-to-year variability is very high, with a standard deviation of between 20 and 40% in the annual rainfall totals.

#### **1.6.4 Agricultural sector**

Agricultural production is one of the main economic activities in the Free State province. The Free State is recognised as an agricultural province (Free State Department of Agriculture, 2002). According to Oelrich (2002), agriculture contributes an average of 9% to the Gross Geographical Product of the province, which makes it the third biggest contributor to the economy of the province after mining and tourism. The gross income for Free State farmers amounted to about R7 395 million. This represents an increase of 15,9% compared to the previous years. Free State farmers annually earn about R4 335 million from field crops (Oelrich, 2002). The Free State province contributes about 36% of the maize, 50% of the sorghum and 42% of the wheat in the total RSA production. This makes Free State farmers the largest producers of grain crops in South Africa. The Free State is also the second largest producer of sunflower seed, peanuts and dry beans. Hence, the province is known nationally as “The Bread Basket of the Country” (Free State Department of Agriculture, 2002).

Agricultural contribution in five district areas in the Free State is illustrated in Table 1.3. Overall farming undertakings in the southern and southwestern parts of the province are more extensive, with wool and meat production comprising the main branches. The Free State is one of the major food producers of the country (De Wet, 1995). According to Claassens, Van Rooyen and Van Zyl (1991) "the Free State produces 40% of the maize, 50% of the wheat, 80% of the sorghum, 33% of the potatoes, 28% of the sunflowers, 25% of the dairy products, 15% of the wool and 18% of the red meat, of South Africa".

**Table 1.3** Agricultural contribution in the five district areas to Gross Geographic Product (R '000) (Free State Development Plan, 2001)

| District Area        | Agricultural Contribution | Percentages |
|----------------------|---------------------------|-------------|
| Xhariep              | 212383                    | 7.5         |
| Motheo               | 251618                    | 8.9         |
| Lejweleputswa        | 1030977                   | 36.3        |
| Thabo Mofutsanyana   | 758531                    | 26.7        |
| Northern Free State  | 583662                    | 20.6        |
| <b>Total/Average</b> | <b>2837171</b>            | <b>100</b>  |

According to a survey conducted in 2002 by the Free State Department of Agriculture, the income from livestock production increased by 5.0% for the year 2001. Wool and dairy production are two of the biggest contributors to the income from livestock production. The Free State contributes 23% of the wool and 18% of the dairy products in South Africa. This summer rainfall region can be extremely cold during the winter months, particularly towards the eastern mountainous regions, where temperatures can drop as low as  $-9.5^{\circ}\text{C}$ . The western and southern areas are semi-desert. Known as the 'granary of the country', 31% of the potentially arable land of South Africa is found in the Free State. However, employment in the agricultural sector has been adversely affected by droughts in recent years. The main agricultural product of the northern Free State is maize, while the southern, arid region is sheep country. Dairy farms are found throughout the province. The Ficksburg district produces 90% of the country's cherry crop, and the two largest asparagus factories in the country are also situated in this district. Soya, sorghum, sunflowers and wheat are also cultivated, especially at Bethlehem, where farmers specialise in seed production. About 40% of the country's potato production comes from the high-lying areas of the Free State.

In the Qwaqwa area, individuals are granted crop production land on a traditional basis, whereas grazing rights are allocated and utilised on a communal basis. Agricultural production usually takes place on a small scale. Mainly beef cattle, dairy cattle, sheep, goats, grains such as maize and beans, broiler chickens, eggs, vegetables and fruit are produced.

Farming areas, as indicated in Appendix B, were identified and surveyed, as they have the largest concentration of developing dairy farmers with different farming systems and management practices in the North-Eastern Free State. The ex-homeland areas of Qwaqwa and Thaba-Nchu predominantly practise backyard farming. Mainly grains, broiler chickens, eggs, vegetables and fruit are produced. Stock farming is done with beef cattle, dairy cattle, sheep and goats. Grazing takes place on a communal basis, where good soils and water and the pleasant climate of the North-Eastern Free State stimulate interesting new farming ventures (Claassens *et al.*, 1991).

#### **1.6.4.1 Grazing conditions**

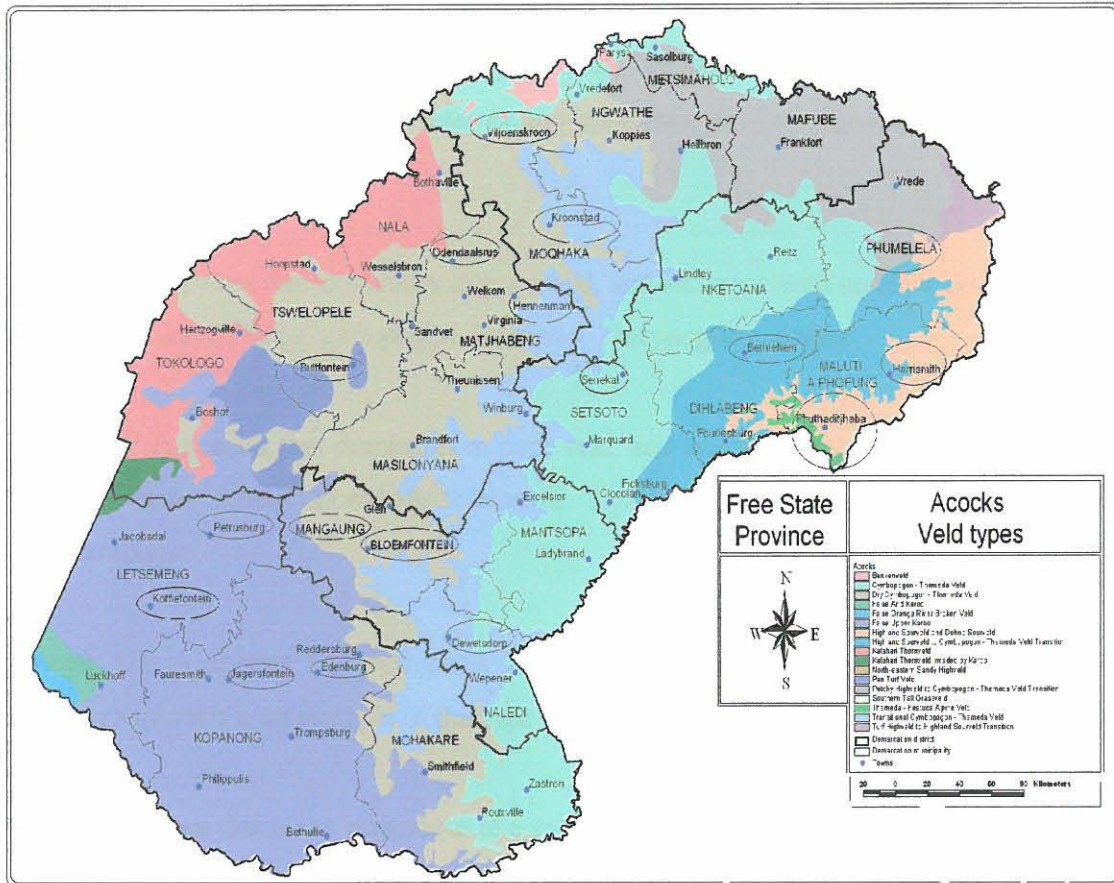
The grazing systems referred to are grazing areas used by the community members, as well as open-access grazing areas. In order to capture a situation where cattle numbers fluctuate in highly variable environments, data were gathered from different communal and commonage grazing areas in the Free State area - in the Eastern Free State, with a mean annual rainfall of 800 mm, the Northern Free State, with a mean annual rainfall of 550 mm, and the Southern Free State, with a mean annual rainfall of 250 mm (Department of Agriculture, Free State, 2002). Grazing destroyed by fire in some district areas is also not showing any sign of regrowth, as a result of insufficient rainfall. The area of below-normal conditions increased to include the entire south-western Free State. The Free State is the centre of the Grassland biome, with the Karoo biome slowly encroaching on its western part.

The Free State is characterised by the palatable climax grass species. Around communal lands, palatable climax species are depleted due to persistent defoliation. Unpalatable pioneer species then replace these grass species, i.e. veld retrogression takes place. The veld has now deteriorated, and this makes soil more prone to erosion and the formation of gullies. Inadequate grazing forces cattle to overstep the boundaries of neighbouring farms. Such cattle are impounded, and this results in social conflict between the two parties (farmers on state land and those on communal lands). As in the tribal areas of, among others, KwaZulu-Natal, the crop production land in Qwaqwa is underutilised, whereas the

grazing is overutilised (Claassen, 1999).

Stocking Rate (SR) is the number of animals per unit area (hectare/camp). SR is the single most important factor of veld management. SR has an effect on animal performance as well as veld condition. Too many animals per unit area will compete for food and will perform poorly, while veld condition will deteriorate. SR should be based on the carrying capacity of the veld (Goqwana, 2000). The stocking rates for cattle on communal and commonage areas were determined by means of personal interviews with the livestock owners. Due to the difficulty of obtaining accurate stocking rate data for the communal areas, the following calculations are estimates from other studies. These estimates were made by calculating the Large Stock Unit (LSU), which is defined as an animal with a mass of 450 kg, gaining 0.5 kg per day on forage, with a digestible energy percentage of 55% (Parsons, 1991). It was therefore difficult to distinguish the effect of potentially different stocking rates in the communal and commonage areas.

Plaas (1999) determined the following six categories for the grazing value of grass species: very low, low, average, high, very high and varying. The factors that determine grazing value are leaf production ability, palatability, nutritional value, growth, digestibility, perenniality and habitat preference. The distribution of grass species in the Free State, where the research was conducted, is illustrated in Figure 1.5.



**Figure 1.5** Map showing the distribution of the grazing areas (Free State Department of Agriculture, 2003)

All data in this figure was abstracted from *Veld Types of South Africa*, compiled by the Farming Information Section, Department of Agriculture, Free State Province. Ecological status included the classification of grasses and forbs into groups on the basis of their reaction to grazing (Holden, 1995) and their distribution in the Free State. Figure 1.5 shows the main areas where research was conducted. Grasses generally react to grazing in two ways: they either decrease or increase in abundance. Grasses are classified according to their response to grazing intensity, using the plant succession concept. According to this classification, all grasses and forbs can be further grouped into the following categories (Harrison, 1993; Mackay, 1994; Holden, 1995; Jordaan, 1997; Hurt, 1998 & Plaas, 1999):

**Decreaser:** A species that dominates in good veld, but decreases when veld is mismanaged. Examples are *Themeda triandra*, *Heteropogon contortus*, *Melinis nervilume*, *Diheteropogon amplectens*.

**Increaser I:** A species that dominates in poor veld, and increases with understocking. Examples are *Trystachia leucothrix*, *Cymbopogon excavatus*, *Tracypogon spicatus*.

**Increaser II:** A species that dominates in poor veld, and increases with overgrazing. Examples are *Hyparrhenia hirta*, *Sporobolus africanis*, *Sporobolus pyramidalis*, *Eragrostis curvula*, *Eragrostis plana*.

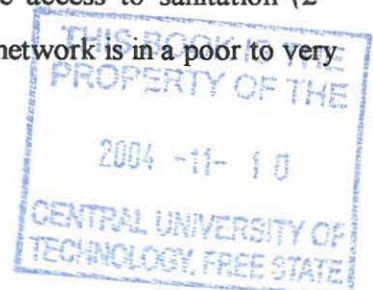
**Increaser III:** A species that dominates in poor veld, and increases with selective grazing. *Aristida junctiformis* is an example of this type of species.

**Invader:** A species that is not indigenous to a species area.

**Others:** Land grasses such as *Setariapallide-fusca*, *Digitaria sanguinalis*, *Eleusine indica*. Turf grasses such as *Paspalum nodatum*, *Pennisetum clandestinum*. Summer pasture grasses such as *Chloris gayana*, *Digitaria eriantha*, *Panicum maximum*, *Bromus uniloids*. Winter pasture grasses such as *Lolium perenne*, *Festuca arundinacea*. Disturbed-site/shallow-soil grasses such as *Melinis repens*, *Eragrostis racemosa*, *Aristida congesta*. Wet-site/drainage-site grasses such as *Imperata cylindrical*, *Paspalum urvillei*, *Acroceras macrum*, *Poa annua*.

#### 1.6.4.2 External agricultural infrastructure

The infrastructure of the Free State can be described as relatively good, since 94% of all households have access to water (3<sup>rd</sup> highest percentage in South Africa), 56.8% have access to electricity (4<sup>th</sup> highest percentage in South Africa), 22.9% have access to landline telephones (6.3% below the national average) and 70.3% have access to sanitation (2<sup>nd</sup> lowest percentage in the country), while 44.2% of the total road network is in a poor to very



poor condition (Free State Development Plan, 2001). In contrast to this, it was evident from the survey that farming infrastructures are poor. It can also be deduced that most communal areas are not in a good condition. A number of factors contribute to this situation in the Free State. From the farmers' point of view, these factors include economic pressures in the agricultural community to maximise production, limited extension activity in communal land management and a perception that there are no economic incentives to maintain good-quality communal land.

## **1.7 OBJECTIVES OF THE STUDY**

The core purpose of this study is to investigate ways in which environmental planning can be integrated into communal grazing systems.

The specific objectives are:

- a) To evaluate the competence level of respondents farming on communal and commonage land in the Free State.
- b) To identify and understand the different methods of allocating land for grazing purposes.
- c) To evaluate and understand the management of grazing areas and the role played by management committees and grazing associations.
- d) To identify and understand the core farming activities and services rendered, and also to assess the efficiency and the efficacy of those activities and services.
- e) To examine the key constraints and opportunities of farmers on communal and commonage grazing areas in the Free State.
- f) To understand the needs and the aspirations of farmers on communal and commonage grazing areas in the Free State.
- g) To ascertain how support rendered to farmers on communal and commonage grazing areas, can be improved.

## 1.8 STRUCTURE OF THE REPORT

**CHAPTER 2** contains a literature review on communal land and management. The methodologies used by other researchers investigating communal grazing areas and management practices, are identified and discussed. **CHAPTER 3** deals with the research methodologies and the measurement of variables. Attention is also given to the survey, including the compilation of the questionnaire (Annexure A).

**CHAPTER 4** of this report is divided into the following main headings: 1) the respondents' general profile and competence regarding communal and commonage grazing areas in the Free State, are discussed. 2) a brief overview is given of access to and allocation of land for grazing purposes in the Free State. 3) account is taken of the management of grazing areas, the commonage management plan, the farming systems on commonage areas and livestock composition, as well as ownership and role. 4) core farming activities and services rendered are discussed, as well as the efficiency and efficacy of those activities and services. 5) key constraints and opportunities of farmers on communal and commonage grazing areas in the Free State are discussed, as well as the availability of infrastructure and facilities. 6) the focus is placed on the farmers' needs and aspirations, their needs and management style preferences, as well as the level of success attained.

In **CHAPTER 5**, all the recommendations relating to the report are combined in one chapter to facilitate access and ease of comment. Various supporting documents are also attached at the end of this chapter.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 PERSPECTIVE ON COMMUNAL GRAZING SYSTEMS

An important observation made by Du Toit Moolman and Burger (1987) reveals that production in agriculture involves the judicious application of the production factors land, labour and capital by means of proper management, in order to derive the maximum yield of agricultural products. Land has a maximum production limit because the production potential is determined by the soil's physical properties, and it is therefore subject to the law of diminishing returns.

Du Toit Moolman and Burger (1987) also make the important point that the availability of land is becoming limited, while the demand for food increases annually. This necessitates increased production per surface area unit. The lack of availability of adequate tracts of suitable land at a reasonable cost to increase food production can result in high food costs in many areas. The advantages of raising livestock instead of cultivating crops, include more time to manage the herd and the elimination of the need for certain equipment. However, a real need exists for suitable grazing land for the small farmer (Matthee, 1997). Throughout the Free State livestock grazing has damaged and altered land, affecting many native species (Dillon, 1999). Although this trend seems to be particularly strong in communally grazed areas and on some land reform projects, it is evident throughout the province. Anderson (1996) noted that in many places these practices are not regulated, and in areas that do have regulations they tend to be relaxed during drought periods, when the effects of grazing are most pronounced.

As a result of decades of dispossession and race-based land laws, land distribution in South Africa is among the most inequitable in the world, with large capital-intensive farms dominating most of the rural areas. The result is that only 28% of South Africa's rural population (a large proportion of which are farm workers and their dependants) live on 88% of the agricultural land.

The remaining 12% of agricultural land supports 72% of the rural population in the overcrowded former homelands, which lack the infrastructure for successful agriculture (Ministry of Agriculture and Land Affairs, 1998). One of the main aims of land reform is to redistribute land to the landless, as well as farm workers, tenants and the historically disadvantaged, so that it can be used for housing, for subsistence agriculture and to improve livelihoods. In order to be sustainable, the Land Reform Programme must give people access to land right across the spectrum, from subsistence farmers to large commercial ventures. This must go hand in hand with access to water, support services and infrastructure that will enable people to use land productively (Ministry of Agriculture and Land Affairs, 1998; Shackleton, Von Maltitz & Evans, 1998).

The land question is one of the most important issues on South Africa's political agenda (Holden, 1995). Rangelands constitute almost 50% of the earth's land surface, and 80% of South Africa (Holden, 1995). In South Africa, there is an increasing need for the creation of commonages, which is largely due to the increasing eviction of farm workers, who then arrive at the nearest town with their livestock, and the voluntary migration of people from rural areas. These people are in search of work, better standards of living, accommodation, schools, infrastructure and essential services. Many of them need additional land for production purposes, since land is not available at the places where they reside. Through the Department of Land Affairs (DLA's) Municipal Commonage programme, formal commonage areas can be established to assist such people (and others). A major challenge for South African government departments, service providers and, most importantly, the land users, is to ensure the sustainable and equitable management of natural resources in these local commonage areas. To date, inadequate attention has been given to these environmental and institutional issues in the many commonage projects already implemented (Department of Land Affairs, 2001).

In this country, agricultural production takes place within two types of land tenure systems: commercial and communal. Scogings *et al.* (1999) define communal rangelands as areas of veld that are not privately owned, but belong to entire communities whose members have equal access to this resource. This system is particularly important for disadvantaged people.

Cousins (1998) describes communal rangelands as those areas used for livestock and other purposes.

Taiton (1999) defines communal rangelands as those areas where agriculture is largely subsistence-based, and where rangelands are generally owned and managed communally.

De Bruyn (1998) and Scogings *et al.* (1999) conclude in principle that, despite the general perception that these areas are badly degraded, they support a quarter of South Africa's human population and half of the livestock population. Most of the people who live in these areas depend on natural resources for their livelihoods. In South Africa, these areas occur mainly in the former homelands such as Qwaqwa, Kwandebele, Kangwane, KwaZulu, Lebowa and the TBVC states. Scogings *et al.* (1999) report that people are dependent on these natural resources chiefly for the purposes of sustaining livestock. Mann (1978) asserts that traditional forms of agriculture have, in the past, been able to sustain large numbers of people on small areas by using intensive, but economically sound methods on a sustainable basis - yet these very same methods are now being abandoned in favour of modern methods. Klug and Webster (1993) express the opinion that, before implementing a plan, it is essential to assess the available natural resources and their present degree of utilisation. Scogings *et al.* (1999) argue further that, in order to achieve sustainable agriculture in the communal rangelands, land use must be ecologically sound, economically viable, socially acceptable and politically supported.

For communal grazing areas to be sustainable, it is crucial that environmental planning is incorporated not only into Land Development Objectives (LDOs) and Integrated Development Plans (IDPs), but also into communal grazing areas. This project will identify ways in which this integrated planning can be achieved. The project will involve local institutions, with the objective that these institutions take more responsibility for the management of local natural resources in communal use, including all resources (firewood, soil, and water) on the rangelands.

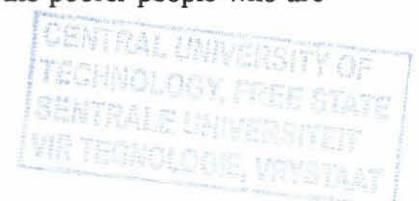
The research conducted is insufficient to specifically address the needs of small-scale farmers

or households in the developing farming sector. Scogings *et al.* (1999) point out that government input into services for farmers had been biased in favour of commercial farmers in the past. Similar support should now be provided for both existing and new communal farmers, such as those on redistributed, formerly commercial land that is now used on a communal basis. The agricultural extension service has not been effective in reaching small-scale farmers with the latest news on technological innovations. Extension has largely served the commercial, wealthier and more motivated farmers, and therefore tended to focus its client contact on innovators and early adopters, in the hope that they would pass on this information to the rest of the community in a 'trickle down' process. Unfortunately, indications are that knowledge does not easily trickle down to peasants, but that instead, new ideas seem to effectively diffuse within homogenous cells of the community (Adupa & Düvel, 1999).

## 2.2 LIVESTOCK OWNERSHIP

Animal husbandry is an essential economic activity in most African farming systems. A significant proportion (about 70%) of ruminant livestock species (cattle, sheep and goats) in southern Africa is kept in smallholder farming conditions based on communal grazing systems (Stone, 2000).

Landless livestock production systems are found in rural areas all over Asia, while urban systems are common everywhere in the developing world. Dairy cattle, in particular, appear to be gaining in importance as the urban demand for milk rises (Wilson, 1995). The value of animals, animal production and animal holdings, be they cattle, sheep, goats or poultry, is of major significance for most of the citizens of the Free State (Van Niekerk, 1997). Cousins (1995), Krause (1997) and Scogings *et al.* (1999) indicate that livestock ownership in the communal rangelands is skewed and complex. It appears to be biased in favour of the more economically and politically powerful members of communities. In the free access system, it is a common scenario to find that a few wealthy farmers own most of the livestock in an area. Those farmers therefore derive greater benefits from the common resource without making a corresponding contribution to its management or maintenance, than the poorer people who are



perhaps more dependent on the free resources. To avoid the further devastation of the natural veld and excessive grazing pressure, communally grazed land must be developed and managed properly. Only through the involvement of the community can proper management structures be implemented, and be expected to function.

Cousins (1995) and Scogings *et al.* (1999) assert that the multiple uses of livestock (for example: animal traction, investment, milk) make them important in different ways to the various social groups of people. Scogings *et al.* (1999) are of the opinion that existing institutions provide neither adequate representation of farmers nor adequate extension, veterinary, marketing or financial services, and would be unable to regulate the numbers of livestock, should such regulation be required. As a result of the increasing human population, herd sizes per person are declining and grazing areas are being lost to housing developments, particularly in the semi-arid and sub-humid areas. Given that livestock numbers appear to be fairly constant, grazing pressure on the remaining rangelands will increase.

Maree and Plug (1993) assert that the indigenous breeds have provided cow's milk, an important part of the traditional diet of rural communities, since the earliest days of pastoralism. Fresh and sour milk is still a popular source of animal protein throughout Africa. These indigenous herds were not selected for milk production, and are not suitable for intensive, high-volume systems. Nevertheless, the importance of the indigenous herds' role in sustaining rural communities, cannot be ignored.

Gravert (1987) and Gertenbach (1995) report that dual-purpose breeds are preferred where land is expensive, although there is no exact borderline between dairy and dual-purpose breeds, as demonstrated by the Frieslands and Brown Swiss cattle. Maree & Plug (1993) conclude that high-quality pasteurised milk is readily available in all urban areas, and large regions of Southern Africa are well suited to intensive or semi-intensive systems of milk production.

### **2.2.1 The role of livestock**

There are two types of animals - those that eat mainly shrubs (browsers, e.g. goats) and those

that eat mainly grass (grazers, e.g. cattle). Cattle do eat shrubs in times of drought or food shortage, and goats will sometimes eat grass. This means that the categories described above may overlap sometimes (Western, 1996). The traits of indigenous breeds can be combined with those of exotic breeds to produce a suitable dairy cow for rural regions. Jersey and Nguni crossbreeds, for instance, hold much promise for subsistence agriculture in large, developing regions (Maree & Plug, 1993).

According to Casey and Maree (1993), environmental adaptability may be defined as all factors that exert an influence on the animal's ability to thrive in a specific environment. This includes its ability to utilise available feed, to walk long distances to its feed and water, and to thrive in both summer and winter conditions. The adaptability of animals is of cardinal importance to the cattle farmer. Should the animal not be adapted to its environment, it will maintain a low level of productivity, which will result in indirect loss for the farmer. Stewart (1995) and Conradie (1990) found that the environmental factors could be grouped into three distinct subdivisions:

- ◆ the way in which the animal interacts with its herd mates;
- ◆ the interactions with the farmer and his labourers (which can be referred to as stockmanship);  
and
- ◆ the physical environment, which includes the farm's facilities, climate and weather.

Muller (1990) found that rainfall significantly reduced the milk production of cows - from 15,23 to 14,79 kg per day in the housing unit, and from 14,40 to 13,82 kg per day in the open camp (Conradie, 1990). The total amount of milk produced by a cow is, to a large extent, controlled by environmental factors such as temperature, humidity and rainfall.

Livestock herds on communal lands are multifunctional in character, and yield reasonable rates of economic return per hectare when all their functions are taken into account. Multipurpose herds make sound economic sense compared to the single-purpose herds of small-scale farmers (Cousins, 1995). The improvement of livestock farming consists of three complementary fields (Catizzone, 1995):

- Protecting animals by strengthening natural resistance or tolerance to disease and parasites by means of the improvement and development of vaccines, and through

support for cost-efficient animal health care systems;

- Exploiting the genetic potential of the indigenous breeds to increase their productivity under local conditions; and
- Finally, quantitatively and qualitatively improving food resources for livestock by better management of natural pastures and integrated production systems, while showing concern for the conservation of the environment and stressing the recovery of deforested or otherwise degraded areas.

Dillon (2000) concludes that livestock production is an important component of the emerging sector's agricultural activities. Cattle, sheep, goats, horses and donkeys, are now no longer considered to be purely "men's animals", according to Basotho tradition. This implies that the money generated from selling livestock or livestock produce, now belongs to the entire family. Therefore, the family now has greater incentive to invest in livestock. However, this livestock is valued for more than its potential to generate income (Sirur & Van den Brink, 1995). In general, the crops and farm stock are adapted to the environment, but there is still room for improvement as far as farming methods in the Free State are concerned (Claasen, 1998). Anderson (1996) believes that livestock provides valuable nutrition to families, and is an important source of additional income. Cattle are very important to communal farmers in the Free State province. Since cattle generally represent a more viable production system than crops and are used as a form of financial security, every farmer aspires to acquire more cattle. This leads to overgrazing as cattle numbers exceed the carrying capacity of the land (Claassen *et al.*, 1991). Laker (1997) indicates that overgrazing is undoubtedly the biggest cause of human-induced soil erosion in South Africa. It removes the dense grass cover, which is the vulnerable soil's only effective protection against erosion.

### **2.2.2 Management of grazing systems**

The condition, productivity and profitability of the communal grasslands in the southern African 'homelands' are assessed largely by reviewing published data. Very little empirical data are available from the communal grasslands themselves. These data, supported by other

circumstantial evidence, do not support the often-held notion that the communal grasslands are severely degraded and beyond recovery. This applies particularly to the moist and mesic areas of southern Africa (Shackleton, 1993). Shackleton (1993) notes that the general perception is that commonage areas are considerably overstocked and consequently excessively overgrazed. For commonages and land reform to be successful, resource conservation and environmental quality must be considered.

Botha and Stevens (1999) report that sound management of environmental resources is of the utmost importance. Veld management research and extension education, training and practice in general have to take cognisance of and develop more participatory approaches to extension. Since the vegetation of the Free State consists mainly of grass veld (Claassens *et al.*, 1991), the main problem is caused by a large variation of carrying capacity, influenced by rainfall in certain areas. For instance, water erosion is a problem in Qwaqwa, particularly in the catchment areas due to steep slopes, animal grazing and the high population density.

Throughout the Free State grazing of livestock has damaged and altered undeveloped areas, affecting many native species (Dillon, 1999). This trend seems to be particularly evident in communally grazed areas and on some land reform projects, but does appear to occur throughout the province. Anderson (1996) noted that "in many places there is no regulation on these practices and in areas where there are regulations they tend to be relaxed in drought years, when the effects of grazing are most pronounced".

Kirsten and Van Zyl (1998), Kotsokoane (1999) and Dillon (2000) assert that "rural people of South Africa are poor and agriculture provides a marginal income to the household economy. The rangeland is relatively overgrazed due to several factors, but may be mostly related to the change in the local management system". The transition from a "headman" system to a democratically elected chairman changed the administrative structure for communal grazing areas (Romuld, Sandham & Vedeld, 1996).

For the purpose of this study, grazing can be visualised as livestock in good condition and in harmony with nature. Livestock can improve soil and vegetation cover and plant and animal

biodiversity. By removing biomass, which otherwise might provide the fuel for bush fires, by controlling shrub growth and by dispersing seeds through their hooves and manure, grazing animals can improve the composition of plant species. In addition, trampling can stimulate grass tillering, improve seed germination and break up hard soil crusts.

The two most quoted sources regarding soil degradation are the Global Assessment of Soil Degradation (Scoones, 1992), which estimates that 680 million hectares of rangeland have become degraded since 1945, and De Wet (1995), who contends that 73% of the world's 4.5 billion hectares of rangeland is moderately or severely degraded. In humid areas, livestock are associated with range encroachment, the deforestation of tropical rainforests and competition with wildlife for natural resources. Agricultural producers in Missouri, USA, are working to reduce the potential for the transportation of sediment, plant nutrients, pesticides and animal manure into the local surface water and groundwater. Two overall goals of grazing system management address these concerns, namely (1) optimising plant growth will provide vegetative cover that intercepts raindrops, provides plant density that impedes runoff, and ensures a root mass that binds soil particles together on the soil surface, and (2) reducing the potential for surface movement away from the site, or leaching, of nutrients, animal wastes, and pesticides. Managed grazing systems can help to distribute manure more uniformly over the grazing area and improve the runoff efficacy. Proper grazing management can dramatically improve downstream water quality. Improved on-site water quality can also benefit the livestock production enterprise. Micro-organisms and chemicals such as nitrates in the water supply can cause diseases or weaken an animal's immune system. This can adversely affect weight gain, reproduction and milk production. Ponds with high nutrient concentrations may contain large populations of algae, which could be toxic to animals drinking the water.

According to Stewart (1995), management is the Achilles heel of successful farming. As a result of the diversity of skills required, successful farming makes greater demands on management. Stewart (1995) stresses the fact that livestock farming may be conducted as a sideline to some other enterprise(s), or as a single enterprise by the specialist livestock farmer. There are several approaches to resource management. At a broad level, resource management studies take the

physical environment as one possible departure point, and the human attributes and the interaction between physical and human attributes, as the other two possible departure points. For organisational convenience, the human or managerial attributes are frequently grouped under the ethnological approach (Claassen, 1998). The ethnological approach stipulates that cultural differences influence the way people perceive and use the resources of their environment. The use of a resource is therefore related to specific cultural themes and different perceptions of resources. Management is a farmer's understanding of what to do and when to do it. Sanitation, ventilation, feeding, treatment, close observation and the provision of adequate space for water, feed, rest and exercise, are all important management practices (Stewart, 1995).

Selecting the type of cattle breed to be kept is largely a matter of personal preference. There are highly successful livestock enterprises representing all breeds and herd sizes varying from 25 to several hundred, both grades and pure-breds, all over South Africa. This allows individuals and groups the flexibility to choose the type of operation best suited to the available resources, personal interests and goals (Matthee, 1997). The demand for milk is increasing steadily as more people in rural areas become aware of the nutritional value of milk. Milk is highly valued as part of a balanced diet and as a source of high-quality protein for man (Kohls & Uhl, 1990; Maree & Casey, 1993). However, many people associate grazing animals with overgrazing, soil degradation and deforestation. To them, keeping livestock in arid regions of the tropics brings to mind images of clouds of dust, bleached cattle skeletons and an advancing desert. To promote proper grazing management, intensively managed grazing systems may be cost-shared by utilising funds from the government's value-added tax for soil conservation and parks, as a water quality enhancement practice.

### **2.3 MANAGEMENT OF NATURAL RESOURCES**

The management of natural resources in South Africa is regulated by the Conservation of Agricultural Resources Act (43/1983) (CARA), which empowers the Minister of Agriculture to take wide-ranging steps to protect the natural agricultural resource base of the country. In particular, the Act aims to combat and prevent soil erosion, protect water sources and

control invader plants and weeds. The powers of the Department of Agriculture and the Minister of Land Affairs, can be summarised as follows (Department of Land Affairs, 2001):

- the cultivation of virgin soil;
- the utilisation and protection of cultivated land;
- the irrigation of land;
- the regulating of the flow pattern of runoff water;
- the control of weeds and invader plants;
- the prevention and control of veld fires;
- the protection of water sources against pollution; and
- exercising control over the maximum number and type of animals that may be kept on veld.

The Act provides that land users must, at all times (except where the Act or a scheme provides otherwise), maintain a soil conservation plan at their own expense. A soil conservation plan is a plan that is implemented on land with a view to (Department of Land Affairs, 2001):

- the prevention of erosion or the conservation of land which is subject to erosion;
- the conservation or improvement of the vegetation on the surface of the soil;
- the drainage of superfluous surface or subterranean water;
- the conservation or reclamation of any available water source; or
- the prevention of the silting of dams and the pollution of water.

The Minister may also authorise an official to enter an owner's land in order to advise on the better conservation of agricultural resources, or to take any steps necessary in order to ensure compliance with the Act. Similarly, the Minister may also issue orders to land users to ensure compliance with the Act.

Embarking on a farming enterprise without assets, managerial experience or skills is not only frustrating, but also affects the level of production and may lead to the failure of the enterprise (Claassen, 1998). Barnard and Nix (1973), as well as Gordijn and Whitehead (1995), state that adequate management and management ability are key factors in making a profit from dairy farming. Management skill, knowledge and familiarity with livestock raising,

especially feeding and veld management practices, are essential for small-scale farmers. Since emerging farmers have little experience in this regard, adaptable breeds may be more suitable for them (Krause, 1997; Dixon, 1973).

The opinions of Barnard and Nix (1973) and Slater (1991), to the effect that attitudes to the uncertain nature of farming activities and the willingness to take risks (which may be determined by the relative availability of capital), are important in this regard. The farmer who is prepared to take risks, may adopt a system that would be quite unacceptable to another farmer who is more cautious, and whose aim is to generate a stable and reasonably certain income from year to year.

### **2.3.1 Perspective on modern approach to grazing systems and natural resources**

Among others, Barnard and Nix (1973), Boehlje and Eidman (1983), Buckett (1988) and Van Reenen and Marais (1992) assert that each farmer has objectives for his business. Management is concerned with ensuring that these objectives are attained. Farm management may be regarded as the process whereby a farmer organises, plans, motivates, co-ordinates and controls all the production factors of his farm business, namely land, labour, crop, stock, machinery and capital, in order to achieve certain objectives such as maximum profit, growth and an improved standard of living. Environmental factors, which can be physical, economical, political or sociological, may influence the production factors and the way in which the management processes are applied to them. It is therefore necessary, as part of the management process, to make projections regarding both the performance of the production factors and the influence of the environment. There are five main processes, namely: (i) forecasting; (ii) planning; (iii) implementation (which is allied to operation); (iv) recording; and (v) controlling. The most important elements of management are:

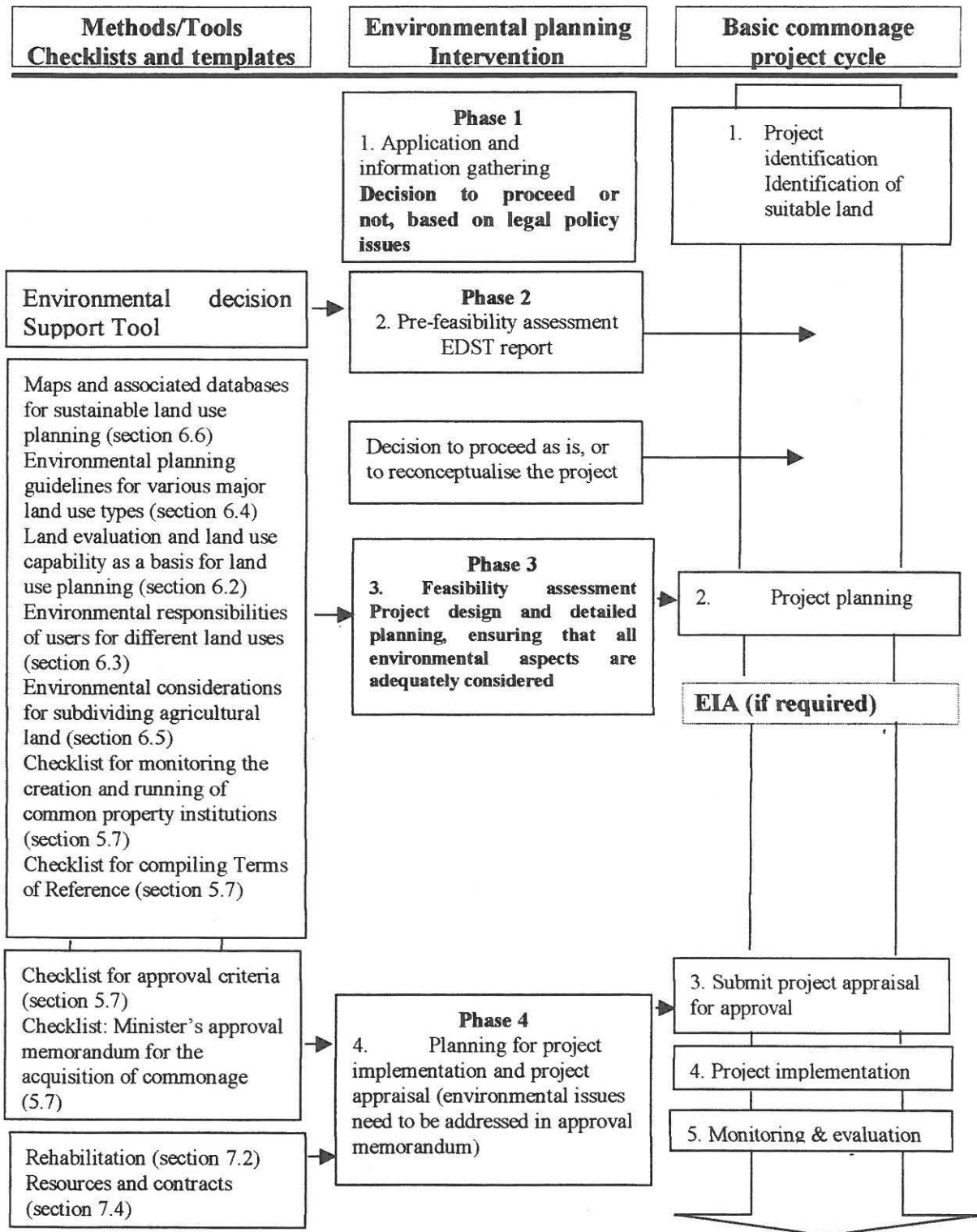
- Objectives of the farm business;
- Decision-making regarding the farm business; and
- Farm management tasks.

Farm management is classified as a science, an art and a profession. Scientific ability involves systematic knowledge related to management functions (planning, implementation and control) and management resources (information, techniques and principles). An art is a talent linked to certain personality traits, e.g. communication, negotiation, motivation, self-discipline and leadership. A profession, on the other hand, is a specific type of work requiring certain skills. Every profession requires specific knowledge and personality traits, involving elements of scientific ability as well as an art talent. The farm manager can evidently acquire certain aspects and develop others (The Standard Bank of South Africa Limited, 1988).

Management systems should suit the environmental conditions and objectives of livestock owners, and overcome constraints on livestock production. The problem of a lack of winter resources as a key constraint on animal production has long been identified by South African commercial farmers in summer rainfall areas. Planted pastures and concentrate feeds have traditionally been used to overcome the winter shortage. Likewise, the main constraint that was identified as affecting all communal livestock systems in South Africa is the inadequate quantity and quality of rangeland forage at the end of the dry season. In addition, limited availability of water was identified as a key constraint in the arid areas (Scogings *et al.*, 1999). Although agricultural production in South Africa is diverse, a common need among all agriculturists is to use and sustain the natural land resources for crop and animal production (Kirsten & Van Zyl, 1998). Laker (1997) concludes that South Africa is very poorly endowed with land resources, as is the case in the rest of Africa. Kirsten and Van Zyl (1998), Kotsokoane (1999) and Dillon (2002) state that rural people of South Africa are poor, and agriculture contributes at least a marginal income to the household economy. The rangeland is relatively overgrazed due to several factors, but this could mostly be related to the change in the local management system.

The transition from a "headman" system to a democratically elected chairman changed the administrative structure of communal grazing areas (Romuld *et al.*, 1996). Bembridge and Tapson (1993) state that a vicious cycle of land and cattle deterioration that developed in southern and central Africa over the past four to five decades due to the expansion of arable

areas and the rapid increase in the human and livestock population, has resulted in overgrazing, erosion and the deterioration of natural rangeland. According to Sebina and Düvel (1999), the poor performance of the livestock sector has necessitated fencing of the current communal grazing areas, as advocated by the National Policy on Agricultural Development in 1991. Fencing of communal grazing was regarded as a step towards addressing the environmental and economic problems associated with poor management of communal grazing areas. Scogings *et al.* (1999) conclude that sustainable agricultural production and the conservation of natural resources should be emphasised in the agricultural policies of South Africa. Figure 2.1 reflects the integration of grazing and conservation issues as essential elements for land use.



**Figure 2.1** Flowchart indicating the environmental interventions, methods, tools and checklists for ensuring sustainability in the State land disposal process (Department of Land Affairs, 2001).

On any farm where grass can be grown it forms the cornerstone of livestock production systems, while decisions on grassland management and veld-burning management play a key role in the operation of the system and its profitability. These decisions are never easy, since grassland management and veld-burning management are complex and involve the integration of grazing and conservation. Management must also contend with variations in grass growth during the season, and from one season to the next (Allen and Kilkenny, 1980). According to Dillon (1999), "knowing the rate of herbage production and the nutrient requirements of cattle, it is possible to establish guidelines for stocking rates that will ensure that grass is utilised efficiently". One of the greatest challenges of our times lies in ensuring the sustainability of our environment while, at the same time, meeting the needs of the rapidly expanding human population. Scogings *et al.* (1999) assert that "human beings depend on land and its natural resources for food and nutrition, and the future of the environment and natural resources depends very much on sustainable management by humans".

### **2.3.2 Livestock grazing systems and the environment**

The formulation of local by-laws to regulate the number of cattle per household will enable cattle farmers to be productive (Dillon, 2002). Decisions on stocking rates have to be taken at grass-roots level by the local community and the grazing committees, under the guidance of government extension services. The government needs to move away from its role as a regulator to that of facilitator, empowering communities to manage their own resources in a responsible and sustainable way (Olivier, 2001). According to Dillon (2002), breed choice for a communal farming system is influenced by the fact that grazing is generally over-utilised due to lack of access control. The best choice is therefore a low-maintenance, easy-care and disease-resistant animal with the ability to utilise roughage with very little or no supplementation. In the previous homelands of Qwaqwa, Kwandebele, Kangwane, KwaZulu, Lebowa and the TBVC states (Transkei, Bophuthatswana, Venda, Ciskei), the majority of the households farming on communal and state land lack agricultural resources such as land, agricultural input and water. A lack of infrastructure and subsequent conflict over the use of existing resources has greatly

hampered agricultural development in these areas (Dillon, 2002). Due to the high population density and lack of a grazing system, environmental degradation is taking place at an increasing rate.

### 2.3.3 Environmental challenges

Environmental challenges, issues and options differ significantly according to climate and land capabilities. The environmental challenge is to identify the policies, institutional arrangements and technologies that will enhance the positive and mitigate the negative effects of grazing. According to Botha and Stevens (1999), the occurrence of veld deterioration has regularly been reported in South Africa since 1775, and several extension and research programmes have been launched to address this problem.

Because communal areas in the Free State are the areas where communal farmers reside and practise agriculture for subsistence purposes (while, in most cases, they produce excess crops and livestock products for sale), these farmers are affected by certain constraints that need to be addressed. The following are points of concern identified by the Department of Land Affairs (Department of Land Affairs, 2001):

- Extensive numbers of livestock farmers on communal and commonage grazing areas do not take environmental planning into account.
- There is a general lack of community participation in environmental planning and veld management plans.
- Poor knowledge of and familiarity with livestock production, since the upcoming farmers generally have relatively little experience of commercial livestock raising, particularly regarding feeding and veld management practices.
- Veld burning as a management tool to remove unacceptable grass material, prevent the encroachment of undesirable plants and stimulate new out-of-season green growth is abused in the Free State. A great deal of damage has and is being done to the veld through the incorrect use of fire, resulting in a serious deterioration in the condition and productivity of the vegetation, as well as widespread soil erosion. The ecological role of fire in the dynamics of plant communities in particular, can be a very important and

useful tool in the management of vegetation for livestock production.

- Water erosion is a problem, especially in the catchment areas, due to steep slopes, animal overgrazing, high population density and lack of management practices.
- Management of communal and commonage grazing areas is poor.
- Land degradation is a growing concern in Southern Africa. There are frequent reports about accelerating soil erosion, overstocking, rangeland degradation, deforestation or desertification. At the same time, most of the numerous projects and programmes aimed at rehabilitating degraded land and changing natural resource management are described as total or partial failures.

## **2.4 SUSTAINABLE RESOURCE USE AND IMPACT MANAGEMENT**

The sustainable livelihoods framework put forward by Carney (1998) facilitates the analysis of the strengths of particular systems of land tenure, and of their evolution. The framework is useful when considering options for change and their likely impact on people's asset status. Access to capital assets, including finance, land, natural resources and social capital, determines how and to what extent livelihoods can be enhanced. Where financial resources are lacking, social capital can provide the basis for a range of livelihood opportunities, including customary access to land and natural resources and opportunities for the poor to sell their labour (Adams *et al.*, 1999).

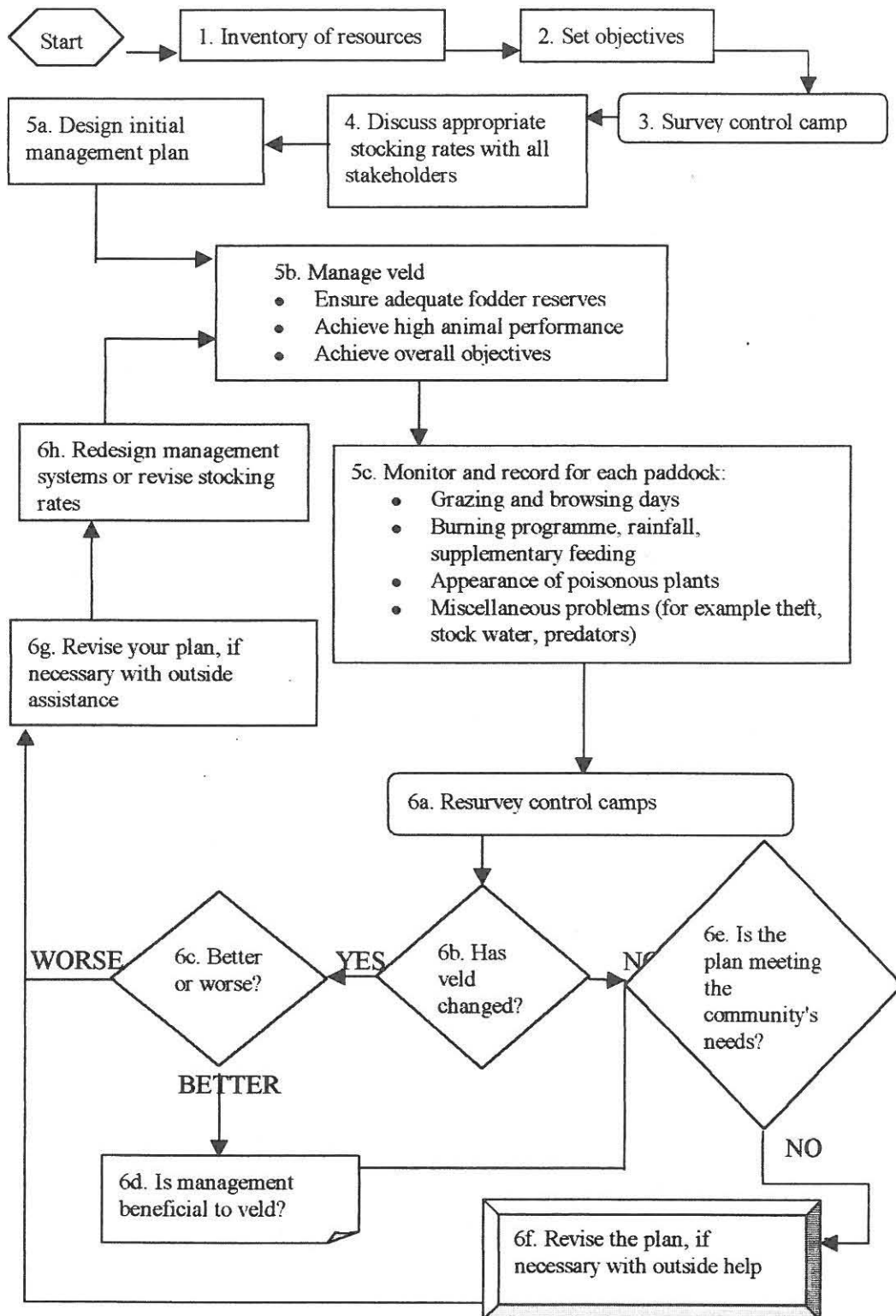
### **2.4.1 Land degradation**

Early veld management recommendations (developed during the 1940's) in South Africa emphasised the importance of rest during the critical growth phase (Haschke & Kirkman, 1994). The severity of degradation depends both on the degree to which production is reduced and the duration for which it is reduced (Scholes, 1994). Degradation is a complex problem with various levels of causation. Seely and Jacobson (1994) and Berliner (1999) distinguish between ultimate and proximate causes of degradation. Ultimate causes can be roughly categorized as political, administrative, economic or social in nature. The proximate

causes include the biophysical and land management factors more commonly associated with degradation, for example:

- climatic extremes (extended drought, storms and floods), in combination with low vegetation cover;
- historic land use practices other than grazing, particularly cultivation;
- high stocking rates with restricted animal movement (no access to dry-season grazing, no resting of veld, concentration of animals around watering points);
- trampling and concentration of animals around watering points and key resource areas;
- no movement of animals, no veld rest;
- socio-economic, "tragedy of commons" phenomena (communal issues vs. issues limiting private ownership); and
- a combination of two or more of the above.

Where communities have low incomes, they are critically dependent on a local, natural resource base and face a high degree of uncertainty with respect to income streams. In this case, communal forms of tenure are cost-effective and efficient (Mackay, 1994). Where the distribution of basic natural resources, in particular rainfall, is erratic and where income streams are uncertain, communal property systems act as a fortification against environmental risk by allowing access to other areas (Haschke & Kirkman, 1994; see Figure 2.2).



**Figure 2.2** Procedure for adaptive management in preventing veld degradation (Haschke & Kirkman, 1994).

Land degradation can be defined as the loss of potential productivity where the measure of productivity must be related to the goals of land use (Stuth & Smith, 1993). In grazing systems, this may be translated into a reduction in the utilisable primary production of the land, which in turn leads to a reduction in the potential secondary production of the land, as shown Figure 2.2.

## 2.5 MANAGEMENT OF COMMUNAL GRAZING SYSTEMS

Properly managed livestock grazing is a sustainable form of agriculture, and is compatible with a wide array of other sustainable uses of rangeland. Society recognises the cultural and economic importance of livestock grazing, especially to rural communities. Livestock grazing is an efficient method for converting low-quality forages into high-quality agricultural products that meet the demand of human needs worldwide. Managed grazing may be used to expedite desired changes in the structure and function of rangeland ecosystems. Livestock grazing can be complementary to and synergistic with other rangeland restoration techniques. Livestock grazing may not be appropriate on certain fragile and highly erodible lands; on the other hand, the elimination of livestock grazing on other lands may be of no benefit (The Society for Range Management International Board of Directors, 2000).

### 2.5.1 Grazing systems

Klug and Webster (1993) are of the opinion that "before starting a plan, it is essential to assess the available natural resources and their present degree of utilisation". Scogings *et al.* (1999) further argue that "in order to achieve sustainable agriculture in the communal rangelands, land-use must be ecologically sound, economically viable, socially acceptable and politically supported". A team of researchers from Plaas (1999) concluded that veld must be looked after well so that the grass and soil are not damaged and animals can get enough food.

Scholes (1994) concludes that soil and grass have a symbiotic relationship. If grass is overgrazed by animals, the sun will dry up the soil so that grass roots cannot hold the soil, which means the soil can be eroded, grass will not grow on it again and animals will have less food.

### 2.5.2 Grazing systems in the semi-arid and sub-humid tropics

Although the semi-arid and sub-humid tropics zones are combined in this discussion because of their similar physical livestock-environment interactions, many of their agro-ecological and socio-economic conditions are different. The semi-arid zones are generally densely populated. Typical areas include parts of the Sahel, the rainfed crop-livestock areas of North Africa, some of the rangelands of Central Asia and the drier areas of the Indian subcontinent. The sub-humid zone savannas have, until recently, been rather sparsely populated because access was impeded by human diseases (such as river blindness, African sleeping sickness) and tick-borne diseases in animals. Typical areas include the savannas of West Africa, eastern Colombia and the Cerrados of Brazil, southern and eastern Africa and the eastern areas of the Indian subcontinent. These areas are now becoming the main frontier for agricultural development, and ruminant livestock numbers here are increasing steadily as these areas accommodate an overflow of animals from the drier areas in sub-Saharan Africa, and animals from the Andean Highlands in South America. Livestock interaction involves most components of the environment, i.e. land, water and biodiversity.

### 2.5.3 Types of grazing systems

According to Scholes (1994), there are basically two types of grazing systems:

1. **Continuous grazing:** The advantages of a continuous grazing system include lower setup costs (water and fencing) and less required management. Animals can also eat their choice of plants, if the pasture is not overstocked. However, less beef is produced per hectare, animals use only 30-35 percent of the available grass, undesirable plants begin to dominate the pasture and it is difficult to maintain legumes and re-establish weakened areas

with this system. This system usually results in poor manure distribution.

**2. Rotational grazing (two to seven pastures):** The advantages of a rotational system include the following: the producer can match grazing to plant growth, the desirable plants have a period of rest and re-growth, there is an increase in both forage and animal production, and fields can be set aside for haying and fall stockpiling. The disadvantages are increased costs for fencing and water supplies, more required management and labour, and difficulty in maintaining legumes and re-establishing weakened areas. Manure distribution may still be concentrated, and not evenly distributed.

## 2.6 VELD BURNING

Trollope (1989) and Beukman (1999) note that veld is burnt mainly for the following reasons:

- to improve the grazing value for livestock by removing old, dead plant material and increasing productivity;
- to assist in alien plant control and reduce the risk of runaway fires; and
- to improve the habitat for wetland-dependent species.

In their research study, Haschke and Kirkman (1994) report that the time of burning affects herbage production. Winter (dormant) burning is regarded as potentially harmful, because the veld remains bare until after the first rains and is thus susceptible to wind and water erosion for a considerable period of time. The soil surface under blackened, burnt veld is likely to reach higher temperatures than under unburnt veld, resulting in a higher potential for moisture loss during the first spring rains, or during the period immediately before the expected start of regrowth in spring.

According to Beukman (1999), uncontrolled, untimely or indiscriminate veld fires also pose a threat to healthy grasslands and good grazing in the Free State province. Large parts of the protected areas have been burnt as a result of runaway veld fires sweeping into parks from

adjacent land, while large tracts of valuable grazing have been destroyed on neighbouring farms. Indiscriminate or untimely burning can have a seriously negative effect on the palatability and nutrition levels of veld grasses. This results in greater grazing pressure on areas where grasslands are still healthy.

Tainton (1981) concludes that any discussion of veld burning in South Africa must take account of the practical objectives of including fire in management programmes for each vegetation type independently, if its role is to be realistically assessed. Trollope (1989), cited by Haschke and Kirkman (1994), concludes that no set rule can be laid down regarding the frequency of burning. The fuel load, moisture content of fuel load, wind, air temperature, humidity and type of fire (head or back fire) all have an influence on the fire intensity. Haschke and Kirkman (1994) conclude that fire intensity may affect tuft mortality, and it seems logical to aim for the lowest possible fire intensity when burning to remove dead herbage. Farmers and landowners are advised that, in addition to complying with set burning dates, they must also comply with the regulations laid down in the Conservation of Agricultural Resources Act (43/1983), and the National Veld and Forest Fire Act (101/1998), which make provision for the control, management and prevention of mountain, forest and veld fires, allow fire control committees and fire protection associations to be more effective and provide training and support to rural communities regarding the management and control of veld fires. These Acts work hand in hand to ensure better environmental management and conservation planning.

## 2.7 WATER SOURCES

The purpose of the National Water Act (36/1998) is to revise and rationalise the legal framework for water by making provision for the more equitable and sustainable management of the country's water resources. The Act gives the Minister of Water Affairs and Forestry the power to regulate the use, flow and control of all water in the country, and stipulates that water may only be used in accordance with the Act. No individual person or group of people can own water. However, they can use it in various ways, depending on the

authorisation they have from the Minister. While water use for basic needs is permitted under the Act, permission must be obtained in accordance with the applicable catchment management strategy for water use for any other purposes, such as commercial agriculture. The pricing of water will promote conservative use of water resources, discouraging wastage and the excessive use of water in areas where it is scarce.

### **2.7.1 Providing water for grazing systems**

Within any grazing system, water must be provided to livestock in adequate quantity and quality. Clean water and ample high-quality forage are essential for improved livestock production. Inadequate water for livestock in pasture areas can contribute to serious livestock losses, prevent efficient use of forage and encourage over-grazing near existing water supplies and under-grazing away from the water sources. Table 2.1 can be used as a general guideline for the daily water requirements of grazing animals (taken from Parsons, 1991; Plaas, 1999).

**Table 2.1:** A general guideline for the daily water requirements of grazing animals  
(Parsons, 1991 & Plaas, 1999)

| Animal                  | Age        | Weight<br>kg | Condition       | Water<br>requirements<br>litres per day |
|-------------------------|------------|--------------|-----------------|---|
| <b>Cattle</b>           | 4 weeks    | 51           | growing         | 0.3-5.7                                 |
|                         | 8 weeks    | 69           | growing         | 5-7                                     |
|                         | 12 weeks   | 93           |                 | 8-9                                     |
|                         | 16 weeks   | 119          | growing         | 11-13                                   |
|                         | 20 weeks   | 148          |                 | 15-17                                   |
|                         | 26 weeks   | 189          | growing         | 17-23                                   |
|                         | 60 weeks   | 354          | growing         | 23-30                                   |
|                         | 84 weeks   | 464          | pregnant        | 30-38                                   |
|                         | 1-2 months | 464-545      | fattening       | 30-34                                   |
|                         | 2-8 months | 545-726      | lactating       | 39-95                                   |
|                         | 2-8 months | 545-726      | grazing         | 17-34                                   |
| <b>Pigs</b>             |            | 14           | growing         | 1-4                                     |
|                         |            | 27-36        | growing         | 2.6-4.5                                 |
|                         |            | 36-57        | growing         | 4.0-7.5                                 |
|                         |            | 91-180       | maintenance     | 5.7-13                                  |
|                         |            | 91-180       | pregnant        | 15-19                                   |
|                         | 91-180     | lactating    | 19-25           |   |
| <b>Sheep and goats</b>  |            | 9            | growing         | 1.9                                     |
|                         |            | 23           | growing         | 1.5                                     |
|                         |            | 68-91        | grazing         | 1.9-5.7                                 |
|                         |            | 68-91        | grazing (salty) | 8                                       |
|                         |            | 68-91        | hay & grain     | 0.4-3.0                                 |
|                         | 68-91      | good pasture | <1.9            |   |
| <b>Chickens</b>         | 1-3 weeks  |              | growing         | 2.7-5.0                                 |
|                         | 3-6 weeks  |              | growing         | 5.7-11.3                                |
|                         | 6-10 weeks |              | growing         | 11.3-15.2                               |
|                         | mature     |              | growing         | 15-19                                   |
|                         | mature     |              | non-laying      | 19                                      |
| mature (32°<br>Celsius) |            | laying       | 19-28           |   |
| <b>Horses</b>           |            |              |                 | 45                                      |

Water needs vary greatly depending on air temperature, relative humidity, animal size and moisture percentage of the diet. For example, water needs are higher on hot, dry days or when animals are grazing dry forage. Water needs decrease on cool, rainy days, or when

livestock are grazing lush forage. Young, lush forage will have a moisture content of 70 to 90%, and can account for a large percentage of an animal's water needs (Parsons, 1991).

### 2.7.2 Sources of water

The right of all citizens to have access to the basic water services (the provision of a potable water supply and the removal and disposal of human excreta and waste water) necessary to afford them a healthy environment on an equitable and economically and environmentally sustainable basis must be supported (Plaas, 1999).

Key elements of an appropriate incentive policy would be (Sirur & Van den Brink, 1995):

- Increasing the costs of grazing in order to reduce animal pressure and to promote a more rapid turnover. The perception of pastoral people keeping livestock for wealth and social status, must be done away with;
- Levying grazing fees for communal areas. Such fees have been proposed often, but little experience exists of them in practice. A system of progressive fees, with larger herds paying more per head (Sirur & Van den Brink, 1995), is an attractive option, particularly for many of the dry areas in Africa where livestock are increasingly concentrated in the hands of outside owners such as civil servants, traders and crop farmers;
- Full cost recovery, especially for water supply and animal health services. In many cases, water has thus far been a free resource supplied by the public sector (and frequently financed by the international donor community). Full cost recovery, including construction costs, will probably reduce the number of large boreholes and thus also reduce local degradation around these water points;
- Elimination of price distortions for other agricultural inputs, in order to reduce the conversion of key pastoral resources into marginal cropland.

Most donor agencies now accept these as basic elements of their pastoral strategy, as shown, for example, by the excellent review of common property resources by Sirur and Van den Brink (1995). In addition, African and Middle Eastern government authorities are increasingly adopting participatory and decentralised approaches with a greater degree of cost recovery, although there is still considerable apprehension regarding allowing pastoral groups any great degree of independence.

## **2.8 PERSPECTIVE REGARDING THE MONITORING OF COMMUNAL GRAZING AREAS**

### **2.8.1 Monitoring communal grazing areas in Southern Africa**

A number of case studies from around Southern Africa shed light on the range of resources available on communal rangelands, their high economic value and the social and institutional complexity of patterns of use. Successful natural resource management (NRM) is hard to find in southern Africa (Critchley & Turner, 1996). Resource governance and management institutions must take diverse, legitimate interests into account. Successful natural resource management institutions recognise the diversity of any local society and mediate the interaction of different economic and social forces (Critchley & Turner, 1996). The way most dryland ecosystems are traditionally used explains, to a large extent, their resilience. Flexibility of animal movement is progressively hampered by increased population pressure and the loss of corridors between wet- and dry-season grazing areas.

CAMPFIRE informs rangeland management policy. Forage resources (grazing, browsing, water), on which domestic and wild species depend, are the primary production base in

semi-arid areas. Access to forage is generally broad and subject to competing legal (national) and utilisation (local) systems. Although forage is communal property in principle, it is effectively privatised by those households that own most of the livestock - usually a minority group in the community.

### **2.8.2 Monitoring communal grazing areas in African countries**

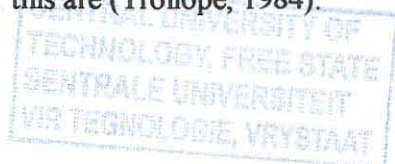
Arid rangelands have traditionally been used under a communal property regime by nomadic producers, who move their stock in search of new pasture according to season. From the wet-season grazing they will move their animals to higher-potential river valleys, cropland or mountain meadows (the "key resources" for the dry season). With a highly variable rainfall (with regard to both time and space), pastoral economies are typically of the "bust and boom" type: a "boom" when rainfall is plentiful and herds and flocks grow, and a "bust" when drought (or late winter storms in Central Asia) occurs and animals die. Thus, abiotic factors such as rainfall, rather than livestock density, determine long-term primary production and vegetation cover (Coppock, 1996). This continuous disequilibrium conserves soil and vegetation, particularly annual vegetation in more arid areas, since grazing pressure has to adjust to the quantity of feed available. The theoretical bases for range management under such conditions ("opportunistic range management") are described well by Behnke, Scoones and Kerven (1993), and Scoones (1994).

A substantial body of evidence from the last decade (Thomas, 1994) shows that arid regions contain dynamic and highly resilient ecosystems, with a strong capacity to regenerate rapidly when the rains return. Similarly, traditional pastoral systems have conserved biodiversity because pastoralists have a direct interest in preserving a wide variety of plants and animals. Gathering range products such as medicinal plants, gums and resins, is an important part of the pastoral way of life.

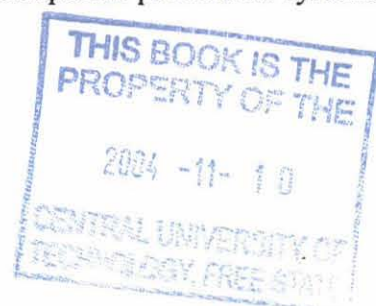
Stock is increasingly concentrated on the same lands for the entire year, breaking the ecologically sound cycle of alternating the use of wet- and dry-season grazing areas, leading to over-use of dry-season grazing land and, inevitably, to human suffering. Such increased pressure often results in war, as shown by the recent confrontation between Senegal and Mauritania and the many armed conflicts in East Africa. Increased population pressure also leads to greater water development and permanent human settlement in arid rangelands. Although the direct effect of water points on land degradation is relatively limited, the development of water supplies for more intensive use can upset an entire ecosystem. It may lead to *de facto* privatisation of land around the water point (Tshabalala, 1995) and change the relationship between traditional wet- and dry-season grazing areas, changing traditional dry-season grazing into year-round grazing.

However, not all forces are exogenous to the pastoral system. In the Borana region of southern Ethiopia, the number of milk-producing cattle per head of the pastoral population is falling due to indigenous population growth (Coppock, 1996). Consequently, the pastoralists face increasing poverty, declining food energy levels and greater risk from the effects of drought. Furthermore, the larger number of people in the region means that fuel wood is being cut at an ever-increasing rate. The inevitable result of all these pressures is land degradation. Drought often exacerbates such situations - in fact, the ability to recover after drought is one of the main indicators of the long-term environmental and social sustainability of arid grazing systems.

More than half of southern and eastern Africa is classified as semi-arid to arid. CAMPFIRE presents wildlife as a valuable communal resource with a valid claim to forage resources. Most extensively managed rangelands today are used by monospecies production systems. The reasons for this are (Trollope, 1984):



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- Domestic livestock can easily be owned, used and marketed, and are integral to the household production system.
- Although wildlife has a comparative economic and ecological advantage, it is not regarded as useful. Communal people in semi-arid and arid areas lack adequate legal, institutional, economic and technological resources to conserve both their rangelands and their wildlife. Fundamentally, they lack the incentives to do so.

Rangeland resources, critically important to community livelihood, are becoming increasingly fragmented through a combination of population growth and privatisation of the commons. The management costs of conserving them remain largely externalised (Western, 1996).

### **2.8.3 Monitoring of communal grazing areas in Lesotho**

Sehlabathebe, in the eastern mountains of Lesotho, has been the scene of pioneering efforts to enhance range management, livestock productivity and herd owner income by clearly defining a unit of grazing land (a Range Management Area) and specifying the authorised users of that land: members of a Grazing Association, which is open, upon payment of an annual fee, to all stock owners residing in the Range Management Area (RMA) concerned. A management plan has been developed by the Grazing Association (GA), with support from an externally funded project. Overall, this plan has been implemented successfully, although neighbouring communities have suffered due to their loss of access to the Sehlabathebe RMA. The Sehlabathebe model is now being tested in several other parts of Lesotho (Critchley & Turner, 1996).

According to Williams (1994), the economy of rural Lesotho combines a dependence on migrant labour in South Africa, income from the formal and informal sectors in the growing urban areas, and mixed farming. Tshabalala (1995) reports that, in Lesotho, rangeland is a communal resource

to which every community member has free access. Ivy (1992) asserts that, in the mountains, which form two thirds of the total land area at altitudes from 1750 to 3250 metres above sea level, livestock raising has always played a stronger role in subsistence strategies. Growing numbers of lowland stock keepers are moving towards stall-feeding, often of improved dairy cattle; sheep and goats are no longer widely owned. Natural conditions in the Lesotho mountains are favourable for livestock production, and Basotho herd owners have developed systems of local and interzonal transhumance to exploit the rich summer grazing at high altitudes and avoid the worst of the winter weather by keeping stock either in the lowlands or in the mountain valleys. Originally, the mountains were only used as summer "cattle posts" by the Basotho, who had, at that time, not yet been forced into the confines of their modern borders (Ivy, 1992).

Since Lesotho gained independence, Acts of Parliament and subordinate regulations have developed a framework of modern legislation and local committee structures around the indigenous principles of community management of a rotational grazing system. Within this system, chiefs continue to play a central role, and the transhumant origins of modern mountain stock-keeping are still reflected in the authority over mountain range lands accorded to principal chiefs. Government concern about overgrazing in Lesotho is almost as old as that about the related problem of soil erosion on arable land (Lawry, 1988). The 1988 survey by Lawry describes half the mountain rangelands as "badly affected by overgrazing", and the overall carrying capacity as having been "reduced by 25 percent". The following half century has seen many more estimates of the severity of overgrazing, sometimes ranging into hundreds of percent, accompanied more gradually by an acknowledgement that carrying capacity and hence overgrazing are not absolute parameters and must be defined with reference to seasonal and annual variations, herding strategies and off-range feeding, as well as pasture condition. Recent discussions (e.g. Tshabalala, 1992) quote more conservative estimates of overgrazing (30%-50%), and acknowledge how difficult it is to enhance the overall benefits already achieved by the individual owners of the national herd (Berliner, 1999).

According to Ivy (1992), administrative efforts to impose order and moderation on range use in Lesotho were aimed at promoting rotational grazing, limiting stock numbers and controlling stock movement. A number of rotational grazing schemes were introduced by the colonial authorities with the active or reluctant collaboration of the chiefs, although it must be doubted whether these schemes taught the Basotho anything they did not already know about the relationship between grazing patterns and range composition or quality. Regulations were introduced, requiring stock owners to obtain permits from their chiefs to move livestock from place to place or to use specified grazing areas, in the hope that chiefs would refuse to issue permits when government officers advised that carrying capacity was being exceeded. Very little direct limitation of stock numbers was ever accomplished.

Since 1980, a succession of new range control regulations have been promulgated within the changing framework imposed by the Land Husbandry Act of 1969 and the Land Act of 1979, and their subsequent amendments. The key aims of the policy-makers, based in the Range Management Division (RMD) of the Ministry of Agriculture since 1979, have been to reinforce rotational grazing management at local level, with the chiefs still playing an important role, and to reduce pressure on the range by imposing a grazing fee. Not surprisingly, successive administrations have been very wary of enforcing the last-mentioned measure. It was eventually promulgated by a military government in 1992, which imposed annual fees of M3.00 each for cattle and M.050 for small stock. In 1993, the newly elected government rescinded these regulations. Very few fees had actually been collected. Following decades of British conservation programmes focusing primarily on soil conservation but also incorporating the range management efforts described above, the United States government began to support soil conservation activities in independent Lesotho in the early 1970s. From 1982, support for range management was expanded through the Land Conservation and Range Development Project (LCRD). Range management work gradually replaced soil conservation as the primary focus of

USAID support, which has continued through the Lesotho Agricultural Production and Institutional Support Project (LAPIS), to the most recently established Community Natural Resource Management (CNRM) Project. The last project was terminated in 1995. Berliner (1999) made the interesting observation that the land tenure system in Lesotho has always been communal. Users of the land only have the right of use and not ownership, as would be the case in a freehold system. Individual households are allocated a residential site and land for cultivation, and share grazing on a communal basis.

#### **2.8.4 Monitoring of communal grazing areas in Zimbabwe**

There is open access to grazing resource use in the communal areas of Zimbabwe. There are no boundary rules, although households and communities know the boundaries of their communities and the boundaries of their grazing areas. There is no restriction on the number of cattle a household can keep (Critchley & Turner, 1996). As a result, there is no monitoring and sanctioning of grazing resource use. There is potential for communities to design rules for grazing resource use. Households are willing to monitor other households and to be monitored regarding the number of cattle they can keep, to ensure the sustainable use of grazing resources. If households are able to monitor one another, this may be a more cost-effective or efficient arrangement than to depend on an external agent to do the monitoring (Goqwana, 2000).

According to Marovanidze (1995), a large number of grazing schemes have been introduced in the rural areas of Zimbabwe, dating back to 1948. The integrated Rural Development Programme has funded over 25% of veld management schemes in Zimbabwe. The Departments of Agriculture, Technical and Extension Services (Agritex) and Research and Specialist Services (R & SS), the University of Zimbabwe (UZ) and the Environment and Remote Sensing Institute (ERSI), have jointly established a monitoring and evaluation

programme to study the ecology, economic and sociological impact of four grazing schemes in the Gutu District over a period of four years (1994-1998).

The cardinal feature of customary tenure, before its gradual erosion under the impact of colonial policies and population pressure, was its consonance with traditional land use systems, which in turn were well adapted to ecological limitations. Under communal tenure, at least in theory, all members of a community had a right of access to land for cultivation, pastoralism, hunting, fishing and residence. Social or family organisation was intimately linked with the exploitation of the land (Hardy, 1996). Geography could be seen in terms of social organization, land as a genealogical map.

The customary tenure system of the Shona people of Zimbabwe had a chief as the highest authority who was, by and large, a territorial ruler. The tribal area was subdivided into semi-autonomous wards, each under a hereditary headman. Each ward was a geographical and kinship unit containing a number of villages. The villages (kraals) were groups of households whose members were related by family ties, the kraal head being the head of the family. Land was held by the community, but individuals' rights were always secure. Grazing land was common property. The security enjoyed by the tribe's people was based on an inalienable right to share in tribal land. More than a means of production, land represented a hereditary right to belong to a community. However, although communal land customarily had no market value, this did not mean that it was freely accessible to everyone and anyone. The finiteness of land and natural resources was recognised and rationed through an allocation procedure based on kinship and local conventions.

During the ascendancy of the Settler Regime (1890-1980), attempts at communal land reform focused on moves towards granting farming rights (cropping land) while retaining communal grazing. These attempts failed largely because the government lacked legitimacy,

planning communal reform within the context of a racial national land policy framework. These contextual flaws no longer exist today. The people are represented at both local and central level. Communal land tenure reform can take place in relation to reform of the commercial land tenure system, and communal interests can participate in the policy-making process. However post-colonial governance has thus far has featured the further ascension of bureaucratic governance based on co-management by 'democratic' local and central government. Customary authorities have formally been replaced by democratic local authorities. Despite the law, which defines the local authorities as communal land authorities, custom and a sense of community remains the organising principle of communal land. There is a dialectical relationship between tradition (lineage) and modernity (the individual within a democratic system) (Hatch & Zacharias, 1995).

As agreed by Tshabalala (1995) and Hardy (1996), CAMPFIRE in Zimbabwe seeks to:

- obtain the voluntary participation of communities in a flexible programme which incorporates long-term solutions to resource problems (management);
- introduce a system of group ownership with defined rights of access to natural resources, for the communities residing in the target areas;
- provide the appropriate institutions under which resources can be legitimately managed and exploited by the resident communities for their own direct benefit;
- provide technical and financial assistance to communities joining the programme, to enable them to realise these objectives.

Table 2.2 highlights possible configurations for communal rangeland and livestock ownership. Uphoff (1986) suggests that, the better bounded (enclosed) both the resource (rangelands) and the resource users (stock owners) are, the easier the management task will be.



**Table 2.2:** Communal rangeland and livestock ownership in Zimbabwe (Critchley & Turner, 1996)

| RANGELAND OWNERSHIP | LIVESTOCK OWNERSHIP   |  |
|---------------------|---|--|
|                     | PRIVATE   | COMMUNAL   |
| <b>PRIVATE</b>      | (1) RANGELAND & STOCK PRIVATELY OWNED<br>Private farms (conservation costs internalised).<br>Due to open-access use, communal rangelands are privatised by livestock owners (conservation costs externalised) | (2) STOCK COMMUNALLY OWNED BUT FORAGE PRIVATELY OWNED<br>A livestock co-operative on private land. Rarely found in Zimbabwe. |
| <b>COMMUNAL</b>     | (3) PRIVATELY OWNED STOCK ON COMMUNAL LAND<br>If livestock owners were accountable to the community for the use of rangelands, then conservation costs would be internalised.                                 | Wildlife as common property on communal rangelands (CAMPFIRE).<br>Conservation costs internalised.                           |

CAMPFIRE regards wildlife as a valuable communal resource with a valid claim to communal forage resources. Competition for these resources is highlighting the need for land use plans based on clear tenure rights, which consolidate rules of access and provide a mechanism capable of allocating scarce resources productively, sustainably and equitably. An exchange mechanism is needed which can market the natural resources "produced" to resource "user groups" (Critchley & Turner, 1996).

According to Berliner (1999), the prevailing dualistic government structure would mean a co-management institution, which holds resource user interest groups accountable to the local authorities. The authority would have to balance two overriding interest groups at community level, namely the resource **owners** and the resource **users**. The essential features of this institutional model are:

- Common property rights (tenure) belong to the entire community, organised within a village assembly.
- The district co-ordinates village tenure through natural resource committees (NRCs)

within wards, which combine traditional and elected leadership with technological advice from civil servants.

Village-based natural resource user groups are accountable to the village, e.g. livestock owners (users) to rangeland owners (producer community). The CAMPFIRE programme has introduced statute-supported common property institutions in rural communities in Zimbabwe. This has been a difficult task, in view of the inherent contradictions between statutory and customary tenure systems. This dualism pervades the management of all communal land-based resources. It has resulted in divided authority at community level, and dissonance between the community and local authority. In short, the wider policy environment has not facilitated the full fruition of community-based wildlife tenure (Uphoff, 1986 & Marovanidza, 1995).

#### **2.8.5 Monitoring of communal grazing areas in Swaziland**

The Grazing Land Management Demonstration (GLMD) model, initiated in Swaziland in the early 1980's, has proved to be a formula for grazing management that, though no panacea, has endured and brought benefits to both stockowners and range resources. GLMD's are group ranches, each operated by a GLMD association whose members may individually contribute a limited number of cattle, to be grazed as a single herd. Rotational grazing is practised and stocking density controlled. Animal health and breeding programmes are applied. The GLMD associations are institutions formed for a particular purpose, and while they have not expanded spontaneously, they have at least endured (Critchley & Turner, 1996).

### **2.9 CONCLUSION**

There are approximately 9 million hectares of pastoral rangelands in the winter rainfall region of South Africa (Mackay, 1994). Environmental implementation and management plans are binding, and provision should be made for compliance with these plans by all

spheres of government and other government bodies. The purpose will be to describe how government departments plan to ensure that any of their activities that could affect the environment, will comply with the principles and national norms of environmental management. The behavioural sciences continue to represent an even more important terrain for research; for instance, the influence of culture on people's adoption or rejection of improved or harmful practices; their views on the environment and the natural resources; concepts such as conservation and the optimal utilisation of resources for sustainable agriculture (Romuld *et al.*, 1998). This institutional arrangement would provide a communal resource property regime within the local government framework, and establish a market mechanism to mediate between the interests of social security and cohesion, with those of individuality and wealth accumulation. The flaw in this design relates to the influence of wealth and power elites. The majority of livestock is owned by a minority of the community. That minority dominates the leadership of both the traditional and democratic authorities. The 'cattle barons' are not motivated to support a multispecies land management system that threatens their free and open access to the rangelands. Why would the rich tax themselves to the benefit of the poorer members of society? However, livestock owners are interested in (Romuld *et al.*, 1998):

- ensuring that forage use is open to them at minimum cost;
- maintaining exclusive access to the resource.

These two interest groups are not compatible, hence the massive capital losses during droughts. Even if the village were empowered with proprietorship of all forage resources, the 'cattle barons', as leaders, would still preside over the resource. Should they agree pay to the village a grazing levy on their own use of village forage, they would have a right of access which would be enforced not only by the resource users, but by the entire village as resource producers. The benefits would be (Romuld *et al.*, 1998):

- resource users would have enforceable exclusive access (security of tenure), and therefore greater control (stocking levels) over the resource (forage) on which their livelihood depends;
- the community would have greater social security through the resource rent raised from granting access;

- the rangeland would be conserved (sustainable use) through the application of a supply and demand market mechanism (supply/demand = cost of use), and by reinvesting some of the rent in the rehabilitation and conservation of rangelands.

The public purse, to which the livestock owners contribute, would be locally accountable to the members (residents) of a village resource regime. As community leaders, the 'cattle barons' would have considerable influence over the use of the grazing levy.

The local power elite had customarily been accountable to the community. A fiscal arrangement would provide a formal rather than a patrician approach to the issue. A resource use charge (rent) for a given period of time, would grant the user group legitimate exclusive access and the producer group a local revenue base in order to meet both social security and conservation needs. Linking the producer and the user by means of a market mechanism provides for a more predictable and sustainable future. This applies not only to forage resources, but to all resources where a defined user group (irrigation, crafters, beekeepers) desires access to communally owned resources. The worst-case scenario would be the perpetuation of the current blurred boundaries between formal and informal authorities, resources, resource producers and users. In such circumstances, as is presently the case, the only resource manager remains the humbling effect of the rainfall variability of the semi-arid areas (Romuld *et al.*, 1998).

The National Environmental Management Act (NEMA) (107/1998) aims to regulate and guide co-operative governance between the three spheres of government, and within each sphere, with regard to environmental matters (Department of Land Affairs, 2001). This Act creates a number of structures and procedures for improving co-operative environmental governance. These include the requirement that national and provincial government produce Environmental Implementation Plans and Environmental Management Plans. In the cases of some departments, such as the Department of Land Affairs (DLA), a consolidated Environmental Implementation (EI) and Management Plan (MP) is required. The Act promotes integrated environmental management by allowing a department such as the DLA to draw up its own procedures for assessing the environmental impact of its activities,

provided that the procedures comply with certain basic requirements set out in the Act. The NEMA also makes provision for improved enforcement of environmental legislation (Department of Land Affairs, 2001). The environmental issues relating to land use that must be controlled, include (Dillon, 1998):

- Overgrazing;
- Pollution of the environment by runoff water and solid waste disposal;
- Livestock in residential areas due to lack of fencing in communal grazing areas;
- Management of commonage areas;
- Wildfire, and protection of grazing area from fire;
- Land ownership within the commonage areas;
- Co-ordination between town and agricultural planning;
- Unplanned settlement in residential and surrounding areas; and
- Environmental responsibilities of the persons using the land for grazing purposes.

From the literature review it is evident that the lack of research on communal grazing areas, and particularly technology, effective institutional arrangements and policy issues, is of great concern and should be addressed. It is evident from the discussion in this chapter that knowledge of management and the integration of environmental issues into communal grazing areas is very limited. The following chapters will focus on identifying these variables.

The research methodologies and the measurement of variables used in this study will be given in Chapter 3.

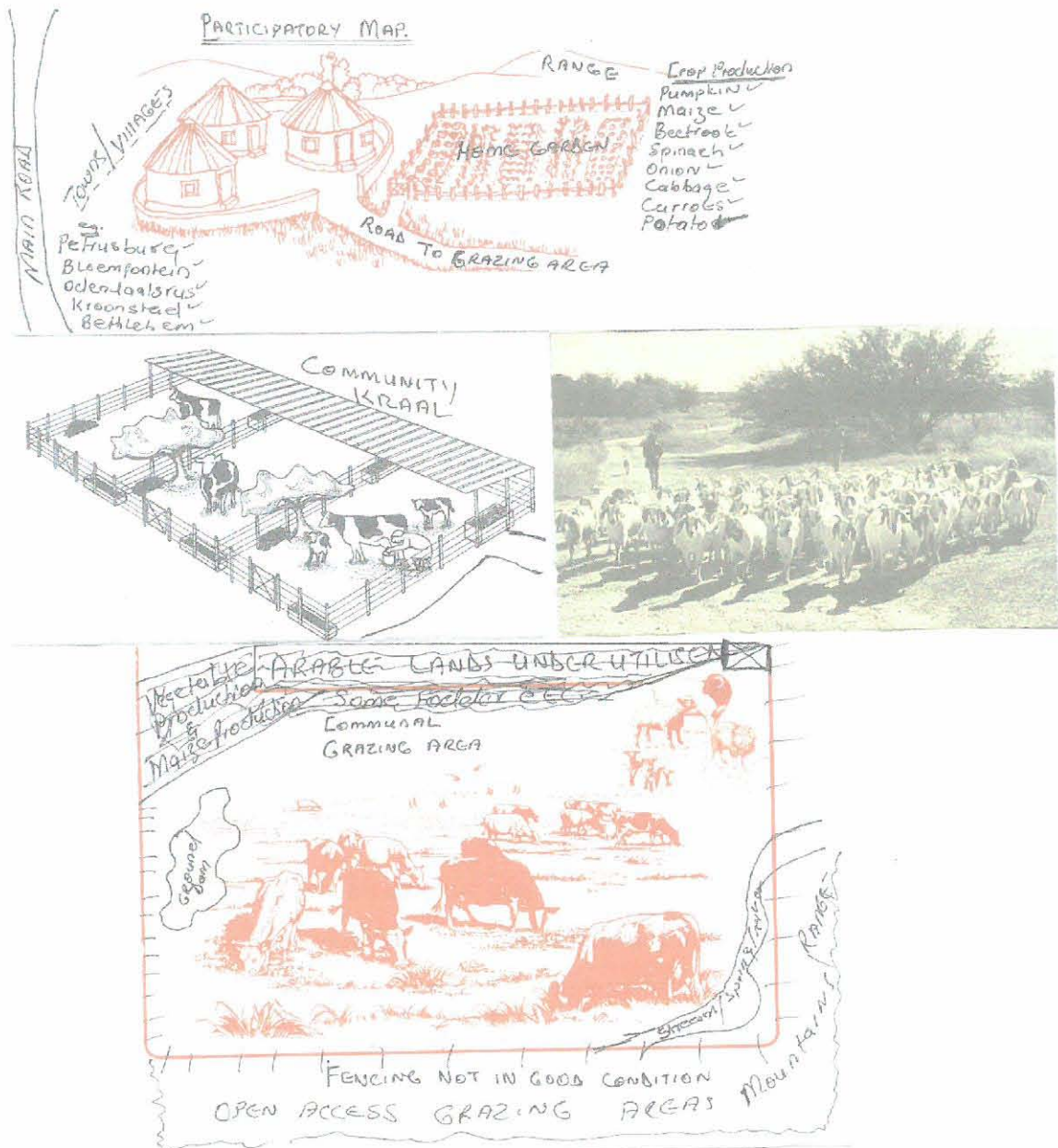
## CHAPTER 3

# RESEARCH METHODOLOGY

### 3.1 INTRODUCTION

The research methodology, involving a number of aspects of investigation and analyses, will be discussed in this chapter. This includes an audit of the infrastructure on communal and commonage land and an examination of the options taken. Demands and expectations with regard to communal and commonage land, were also investigated. This required site visits and interviews with government officials, community leaders and town clerks, as well as survey processes.

Due to the multidisciplinary nature of the research project, the Participatory Rural Appraisal (PRA) approach (transect walk, zigzag, river-bed and mapping) was employed (Chambers, 1990 & Van Zyl, 1998). Diagrams, including maps, sketches and transects, were used for different purposes such as planning and field discussions between participants, as well as to clarify certain issues and questions. Figure 3.1 shows the participatory mapping by the participants. Steps in the Farming System Research and Extension (FSR/E) model for the development and extension of new agricultural technology (Bembridge, 1991), were looked into. Steps followed for the hypothetical site assessments were based on a practical example of the land capacity (Plaas, 1997).



**Figure 3.1** Participatory mapping

Participatory mapping, as shown in Figure 3.1, is used to locate houses, services and infrastructure within an area. Maps in this study were used as a visual stimulant to identify the parameters within which local people live, and to facilitate discussion about the perceived importance of infrastructure provision.

The key issue guiding the investigation was the participatory aspect, implying the full involvement of the participants, namely the people farming on communal and commonage land in the Free State. The farmers were involved in the survey during visits to their farming areas. The methods used within the group sessions involved nominal group techniques, to ensure that no potential contributions were overlooked or overruled. This was invariably followed by Delphi procedures, to facilitate interaction and possibility give participants the opportunity to associate themselves with what they believed to be the best-founded viewpoints (Düvel, 2003).

### **3.1.1 Measuring instruments**

A related research project, conducted by the Economic Services division of the Free State Province's Department of Agriculture in 1998, was used as a guideline in compiling the questionnaire, and it followed a logical and appropriate sequence. The wording has been carefully formulated to eliminate any possible ambiguities. The spaces provided on the questionnaire for recording information, were arranged appropriately so that the data would be readily accessible for analysis. In order to satisfy the objectives of the study, a questionnaire was developed for specific use among farmers on communal and commonage land (Appendix A). The questionnaire contains structured questions, making provision for farmers' comments by means of open-ended questions and encouraging respondents to express their own perceptions in their own words. Minor corrections were made before the questionnaire was finalised. Three farmers were identified for the pilot study by means of the questionnaire.

Structural interviews were held with participants at their respective farming locations, so that a questionnaire could be completed for each farmer. An overview of the commonage, environmental issues, grazing systems and management priorities was presented to farmers before conducting the interviews. All questionnaires were filled out by the interviewers. The researcher, Extension Officers of the Free State Department of Agriculture and post-graduate agricultural students involved in similar projects, conducted all the interviews. In general, the procedure followed when conducting the interviews was aimed at facilitating the

gathering of ideas, viewpoints, opinions, suggestions and comments from the farmers on communal and commonage land. Problems were experienced with timely response to the survey, which resulted in the survey lasting from April to June 2002, while some data was only received at the end of July 2002. Special care was taken during the interview sessions to ensure that respondents understood the issues. A lot of time had to be spent controlling and cleansing the data during and after data capturing on the computer (spreadsheets).

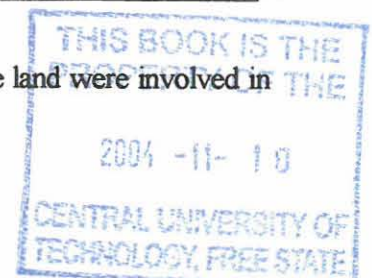
### 3.1.2 Sampling methods

A stratified random sampling method was employed throughout the survey to select the respondents. The interviews were held throughout the province, usually at regional level, and 35 towns out of a total of 78 towns were visited in all 5 district areas. Such visits were usually preceded by discussions with the local Extension Officers, to win their understanding and support. The sample was representative of small-scale farmers farming in communal and commonage areas. These areas are sufficiently representative of the practices in the Free State. Questionnaires were completed with 70 farmers. The degree to which the farmers on communal and commonage land were involved in district areas is indicated in Table 3.1.

**Table 3.1** The sample size and percentage of farmers involved in interviews

| DISTRICT AREAS   | NUMBER OF TOWNS | RESPONDENTS (n=70) | SAMPLE %    |
|--|-----------------|--------------------|-------------|
| Eastern Free State (Thabo Mofutsanyane: DC 19).                            | 20              | 38                 | 54.3%       |
| Southern Free State (Motheo: DC 16 and Xhariep: DC 17).                    | 9               | 17                 | 24.3%       |
| Northern Free State (Lejweleputswa: DC 18 and Northern Free State: DC 20). | 6               | 15                 | 21.4%       |
| <b>TOTAL</b>   | <b>35</b>       | <b>70</b>          | <b>100%</b> |

Approximately 40% of all farmers farming on communal and commonage land were involved in



the interview, which is an extremely high representation, making it one of the most extensive surveys ever conducted among farmers on communal and commonage land in South Africa. The smallest sample was in the Southern Free State (21.4%), but even in this case, the fact that 15 farmers participated reflects reasonable support.

### **3.1.3 Selection of indicators**

The purpose of this section is to describe the selected indicators that were used in the survey of farmers on communal and commonage land. Various indicators were suggested by agricultural economists from the Free State Department of Agriculture. The indicators used to rank farmers' level of success included standard of living, income, consumption (or expenditure), access to information and social services, finance, training, and more "intangible" factors such as freedom or political and human rights (Sirur & Van den Brink, 1995). The following factors were also assessed:

- ◆ the management level of funds;
- ◆ the gross income generated by the project;
- ◆ the level of respondents' training;
- ◆ co-operation between parties in general; and
- ◆ the availability of markets.

It is possible to classify and use some indicators either as continuous or categorical indicators, depending on how they were approached or measured. An example, for instance, is the number of extension visits to farmers on communal grazing areas per year, which can be measured and classified as a continuous indicator, or as a categorical indicator if the researcher is only interested in whether the farmers received extension visits or not.

#### **3.1.3.1 Continuous indicators**

These indicators take any numerical value in a real interval when measured accurately (Ramanathan, 1992; Nel, 1998):

- Age of the farmer;

- Number of people in household;
- Education level of farmer;
- Years of farming experience in communal grazing area;
- Management skills; and
- Herd size.

### **3.1.3.2 Categorical indicators**

These indicators are denoted by a one or a zero, and are also called binary or dummy indicators (Nel, 1998):

- Literacy of farmer;
- Gender;
- Traditional medication used (herbs and plants);
- Training sources;
- Record-keeping;
- Information sources;
- Availability and accessibility of roads, transport, telephone, electricity, markets, government, extension and agricultural research institutions, and
- Location of farmer/farm

The education indicator is measured in terms of the highest grade the farmer has obtained in formal education. Farming skills or experience is approximated based on the number of years' farming experience on the piece of land in question. Management skills are approximated based on the number of days the farmer is planning ahead. Farm and herd size are scale indicators.

### **3.1.4 Data collection**

The relevant data was collected using techniques adapted from Dillon and Hardarker (1993):

- Written reports and publications by the farmers and relevant agencies, scientific journals, theses and dissertations, conference proceedings as well as past and present

statistics, will be used to supplement the secondary data. First-hand observation of a programme is another important source of qualitative data for evaluation. The main purpose of observational evaluation is to obtain a thorough description of the programme, including programme activities, participants and the meaning they attach to the programme. This study includes careful identification and accurate description of relevant human interactions and processes.

There are several advantages to the observational fieldwork conducted for evaluation purposes in this study (Jordaan, 1997):

- it provides a better understanding of the context within which the study activities take place;
- it provides important information participants may ignore or omit, willingly or unwillingly, in an interview;
- it permits the researcher to present a more comprehensive view of the study by combining his own perceptions with the perceptions of others;
- it facilitates understanding and interpretation of the study area by providing personal knowledge and direct experience.

### **3.1.5 Data capturing**

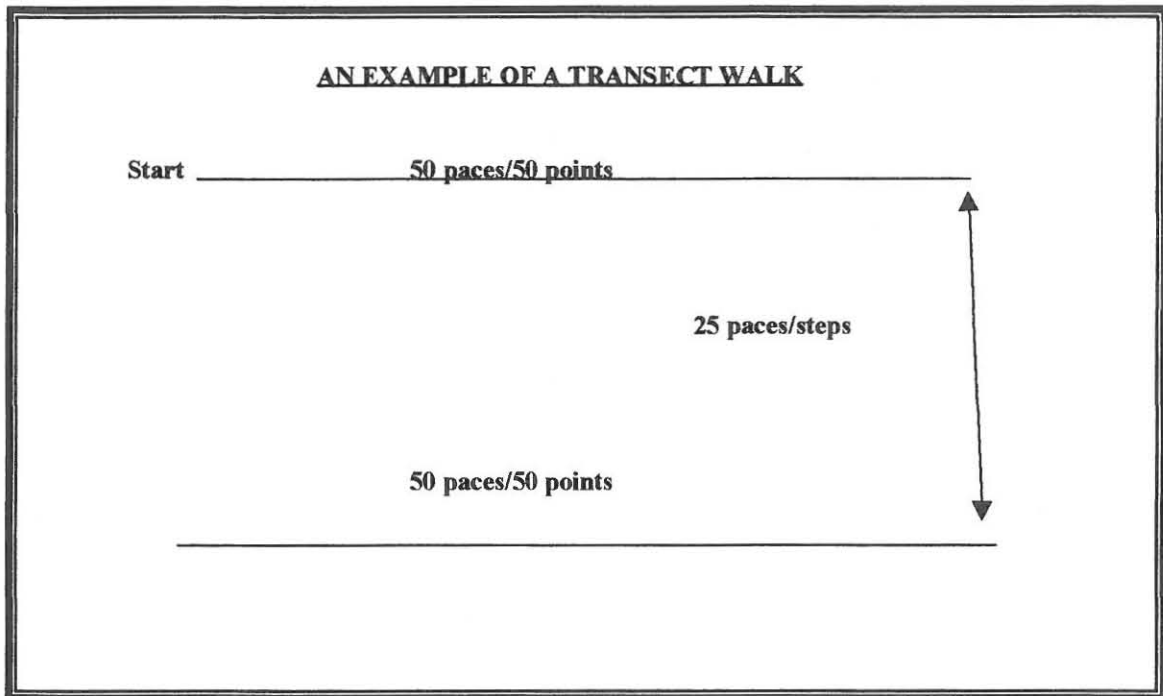
Data collection and interviews took place between May and December 2002. All the respondents interviewed were black farmers, farming on communal and commonage land. The areas were identified, and at least 2 farmers were selected and interviewed in each town. The selection ranged from backyard farmers, farmers at cattle posts and respondents farming at project and farm level, in a group or as individuals, to individuals farming on communal land and commonage land, meeting certain quantifiable criteria, as shown in paragraph 4.6. It was ensured that each member of the sampling population had the same probability of being selected. The sample selected consisted of 78 respondents. It was expected that approximately 11% of the total number of questionnaires would be spoiled during the completion process.

The interviews were conducted with individual farmers at their respective farming locations. The

questionnaire was not handed to the farmers, but was completed by the interviewer. The language used in the interviews was Sesotho. The researcher personally conducted all interviews, and the completion time varied between 60 and 120 minutes. In general, good co-operation was obtained from small-scale farmers.

### **3.1.6 Vegetation**

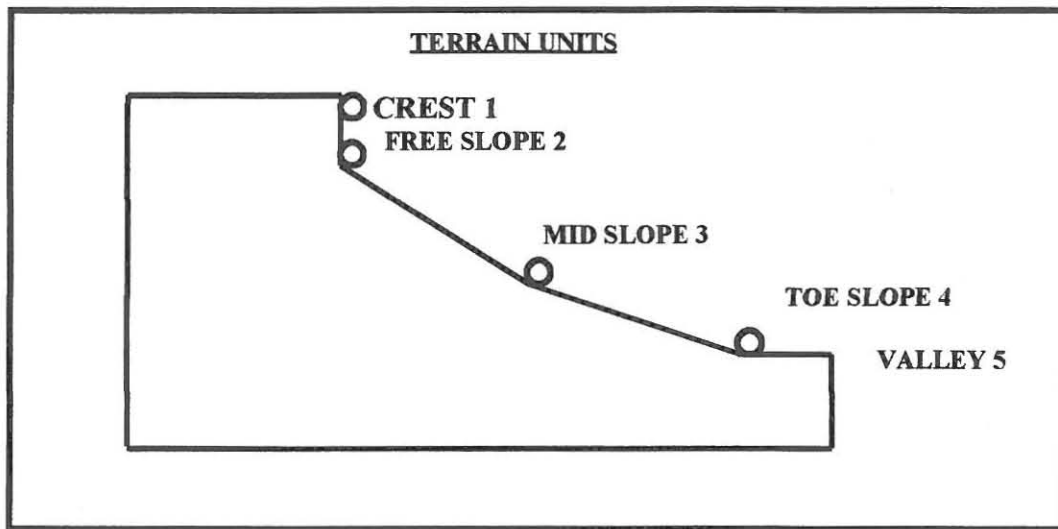
Jordaan (1997) is of the opinion that the agricultural potential can be determined by means of guidelines for establishing and monitoring the range condition on a regular basis, and if the grazing capacity can be determined and ecologically interpreted. Several techniques have been developed over the years to determine rangeland condition. Example of these is the ecologically-based techniques of Tainton, Edwards and Mentis (1980), Vorster (1982) and Plaas (1999). These techniques categorise species according to a defoliation grading. There are also agronomically-based techniques (Barnes, Rethman, Beukes & Kotze, 1984), which involve categorising the species according to their production potential. Accordingly, the need arose for a comprehensive system, which would enable the agricultural researcher to develop a database for all relevant data to be used for rangeland condition and grazing capacity assessment. The Integrated System for Plant Dynamics (ISPD) computer package developed by the Department of Plant and Soil Science at the Potchefstroom University, is such a comprehensive system (Jordaan, 1997). Species composition data were collected in three regions in the Eastern Free State, Northern Free State and Southern Free State by means of a transect walk, as shown in Figure 3.2.



**Figure 3.2** An example of a transect walk while identifying grass species (Plaas, 2000)

A suitable pointer was used while walking in a straight line, following the counter, to identify grass species. After each step, the grass nearest to the stopping point was identified and recorded. At each site, 50 paces/points transects were walked from a central point in upslope, downslope and cross-slope directions. The step-point method (Mentis, 1981) is used nationally in South Africa, and was adapted by the Free State Department of Agriculture and used locally to determine vegetation characteristics. This activity took place during September and December 2002, after the first rains had fallen. These three regions were selected because the degradation gradients of vegetation in these areas have already been determined (Department of Agriculture, 2000).

Sour veld can be described as veld that grows rapidly in early spring and provides good summer grazing, but which, after ripening, rapidly declines in nutritional value and becomes less palatable. In order to obtain data within a specific period of time, grass species were collected from different terrain units, as indicated in Figure 3.3.



**Figure 3.3** Terrain units where grass species were collected (Plaas, 2000)

A total of 16 grass tufts was recorded at each site, providing an adequate sample size to retrieve a minimum level of precision for a coarse-scale investigation (Hardy, 1996); however, time constraints prohibited the collection of more data. At 2-metre intervals along each transect distance to the nearest grass tuft, the species of the nearest grass tuft, its basal circumference, distance from its nearest neighbour and the species of the nearest neighbour, were determined. These quantitative vegetation data were gathered and interpreted to provide very accurate results.

Plaas (1999) defines grazing value as the potential genetic ability of a grass species to produce grazeable plant material. It can also be seen as the value of a grass species for grazing animals, in this case particularly bulk grazers such as cattle, buffalo and zebra. The grazing value in this context is a non-seasonal, long-term value under normal, natural growing conditions.

### 3.1.7 Data analysis

The data collected was coded and prepared for analysis by computer (Annexure B). Since the data collected was of a multivariate nature, it required some form of multivariate analysis. The Computer Centre at the Central University of Technology, Free State did the data analysis. The captured data was checked against the original questionnaire before the final calculation of frequencies, averages and percentages was done.

### 3.1.8 Statistical analysis

The explanatory indicators selected from the literature were tested for significances between the respondents considered, using one the following statistical tests (Melville & Goddard, 1996; Rea & Parker, 1997; Wright, 1997) (see Annexure C):

- The **Chi-square test** will be used in the analysis of categorical explanatory indicators with large frequencies.
- The **t-test** will be used to determine significances between two continuous explanatory indicators with a normal distribution.
- The **z-test** will be used as a means test to identify statistical differences in this study. The critical value of the test is  $z^{***} = 2.57$ .

The age of the respondents is an indicator that had a normal distribution, and will therefore be used as a summary statistic. For other indicators that had skewed distributions, the median will be used as a more representative criterion in a data set where the distribution is skewed (Nel, 1998).

### 3.2 CONCLUSIONS

It is clear from the discussions that the long-term sustainability and productivity of rangelands in southern Africa, and particularly in the Free State, is closely linked to the availability or sustainability of suitable and appropriate techniques to monitor the environmental issues and the changes in the species composition of plant communities. The resources available, the internal and external infrastructure in the Free State, are not maintained well enough to support the effective utilisation of resources on communal grazing areas. The influence of the rapidly increasing population growth on the deteriorating natural resources, which are essential for the development of farmers on communal grazing areas, is very serious. Guidelines are essential for the integration of the environmental planning into communal grazing systems and the assessment of the procedures that are currently used, as well as for making recommendations for use by range survey personnel and other users in the Free State.

## CHAPTER 4

# RESULTS AND DISCUSSION

### 4.1 INTRODUCTION

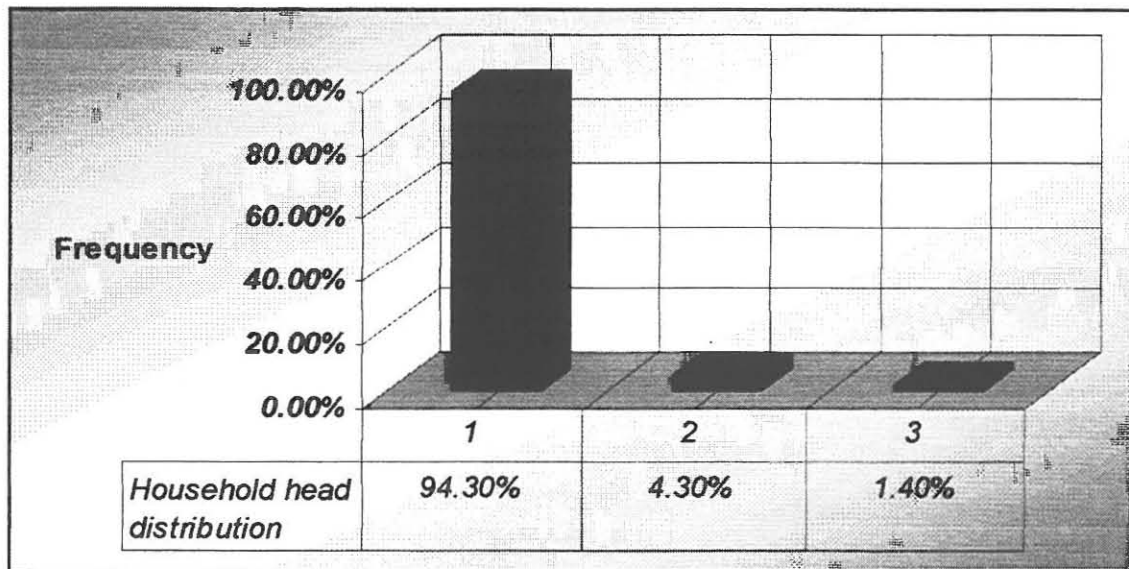
Continuous monitoring and regular evaluation should be a normal part of communal and commonage land development. Certain circumstances, however, may require a general reassessment. The research on the integration of environmental planning into communal and commonage land in the Free State has uncovered a strong relationship between development and conservation issues. Development and conservation should be regarded as essential components of one indispensable process, and therefore they should not be seen as being in opposition to one another. Currently, development is unsuccessful because it does not fully meet human needs, and often destroys or degrades its resource base. In this study, the approach to development is both people-centred, concentrating on improving the human condition, and conservation-based, maintaining the variety and productivity of nature.

The main findings of the research project among communal and commonage farmers in the Free State are discussed in this chapter. This research report and the studies that led to it are meant to be practical contributions to the creation of effective development strategies for commonage areas in the Free State. Practical suggestions about what farmers, government and outside agencies can do to enhance the livelihoods of people farming on commonages should not be confused or obscured by lengthy analysis of the subject. However, it is important that the recommendations should be based on solid analysis. The findings should be seen as indicative of some trends that perhaps require further investigation in order to ensure an in-depth and comprehensive profile of the issues in question. Problems related to management practices, livestock productivity and support services, based on a survey carried out in 2001, are identified and discussed in this chapter. It is also important to investigate the characteristics of farmers within the farming area.

## 4.2 GENERAL PROFILE OF RESPONDENTS

### 4.2.1 Status of male- and female-headed households

Households headed by an older (≥ 69 years) person are especially vulnerable to poverty unless the household heads have access to pension income from past employment in the mines or other formal-sector jobs (Sirur & Van den Brink, 1995). In a closed question, farmers were asked what positions they hold in the household. Figure 4.1 provides a graphical illustration of the percentage of households headed by men, women and children respectively.



**Figure 4.1** Distribution of male, women and children headed households

The majority (94.3%) of the households in this survey were headed by men. About 4.3% of the household heads were women, while 1.4% of the households were headed by children. This finding is in line with the finding of Sirur & Van den Brink (1995) in the study conducted in the Lesotho communal grazing areas. The authors concluded that, in the Basotho culture, it is generally accepted that a man is the head of the household. This has very important implications for knowledge support services in communal and

commonage areas. This should be taken into account when training programmes are designed and when new ideas and technology are introduced to farmers. Marfo (2000), in studying gender and head of family distribution, stated that 87% of household heads are males, while females headed only 13% of the households. In the farming community, males dominate both within the households and as head of the family.

#### **4.2.2 The age of farmers and distribution of family members**

The effectiveness and efficacy of farmers farming on communal and commonage land is a direct function of their competence. The professionalism of farmers farming on communal and commonage land stems not from the techniques or recipes they use, but from the way they face unique environmental, financial, managerial and human relations challenges. Seen from this perspective, age, experience, proper training and competence can be regarded as prerequisites for the effective utilisation of communal and commonage land. Many studies have shown that the farmers in the developing rural areas of Southern Africa tend to be too old to farm effectively (Williams, 1994). Claassen (1998) reported that most of the farmers in the Qwaqwa area (53%) were older than 50 years of age. The age of respondents in this study was determined by means of a closed question. In this study, the term “range” refers to the difference between the highest and lowest score (high-low). The range describes the score distribution, but cannot be compared to distributions with a different number of observations. In Table 4.1, the range is 58 (93-27).

**Table 4.1** Age structure of the farmers in the sample (n=70)

| Farmer's Age        | Frequency | Percentage (%) |
|---------------------|-----------|----------------|
| ≤ 39 years          | 4         | 5.7%           |
| 40 years - 49 years | 18        | 25.7%          |
| 50 years - 59 years | 18        | 25.7%          |
| 60 years - 69 years | 16        | 22.9%          |
| ≥ 70 years          | 14        | 20.0%          |
| <b>Total</b>        | <b>70</b> | <b>100%</b>    |
| <b>Mean age</b>     | <b>57</b> |                |

When analysing the age of respondents on communal land, the average age of farmers was found to be 57 years, with a sample standard deviation of 5.83 years. Respondents in the groups 40- 49 years and 50-59 years constituted 25.7% respectively.

Larger families tend to put a lot of pressure on the heads of the households to provide for their most basic needs. Other researchers have found that important aspects such as the education of the children often suffer first (Claassen, 1998; Mukhala, 1999). Marfo (2000) reported that, traditionally, youths younger than 18 years of age and elderly persons who are 55 years and older are considered unemployable in the formal sector, and are therefore seen as dependent on other members of the family for their daily subsistence needs. In the questionnaire, farmers were asked to give the number of people residing in their households and the number and age of people directly dependent on them. These results are summarised in Table 4.2.

**Table 4.2** Number of dependants per respondent (n=70)

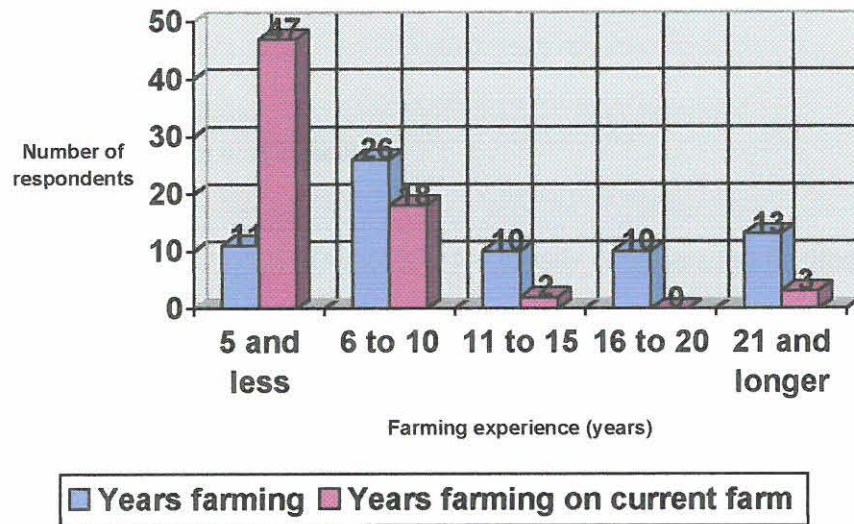
| NUMBER OF DEPENDANTS             | NUMBER OF RESPONDENTS | RESPONDENT % |
|----------------------------------|-----------------------|--------------|
| None                             | 5                     | 7.1%         |
| ≤ 3                              | 14                    | 20.0%        |
| 4-6                              | 32                    | 45.7%        |
| 7-12                             | 17                    | 24.3%        |
| ≥ 13                             | 2                     | 2.9%         |
| <b>Mean number of dependants</b> | <b>5</b>              |              |

The variable family size presented a skewed distribution and therefore the median is used as the summary statistic. The median family size of the total sample is 5 people, and the family size varies from 1 to 16 people per household. In a similar study, Nel (1998) reported that the median family size in the Qwaqwa area is 7 and varies from 1 to 15 people per household. In contrast, Marfo (2000) reported the median family size of the total sample to be 6, varying from 3 to 17 people per household. It can be assumed that stress and pressure are greater on those farmers with more people depending on them. It is important to note that the family size of the households is, in most cases, increased by other family members staying with the farmers. From the farmers' point of view, the additional family members could supplement the labour force. The relatively large number of males residing with the respondents may be ascribed to a number of factors, including the lack of job opportunities, poverty and succession. In most cases, females get married and leave the household.

### **4.2.3 Competence of respondents**

#### **4.2.3.1 Farming experience**

The practical ability to do the general work required on a farm is essential if farmers want to work their way up the farming ladder (Slater & Throup, 1981). The report by Claassen (1998) suggests that farmers with less than 6 years' experience of independent farming lack managerial experience. A more specific analysis of respondents' competence can be obtained by focusing on the practical farming experience of individuals. It must be taken into account that formal qualifications (*per se*) in this regard do not provide a guarantee of competence or success as far as farming on communal land is concerned. Information on the practical farming experience of independent farmers was obtained via a closed question. Figure 4.2 illustrates the practical farming experience of respondents.



**Figure 4.2** Number of years respondents have spent farming on the land (n=70)

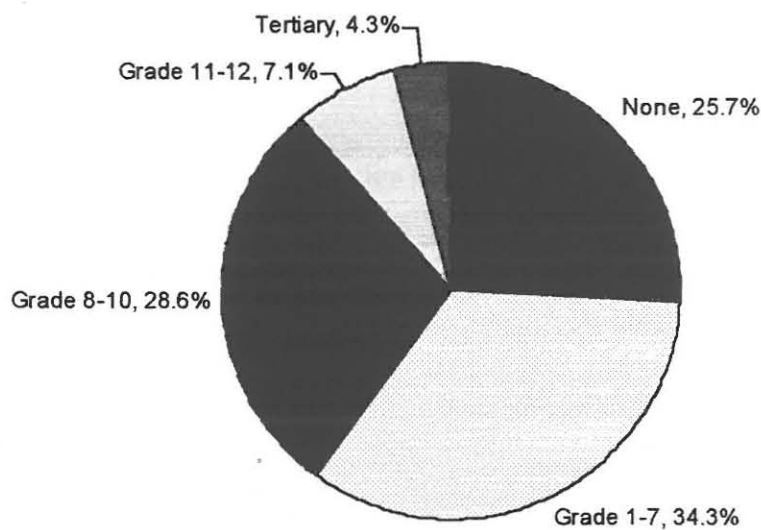
The variables “years of total farming experience” and “years of experience farming on current land” presented skewed distributions, therefore their medians were used to summarise the statistics (see Figure 4.2). The average farming experience of 7 years on communal land shows that farmers had farmed on the land for a reasonable number of years. The majority of the farmers (47) had  $\leq 5$  years farming experience on the current farm. The total number of years spent farming varied between 5 and 21 years, with 15 years as the average, which shows that farmers had a lot of farming experience. Most of the farmers (26) had 6 to 10 years’ farming experience. This can be compared with the findings of Marfo (2000), who reported that the farming experience of cattle farmers in Mopeane in the Rustenburg district varied between 5 and 50 years, with 11 years as the median.

Bembridge (1975) showed that practice adoption and farming efficiency are negatively correlated ( $r = -0.2$ ) with the number of years of farming experience. This means that it is more difficult to introduce new technologies to experienced farmers than to inexperienced farmers. Less experienced farmers are more open to technological innovations with high returns and should therefore be more efficient or productive. In this study, years of farming experience show a significant positive correlation ( $r = 0.29$ ,  $p > 0.05$ ). There is no

significant difference (at a 99.5% test level) between the respondents' respective levels of farming experience.

#### 4.2.3.2 Skills, capabilities and education

Persons with less than four years of schooling are usually considered to be illiterate, and this group had difficulty in understanding the guidelines for financial planning (Williams, 1994). Williams (1994), Sirur & Van den Brink (1995) and Claassen (1998) agree that education status and poverty are negatively correlated, that is, people with low educational levels are much more likely to be poor. Williams (1994), Claassen (1998) and Mukhala (1999) report that there is strong evidence that many educated farmers are more successful than those less educated, and that the better educated farmers outperform those with lower levels of education. Information about the level of education was obtained from the respondents via a coded question. An overview of the findings is presented in Figure 4.3.



**Figure 4.3** Exposure of farmers to schooling (n=70)

As can be seen in Figure 4.3, 25.7% of the respondents have no formal education. The educational level of the farmers varies from no school education to tertiary level education, with the majority (34.3%) having attained a level between grade 1 and 7. In all cases, there is a realisation among respondents that they require more knowledge. In Qwaqwa, Nel (1998) found that both the educational and literacy levels of farmers were far lower than the above-mentioned levels, with only 7% of farmers and their spouses having educational qualifications higher than grade 12. Marfo (2000) reported the educational level of farmers in the Rustenburg district to be high, with 17% of the farmers having a tertiary education.

Drawing on the statements by local people that were recorded during the survey, it was found that a large proportion of very poor households do not have any marketable skills. Among those who do, sewing, knitting, shoe repair, building and handicraft (making brooms and mats out of local grasses) were cited as the most marketable skills. However, many of those possessing these skills do not, or no longer have, the means to market themselves. This is due to inability to purchase equipment, tools and other input materials. It may also be due to ill health and/or a general physical inability to perform types of work the respondents may have done in the past. Table 4.3 correlates the educational qualifications of respondents with different age groups.

**Table 4.3 Educational qualification by age of respondents**

| Educational qualification | Age of Respondents |            |           |            |           |            |           |            |           |            |           |            |
|---------------------------|--------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
|                           | ≤ 39               |            | 40-49     |            | 50-59     |            | 60-69     |            | ≥ 70      |            | Total     |            |
|                           | f                  | %          | f         | %          | f         | %          | f         | %          | f         | %          | f         | %          |
| None                      | 0                  | 0          | 0         | 0          | 2         | 11         | 5         | 31         | 8         | 58         | 15        | 22         |
| Grade 1-7                 | 0                  | 0          | 9         | 50         | 8         | 44         | 6         | 38         | 0         | 0          | 23        | 33         |
| Grade 8-10                | 3                  | 75         | 7         | 39         | 5         | 28         | 5         | 31         | 2         | 14         | 22        | 31         |
| Grade 11-12               | 1                  | 25         | 2         | 11         | 2         | 11         | 0         | 0          | 2         | 14         | 7         | 10         |
| Tertiary                  | 0                  | 0          | 0         | 0          | 1         | 6          | 0         | 0          | 2         | 14         | 3         | 4          |
| <b>Total</b>              | <b>4</b>           | <b>100</b> | <b>18</b> | <b>100</b> | <b>18</b> | <b>100</b> | <b>16</b> | <b>100</b> | <b>14</b> | <b>100</b> | <b>70</b> | <b>100</b> |

As shown in Table 4.3, most (75%) of the respondents in the age category ≤ 39 have obtained an educational level that varies from grade 8 to 10, while the rest have attained

grade 11-12. Respondents in the age category  $\geq 70$  (58%) have no school education. As was discussed already, a more detailed analysis of the respondents' level of education was done and it was found that most of the respondents (64.4%) can read and write, while 35.6% of the respondents cannot read. It is true that while some respondents cannot write, they are able to read. These respondents are still unable to read and write. The educational level of farmers varies enormously. Educational level and innovation, new technology adoption, farming efficiency and progressiveness have been found to be positively correlated among commercial farmers in South Africa (Rogers & Shoemaker, 1971).

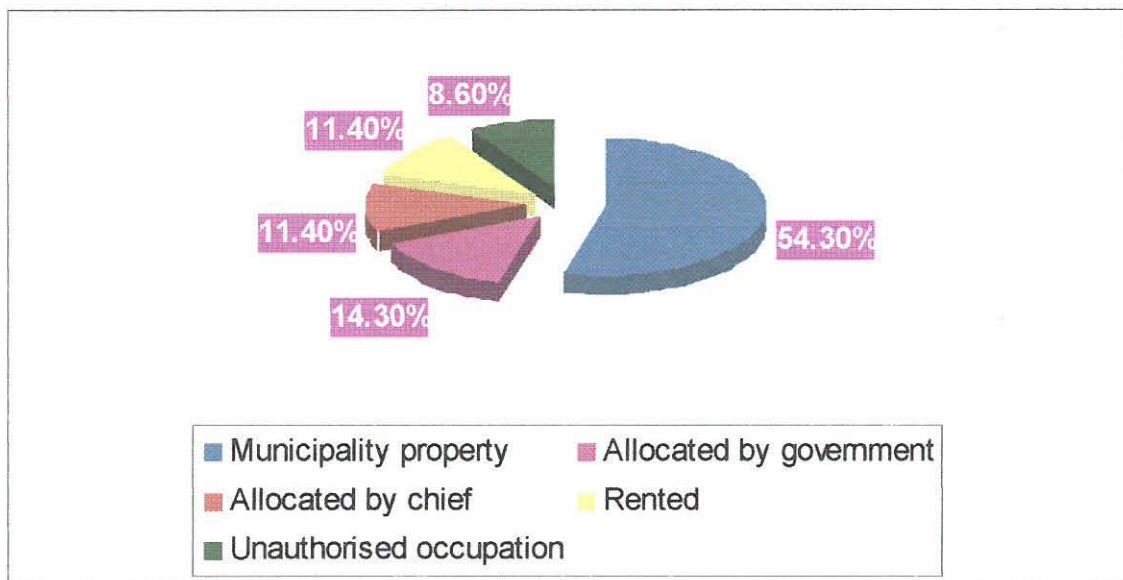
### **4.3 ACCESS TO LAND IN THE FREE STATE**

#### **4.3.1 Introduction**

In the Free State the basic entitlement of every rural household to three forms of land ownership or use has acted as an essential safety net for the poor and a valuable resource for the more entrepreneurial. The three forms are residential land for building purposes, fields for crop production and access to commonage land for grazing animals. In the rural areas the allocation of sites is presently a function residing with the District Chiefs of each Tribal Council (village). The District Chiefs issue "Permission To Occupy" permits (PTOs) for residential and business sites, as well as permits for grazing to be utilised on a joint and communal basis. The government allocates state-administered land and commonage land to small-scale farmers. Some researchers view farm income as a major incentive in the settlement of farmers (Claassen, 1998). The approach to farm planning should, however, not be to match up a specific farm size with a standardised income (Van Rooyen & Botha, 1994). Dixon (1973), Klug and Webster (1993) and De Waal (1997) agree that the objective of fodder planning is to match the feed production capabilities of the farm to the animals' requirements in order to allow a wide margin of error for feed costs, within the safe limits of natural resource utilisation.

### 4.3.2 Methods of allocation

People living on communal land have inadequate levels of tenure security. Communal land rights have insufficient protection in law, allowing for arbitrary decision-making by tribal authorities. The administrative systems in the former homelands have virtually collapsed, causing further tenure insecurity (Cousins, 2000). In the questionnaire, farmers were asked who allocated the land to them. Figure 4.4 illustrates this aspect of the allocation of land to respondents.



**Figure 4.4** Allocation of land in the Free State to respondents (n=70)

As shown in Figure 4.4, most of the farmers (54.3%) use municipal land, and only 11.4% use communal land that was allocated by the District Chiefs of the Tribal Council. The utilisation right cannot be traded or transferred. The farmers utilising the land allocated by the government (14.3%) have obtained the right of utilisation of state land by means of three-year lease contracts with the Department of Agriculture (DoA). The farmer must obtain special permission for the subleasing of a unit or for the erection of fixed capital assets. Table 5.4 depicts the results of farming options according to allocation of land to respondents.

**Table 4.4 Farming options according to allocation of land to respondents**

| Allocation of land |              |            |            |            |           |            |          |            |              |            |           |            |
|--------------------|--------------|------------|------------|------------|-----------|------------|----------|------------|--------------|------------|-----------|------------|
| Farm size (ha)     | Municipality |            | Government |            | Chief     |            | Rented   |            | Unauthorised |            | Total     |            |
|                    | f            | %          | f          | %          | f         | %          | f        | %          | f            | %          | f         | %          |
| ≤ 89               | 1            | 3          | 0          | 0          | 2         | 20         | 3        | 37.5       | 0            | 0          | 6         | 9          |
| 90 – 179           | 1            | 3          | 0          | 0          | 0         | 0          | 3        | 37.5       | 0            | 0          | 4         | 6          |
| 180 – 269          | 1            | 3          | 2          | 17         | 0         | 0          | 2        | 25         | 1            | 50         | 6         | 9          |
| 270 – 359          | 3            | 7          | 6          | 50         | 0         | 0          | 0        | 0          | 0            | 0          | 9         | 12         |
| ≥ 360              | 32           | 84         | 4          | 33         | 8         | 80         | 0        | 0          | 1            | 50         | 45        | 64         |
| <b>Total</b>       | <b>38</b>    | <b>100</b> | <b>12</b>  | <b>100</b> | <b>10</b> | <b>100</b> | <b>8</b> | <b>100</b> | <b>2</b>     | <b>100</b> | <b>70</b> | <b>100</b> |

The size of the farms varies between 20 ha and 3000 ha, with an average farm size of 579.7 ha. Land ownership and usage is predominantly communal and the farms are relatively large ( $\geq 360$  ha). This is illustrated by the fact that the Municipality owns 84% of the land under the chief's administration (80%), and that 50% of the land in this size category is occupied unauthorised. This corresponds with the findings of Nel (1998), who reported that the size of the farms in New Qwaqwa varied between 161 ha and 1260 ha, with an average size of 455 ha, and Marfo (2000), who found that in Mopeane in the Rustenburg district land ownership and usage is predominantly communal, due to the fact that 66% is under tribal ownership.

In the questionnaire, respondents were asked the size of both arable and natural grazing lands. The size of arable land varies between 0 ha and 926 ha, with an average size of 135.8 ha, and the size of natural grazing land varies between 6 ha and 2500 ha, with an average size of 381.6 hectares. Among farmers, lack of clarity on land rights hampers infrastructure and service provision in rural areas, and leads to tension between local government bodies and traditional authorities over the allocation of land for development projects such as housing, irrigation schemes, business centres and tourist infrastructure. It also undermines the effective management of common resources such as grazing land, which is the key to survival in rural areas.

The area where cows graze is about 3 km from the milking areas. Research has shown that for every 1 km a cow has to travel, it loses 1 litre of milk (Ntsane, 1999). Respondents were asked whether they were farming in a group or as individuals. The results are illustrated in Table 4.5.

**Table 4.5 Farming options according to allocation of land to respondents**

| Allocation of land |              |            |            |            |           |            |           |            |              |            |           |            |
|--------------------|--------------|------------|------------|------------|-----------|------------|-----------|------------|--------------|------------|-----------|------------|
| Farming options    | Municipality |            | Government |            | Chief     |            | Rented    |            | Unauthorised |            | Total     |            |
|                    | f            | %          | f          | %          | f         | %          | f         | %          | f            | %          | f         | %          |
| Group              | 2            | 67         | 13         | 68         | 7         | 39         | 9         | 56         | 8            | 57         | 39        | 56         |
| Individual         | 1            | 33         | 6          | 32         | 11        | 61         | 7         | 44         | 6            | 43         | 31        | 44         |
| <b>Total</b>       | <b>3</b>     | <b>100</b> | <b>19</b>  | <b>100</b> | <b>18</b> | <b>100</b> | <b>16</b> | <b>100</b> | <b>14</b>    | <b>100</b> | <b>70</b> | <b>100</b> |

Respondents farming under the group scheme on municipal land (67%), on government land (68%) and on chief-administered land (39%), have planted pastures on the arable lands in order to generate fodder. The majority of the respondents (56.0%) were farming in groups and 44.0% of the respondents were farming as individuals. This finding corresponds with a recent survey conducted for the Department of Land Affairs by Van Zyl (1998), who revealed that there is a huge power struggle in the Qwaqwa area and that the community would like to obtain full ownership of their sites. Although 44.0% of the respondents in this study farm as individuals, group formation has been encouraged among farmers with the hope that farmers can gain through the sharing of facilities and consequently can achieve what individuals cannot do on their own (Sebina & Düvel, 1999). However, Mathivandlela (1999) believes that there is a need for a policy switch from group ownership to individual land ownership. Farmers farming under group schemes have a constitution that gives preference to project-level activities. Each farmer is given tasks to perform on a daily basis.

### 4.3.3 Commonage land usage

Commonage projects may easily lead to environmental damage because of the danger of an “open access” situation developing, leading to rapid degradation of natural resources. The importance of both matching the capacity utilisation of the land with the capacity of the natural resources, and of putting in place sound management systems, cannot be stressed enough (Belsky, 1994). When asked in a questionnaire to list other sources/forms of income, it became clear that 67.1% of the respondents have no source/form of income other than farming. Some of these respondents were looking for work and a better standard of living, infrastructure and essential services where they resided. The other 11.6% of the respondents had day jobs and piece jobs in the local towns, while some respondents (21.3%) were pensioners. These respondents relied on school-going children to herd animals after school and hired people to look after their animals each day. Table 4.6 below shows the distribution of other means of generating income on communal grazing areas.

**Table 4.6 Other means of generating income on communal areas**

| OTHER INCOME SOURCES    | FREQUENCY | PERCENTAGE |
|-------------------------|-----------|------------|
| Cutting of fodder       | 24        | 34.3%      |
| Not aware               | 19        | 27.2%      |
| Cutting of thatch       | 18        | 25.7%      |
| Soil conservation       | 8         | 11.4%      |
| Control of black wattle | 1         | 1.4%       |

The types of income generation outlined in Table 4.6 have been initiated by municipalities and do, in fact, generate some income for a large number of respondents who are unemployed. With a median location of 3, the source of income score value lies at a score of 18, which involves the cutting of thatch grass (ranked 3<sup>rd</sup>), which is confined mostly to the winter months and concerns mainly women. Cutting of fodder for animals on communal grazing land is most often ranked highly (1<sup>st</sup>). There is a little awareness of income generation through soil conservation. This could be due to the fact that the Land Care project is not confined solely to commonage areas.

## 4.4 MANAGEMENT OF COMMUNAL AND COMMONAGE AREAS

### 4.4.1 Introduction

Communal areas and commonages in municipal districts are potentially important sources to improve the quality of life of many of the district's communities. Some authors (Ministry of Agriculture and Land Affairs, 1998; Shackleton *et al.*, 1998) feel that land under group ownership features prominently in South Africa, with some 15 million hectares of land (12.3%) in the ex-homeland areas under some form of communal tenure. This is expected to increase considerably as community groups successfully acquire ownership of land through the land redistribution and restitution processes, facilitated by the Communal Property Association (CPA) legislation (Act 28 of 1995), which provides the framework for acquiring, holding and managing property on a communal basis (Shackleton *et al.*, 1998).

The registration of the rules converts the community into a "juristic person" capable of owning land. Once the rules are registered, a land administration committee can be elected, made up of community members, with traditional leaders on the committee in an ex-officio capacity. According to Cousins (2003) community members can make up more than 25% of the committee. The Community Land Rights Bill (CLRB) gives far-reaching powers and responsibilities to land administration committees. Some of the challenges currently being experienced with regard to the use of commonage land include:

- Municipalities lack the capacity to administer the commonage lands;
- Municipalities see the land as a source of potential income and rent it out to commercial farmers;
- In some areas where the land is being used by small-scale, upcoming farmers, no formal institutional arrangements are in place; and
- The land is not properly managed in terms of sustainability, market potential and carrying capacity.

The establishment of commonage management committees and the steps in the process for the establishment of a sustainable committee to manage the communal grazing lands were

observed in 3 commonage areas, namely the Clarens Commonage, Petrusberg Commonage and Theunissen Commonage. Table 4.7 below describes some common steps in the process required for the establishment of a sustainable committee.

**Table 4.7 Steps in the process of establishing committees to manage the communal areas (Plaas, 2000)**

| STEPS   | TASK   | ROLES  |
|---|--|--|
| <b>1. Preparation</b>   | Departments and Non-governmental Organisations meet with Land Owner to discuss proposed process for establishment of Commonage Management Committee and answer questions relating to future roles, responsibilities and functions.   | Department of Land Affairs, Department of Agriculture and Non-governmental Organisation                                  |
| <b>2. Mass meeting</b>  | All role players are invited. The idea is to explain and discuss the aims and reason for the establishment of a Commonage Management Committee, and to clarify the different roles of the Local Authority, Farmers' Associations, Commonage Management Committee and other structures.   | Non-governmental Organisation, Local Authority and Department of Agriculture   |
| <b>3. Election of Commonage Management Committee members</b>              | Local Authority informs all structures that are to be represented on the Commonage Management Committee and provides the date before which all structures should elect their representatives (and their seconds). Participating structures elect representatives and notify Local Authority. Non-governmental Organisation monitors activities and keeps process on track.   | a) Local Authority<br>b) Participating Structures<br>c) Non-governmental Organisation                                    |
| <b>4. Commonage Management Committee Constitution and Code of Conduct</b> | The elected members of the Commonage Management Committee should draw up a draft constitution and Code of Conduct. Drafts should be submitted to all interested parties in the community and the Department of Agriculture for comment and final approval. The Local Authority formally approves the documents at a full Local Authority meeting. Copies are given to all participating structures and members of the Commonage Management Committee.  | a) Commonage Management Committee and Non-governmental Organisation.<br>b) Interested role players<br>c) Local Authority |
| <b>5. Commonage Management Committee Meetings</b>                         | Monthly meetings will be arranged at dates and times that will ensure maximum participation of members. Strict enforcement of the Code of Conduct must take place. Minutes, recording and reporting back to participating structures are ensured.  | Commonage Management Committee<br>Chairperson and Local Authority  |
| <b>6. Management Plan</b>   | After the collection of all the relevant information, the Commonage Management Committee can start drawing up the first draft of the Management Plan, regularly consulting the users and the Local Authority. The Management Plan should include at least the following details: 1) Description and maps of land to be managed in terms of the Management Plan, 2) Copies of all Notarial Deeds and Servitudes related to the land, 3) Carrying capacity of the land, 4) Infrastructure inventory, 5) General principles regarding how land will be managed, 6) Procedures and criteria to be used in the handling of applications for access to the commonage, 7) Grazing/Maintenance fees, 8) Grazing regulations, 9) Plan for the maintenance of infrastructure on the commonage, 10) Administration of the commonage and 11) Communication strategies. | Commonage Management Committee, Local Authority and Non-governmental Organisation  |
| <b>7. Monitoring of implementation of the Plan</b>                        | The commonage should remain a permanent item on the agenda of the Local Authority. The Department of Agriculture should inform the Local Authority of problems such as overgrazing.  | Local Authority and Department of Agriculture  |

According to Table 4.7, management systems are structured to fit well into the environmental plans. The responsibilities of the management committee involve the management of land and its natural resources such as vegetation, water and wildlife. In a

questionnaire, respondents were asked to list the responsibilities of the grazing management committee (or organisation). The following responsibilities were listed:

- Prevention of stock theft (8.3%). The findings on stock theft are in line with that of Pretorius (2003) who reported that the problem of stock theft often affects small-scale community farmers more severely than commercial farmers, simply because commercial farmers are in a better financial position to absorb such losses than resource-poor farmers. Pretorius (2003) also reported that, in the last three years, livestock farming in former communal areas has been reduced by up to 50.0%, and, according to the recently released South African Service annual report stock theft has increased by 10.0% over the past financial year;
- The management committee also has to act as a link between the local authority and the Government (25.0%);
- Ensure that the land is well-managed (8.3%);
- Set ground rules on grazing, veld burning and the improvement of livestock (27.8%); and
- As far as the other 30.6% is concerned: improve herd, negotiate lease agreement and introduce African strategies that will ensure development of farmers.

#### **4.4.2 Grazing land management and utilisation**

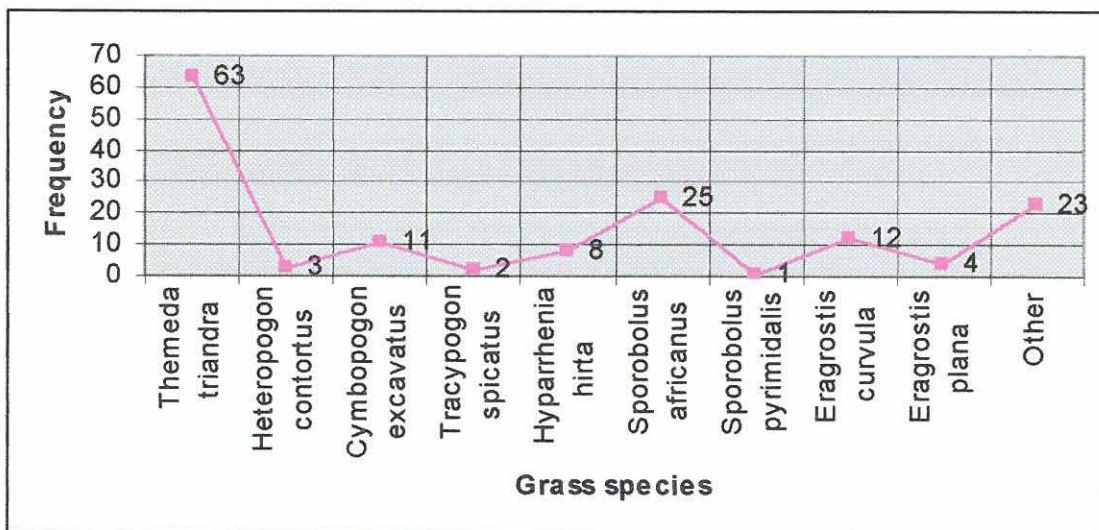
Grazing areas in good condition will have a higher carrying capacity, reduce soil erosion potential and create a wildlife habitat. The implementation of planned grazing systems, along with proven communal management techniques, could significantly improve overall grazing conditions. Such improvements to communal land management are seen as essential for supporting the anticipated future expansion of the livestock sector by the farming community. Scogings, Bally & Lent (2000) conclude that the criteria for success will depend on the objectives of the land user. In communal areas, the main criterion for success is the total number of animals.

Livestock interaction involves most components of the environment, e.g. land, water and biodiversity. The carrying capacity of commonage land varies from place to place.

Grasses on most communal grazing areas in the Free State are well adapted to defoliation (grazing, burning or cutting) and have probably been subjected to defoliation in the past. Lent, Scogings and Van Averbek (2000 (a)) found that bush encroachment in grassland and savanna areas is caused by heavy grazing, together with reduced burning and reduced browsing, while the replacement of palatable grasses with unpalatable grasses is the result of selective grazing.

#### 4.4.2.1 Types of grass species

In the communal grazing areas, it is widely assumed that high stocking rates and continuous grazing lead to overgrazing and accelerated soil erosion (Scogings, De Bruyn, Van Averbek & Lent, 2000). Information on grass species distribution was collected in conjunction with data on the topography of and rainfall distribution in the Free State. The grass species were classified into four categories (decreaser, increaser I, increaser II or increaser III species) and characterised as palatable or unpalatable, perennial or annual. Farmers were asked to name the grass species dominating their grazing areas, and they identified grass species by means of a transect walk. Figure 4.5 below illustrates the distribution of grass species in the three communal areas studied in the Free State.



**Figure 4.5** Distribution of grass species in selected grazing areas of the Free State

*Themeda triandra* (Red Grass) was found to dominate in all three communal grazing areas. Compared to other grass species, Red Grass was the most frequently identified grass species (63 times), compared to other grass species, which were identified 9.89 times on average. Although 16 grass species were recorded, only 9 were common enough to allow the significance test. The Wilcoxon test requires a minimum of 6 pairs for the 0.05 level of significance (Todd, 1997). In this study, it was found that there is a 95.45% chance that *Sporobolus Pyramidalis* is the least distributed grass species on communal grazing areas in the Free State.

The accuracy of the data was confirmed when farmers identified grass species physically. The species composition data was collected in three communal grazing areas, namely in the Eastern Free State, Northern Free State and Southern Free State, by means of a transect walk (see Photo 1). A pointer was used while walking in a straight line, following the counter, to identify grass species. After each step, the grass nearest to the pointer was identified and recorded.



**Photo 1** Identification of grass species on communal grazing areas using a transect walk

Even though Red Grass was found to be the most dominant grass species (63 times), it is a type of grass that diminishes during overgrazing. Another important observation made and confirmed by farmers is that Increaser II grass species increase due to the disturbing effects of overgrazing, and include mostly pioneer and subclimax species such as *Aristida* and *Eragrostis*. These grass types are seen mostly in the southern part of the Free State, where the rainfall is lower.

## **4.5 THE FARMING SYSTEMS ON COMMONAGE AREAS**

### **4.5.1 Introduction**

A farming system can be defined as an agricultural activity practised by particular groups of people and influenced by the agro-ecological environment they live in. Farming

systems vary, depending on population density, rainfall pattern and elevation (Harrison & Shackleton, 1999). All communal land and most commonage land is used mainly for livestock grazing (Free State Department of Agriculture, 2003). Due to population pressure and overgrazing in the communal areas, environmental degradation is taking place on a large scale. Even households with land and livestock struggle in the face of land shortages and the high costs of ploughing, planting and harvesting. Households typically make ends meet by engaging in multiple livelihoods, and these livelihood strategies will need to be supported by sensitive and clearly defined and targeted programmes (John & Van Arendonk, 1988; Van der Westhuizen, Fourie & Viljoen, 1999). The involvement of farmers is of paramount importance for the implementation of measures to minimise the risks associated with small-scale farming, particularly during the first few years. Commonage land is designed to enable farmers to practise mixed farming systems. Grazing permits are issued on a short-term basis in areas where land is unsurveyed and no correct legal description is available.

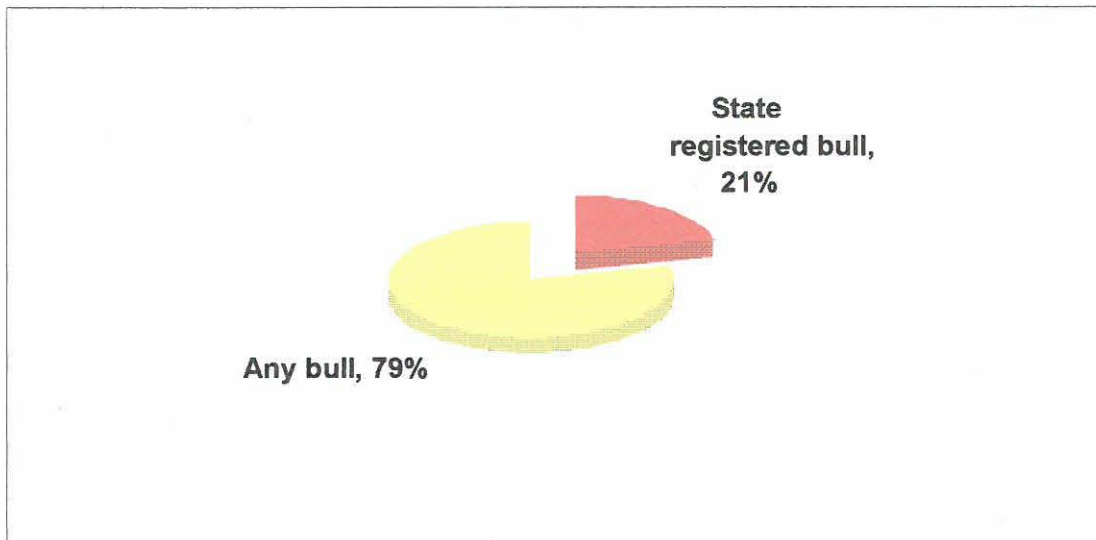
#### **4.5.2 Livestock composition, ownership, role and management**

Livestock ownership on the communal rangelands is skewed and complex. It appears to be biased in favour of the more economically and politically powerful members of communities (Scogings *et al.*, 1999). The word "type" refers to the conformation of the animals, which indicates or suggests the purpose it serves (Gravert, 1987; Casey & Maree, 1993; Gertenbach, 1995). Gravert (1987) reports that dual-purpose breeds are preferred where land is scarce or too expensive for dairy farming. Cattle are defined to include bulls, cows, calves, sheep and goats. This definition is wide enough to cover almost all domesticated animals responsible for grazing (Claassen, 1999). Currently, almost all cattle farmers rear young cows until they enter the production stream (Photo 2). Livestock is sold when farmers do not have other livelihood strategies to fall back on. Cattle are of important cultural value.



**Photo 2** Calves are separated from cows during the day

About 74% of cattle farmers indicated that cows are separated from calves, while 26% did not separate calves from cows. The period of separation varies between 8 hours and 24 hours, with a mean of 12 hours. From the farmers' point of view, it takes a minimum of 24 months before they can expect a return on their investment in calves. Likewise, bull calves are raised for a minimum period of 12 months before being marketed. The rearing costs reduce the net return, especially where farmers do not have large tracts of grazing land to raise the calves. Respondents were asked about their mating/breeding practices and whether the bulls they use are state-registered or not. Figure 4.6 provides some insight into the breeding management of a herd structure.



**Figure 4.6 Breeding management**

All farmers make use of natural mating. 79% of farmers used any bull and 21% used a state-registered bull. When asked how mating was organised, most of the respondents (87.1%) indicated that mating takes place at any time with any bull (they did not really know which bulls mated with their cows). Approximately 8.5% indicated that the bull and cows are kept apart and only cows in heat are mated with the bull, 1.4% indicated that cows are only mated with bulls at night, while 3% indicated that breeding only takes place 8 months after calving. These findings confirm those of Marfo (2000) in Mopeane, in the Rustenburg district, where all farmers used natural mating and 78% of the farmers had their bulls running with the cow herd throughout the year, with 22% using seasonal breeding.

#### **4.5.2.1 Composition and ownership of livestock breeds**

Herd structure provides an indication of how an animal may be utilised, e.g. for breeding, sale or draught purposes (Marfo, 2000). Respondents were asked to name the types of livestock breeds they farm with, and the result is shown in Table 4.8. Farmers were asked to state their main reasons for keeping livestock. The majority of cattle farmers (68%) indicated that livestock, and especially cattle and their products, provide direct cash

income and are a living form of investment for cattle farmers, while 24% regarded cattle as a source of power and security and 8% regarded cattle as a source of prestige. These findings confirm those of Rocha, Starkey and Dionisio (1990) and Wilson (1995), namely that livestock provide direct cash for many African farmers.

**Table 4.8 Preferred livestock enterprise among farmers (n=106)**

| TYPES OF CATTLE BREEDS      | MEAN WEIGHTED PERCENTAGE | RANKED ORDER POSITION |
|-----------------------------|--------------------------|-----------------------|
| <b>Beef cattle breeds:</b>  |                          |                       |
| Brahman                     | 42.9%                    | 1 <sup>st</sup>       |
| Other beef cattle breeds    | 33.3%                    | 2 <sup>nd</sup>       |
| Bonsmara                    | 14.3%                    | 3 <sup>rd</sup>       |
| Drakensberger               | 9.5%                     | 4 <sup>th</sup>       |
| <b>Dairy cattle breeds:</b> |                          |                       |
| Holstein-Friesland          | 60.0%                    | 1 <sup>st</sup>       |
| Jersey                      | 26.7%                    | 2 <sup>nd</sup>       |
| Other dairy cattle breeds   | 13.3%                    | 3 <sup>rd</sup>       |
| <b>Sheep breeds:</b>        |                          |                       |
| Merino                      | 50.0%                    | 1 <sup>st</sup>       |
| Dorper                      | 37.5%                    | 2 <sup>nd</sup>       |
| Other sheep breeds          | 12.5%                    | 3 <sup>rd</sup>       |
| <b>Goat breeds:</b>         |                          |                       |
| Other goat breeds           | 50.0%                    | 1 <sup>st</sup>       |
| Angora                      | 25.0%                    | 2 <sup>nd</sup>       |
| Boer goat                   | 25.0%                    | 2 <sup>nd</sup>       |
| <b>Pig breeds:</b>          |                          |                       |
| Scavenger pig               | 50.0%                    | 1 <sup>st</sup>       |
| Landrace                    | 37.5%                    | 2 <sup>nd</sup>       |
| Other pig breeds            | 12.5%                    | 3 <sup>rd</sup>       |

The questionnaire uncovered the fact that cattle ownership is much higher in the Eastern Free State, where two-thirds of the respondents owned cattle. Using the data in Table 4.8, cattle breeds used by farmers on communal grazing areas can be classified as follows: Beef type: (Brahman (1<sup>st</sup>), other beef cattle breeds (Mix/non-descriptive) (2<sup>nd</sup>), Bonsmara (3<sup>rd</sup>) and the Drakensberger (4<sup>th</sup>). Dairy breeds: Holstein-Friesland (1<sup>st</sup>), Jersey (2<sup>nd</sup>) and other dairy breeds (3<sup>rd</sup>). These findings are in line with the findings of De Ridder and Wagenaar (1986), in Botswana, who found that over 50% of cattle owned in the

Francistown area are Bonsmara, followed by Brahman (43%). Marfo (2000) in Mopeane in the Rustenburg district also found that 35% of cattle owned are Bonsmara, followed by Brahman (30%).

#### 4.5.2.2 Large stock ownership and usage

Respondents were asked in the questionnaire whether they milked all lactating cows. They were also asked to name the breeds they milked and to indicate the number of lactating cows. Most of the farmers milked any lactating animal, irrespective of breed. Photo 3 shows how milking is done on most communal grazing areas.



**Photo 3** Example of how cows are hand-milked in community kraals

All farmers view dairy farming as an investment their children will eventually benefit from. Farmers have a clear understanding of the fact that good management is the key to success and to profit-making. Farmers spend most of their time looking after the cattle and maintaining and upgrading facilities.

Photo 4 shows how grazing takes place on communal grazing areas. A noteworthy point is that, although grasses have adapted to grazing in most communal grazing areas, the greatest threat to the grass plant is overgrazing. On communal land, feeding management consists mainly of free-range grazing. Calves are weaned throughout the year since mating takes place on a continual basis.



**Photo 4** Natural grazing in good condition is the cheapest form of food for grazers

The farmers' opinions on stocking rates were tested, and they were asked how many livestock graze on their communal grazing area. On average, 699.32 livestock graze on communal grazing areas. When asked how many should graze on the communal grazing areas, farmers were of the opinion that on average only 264.78 livestock should graze on their respective communal grazing areas. Photo 4 shows the areas where the soil is most fertile and the grass is most palatable and nutritious. Livestock, in particular, are inclined to concentrate in these parts, and they should therefore be managed with great care. During the surveying process, it was observed that, in most communal grazing areas, grass plants are repeatedly utilised until the reserve nutrients in the roots are exhausted.

Scogings, De Bruyn, Van Averbeké and Lent (2000), in a broad study of range conditions in the Eastern Cape Province, found that there is evidence in the communal rangelands of an increase in soil erosion and a decrease in biomass production. Biodiversity and landscape heterogeneity were also reduced by communal grazing, particularly in drier areas.

#### 4.5.2.3 Small-stock ownership and usage

When farmers were asked to identify their livestock enterprises, sheep farming emerged as the third most popular choice in this farming community (Table 5.8). The most popular choice was dairy farming and the second most popular concerned beef production. Photo 5 (left-hand side) shows sheep in a kraal, where they are protected against predators and thieves, especially during the night. The photo on the right-hand side shows how they are herded each day when grazing on communal grazing areas.



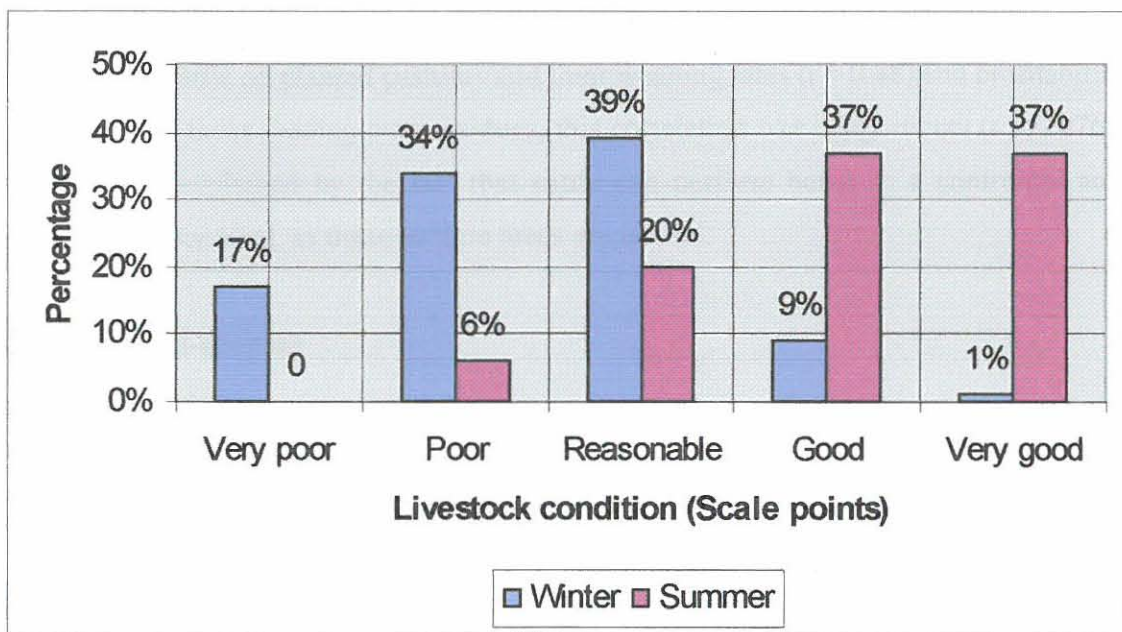
**Photo 5** Small livestock flock to a kraal each night and are herded during the day

Half (50%) of the sheep are kept for mutton, 37.5% being dorper breed; 12.5% were found to be other sheep breeds. It is significant to note that, in most communal areas, the fencing is in poor condition, and constant supervision is necessary to ensure that sheep are not stolen or get lost, as shown in Photo 5. In this study, it was found that the respondents have 36.65 small stock units. As indicated in Table 5.8, the Merino sheep is the preferred breed. Farmers believe that good breeds and good feeding will make their farming activities profitable in the long run. In general, farmers feel that their self-image has been boosted since they have become involved in livestock farming on commonage land. In this study it was found that, on average, farmers were farming with 23.14 large stock units.

Table 4.8 outlines the classification of other animals as follows: 25% Angora goats, 25% Boer goats and 50% classified under other goat breeds. The Landrace pig breed constituted 37%, 50% were scavenger pigs and 12.5% belonged to other pig breeds. This also confirms the report of Nel (1998), in Qwaqwa, where most of the small ruminant farmers keep their animals as an investment or as a form of capital that can easily be converted into cash when the need arises. Scogings, Lent, Van Averbek and de Bruyn (2000) also reported that, in the Eastern Cape, some of the land is used for merino sheep farming. While livestock are an important resource in the communal areas of the Eastern Cape, their contribution to the cash economy is relatively small. The findings of Marfo (2000) in Mopeane, in the Rustenburg district, also confirmed that sheep and goats provide a ready source of meat for own consumption or urgent cash needs, since it is much easier to sell or consume smaller ruminants (sheep and goats) than cattle. The preference for sheep farming is attributed to the fact that sheep are more docile than goats and can be herded together with cattle on communal areas. Based on the different breeds farmers are farming with on communal grazing areas, farmers were asked how much small stock they have in total. However, Tshabalala (1992) found that, in Lesotho, the total number of cattle is lower than that of sheep and goats respectively, although cattle (70%) are more widely distributed among households than sheep (45%) and goats (43%).

#### 4.5.3 Perception of livestock condition in winter and summer months

Communal use of rangelands has generally led to decreased productivity and increased soil erosion, which is reflected in the low quality of fresh water (Lent, Scogings & Van Averbek, 2000 (a)). The communal approach to veld utilisation in the Free State area, as discussed under methods of allocation, threatens the resource base and questions the viability of the veld as a resource. The natural veld, which is the foundation of extensive livestock production, also forms the basis of economical cattle production. The highest level of sustained cattle production therefore depends on the manner in which the veld as a resource is utilised (Marfo, 2000). Figure 4.7 summarises the condition of cattle in the winter and summer months.



**Figure 4.7** Livestock condition in the winter and summer months

When asked about the condition of livestock, 17% of the respondents reported the condition of livestock to be very poor in winter, and only 1% reported the condition of livestock to be very good in winter. The condition of livestock improved during the summer months: 6% reported livestock condition to be poor in summer, while the

majority (37%) of cattle owners reported the condition of livestock to be good or very good in summer (Figure 4.7). With regard to feeding, 70% of the respondents feed their animals hay, 60% offer supplemental feeding in winter in the form of licks, and 23% offer supplement feeding, with concentrates mostly on those animals that are milked. Live-weight gain is known to correlate positively with the consumption of minerals.

This was confirmed by Said, Capper, Chigoro and Yimegruhal (1993), who established correlation coefficients of  $r = 0.73$  for magnesium consumption and  $r = 0.6$  for phosphorus consumption ( $p < 0.01$ ) and live-weight gain, as compared to crude protein ( $r = 0.44$ ) and metabolisable energy ( $r = 0.48$ ). Individual holdings of cattle in communal areas are usually herded by a young family member or a farmer by day. At night, the animals are kept in a small enclosure or communal kraal close to the house. The recent study by Marfo (2000) also indicated a positive but moderate correlation between farmers feeding their cattle on planted pastures and their weaning rates ( $r = 0.48$ ) and profitability ( $r = 0.34$ ). For those feeding crop residues, this correlation was insignificant ( $r = 0.076$ ). This may be explained by the fact that cattle can perform better in a controlled and confined environment, as these pasture areas are fenced.

#### **4.5.4 Record-keeping**

According to Gordijn and Whiteheads (1995) and Venter (1997), it is essential that farmers keep adequate records. The daily entry of income and variable cost transactions forms the most important part of record-keeping, in view of the profitability analysis that can be conducted at the end of the financial or production year. Keeping records is perhaps one of the most important barometers of managerial skill. It is difficult for a farmer to manage a farm without keeping proper farming records (Nel, 1998). Farmers in this study were asked whether they kept records of the activities taking place at project level, and were requested to explain how they kept records. The results of the study regarding record-keeping are shown in Table 4.9.

**Table 4.9** Different methods used to keep records

| RECORD-KEEPING        | PERCENTAGE | RANKED ORDER POSITION |
|-----------------------|------------|-----------------------|
| Does not keep records | 64.3%      | 1 <sup>st</sup>       |
| Notebook              | 27.2%      | 2 <sup>nd</sup>       |
| Files                 | 5.7%       | 3 <sup>rd</sup>       |
| Receipt book          | 1.4%       | 4 <sup>th</sup>       |
| Piece of paper        | 1.4%       | 4 <sup>th</sup>       |

The results in Table 4.9 reveal that, in total, 35.7% of the respondents interviewed use various means to keep records on a daily basis. The majority of farmers (64.3%) do not keep records. In order to estimate the profitability of the enterprise, farmers must keep detailed records. A similar tendency was observed by Nel (1998) in a study in Qwaqwa, which revealed that 43% of the farmers were keeping records. Inadequate records lead to inadequate information, which hampers the making of sound management decisions. These records, which reveal both the physical and financial status quo, should enable the farmer to do spot checks with regard to the performance of the herd and to analyse the financial records that relate solely to the enterprise. The gross margin system of analysis can be used for this purpose. Efficient management can only be instituted and maintained by keeping proper and complete records. Many farmers' record-keeping systems have shortcomings that negatively influence the project or farm if not investigated and rectified. In order to prevent stock theft and monitor and determine the farm animals' productive and reproductive performance, there is a need for relevant record-keeping (Marfo, 2000).

## 4.6 AVAILABILITY OF INFRASTRUCTURE AND FACILITIES

### 4.6.1 Introduction

In an attempt to address infrastructure problems on farms, such as reliable water supply, electricity, fencing and roads, the Department of Agriculture has made R25 000.00 available to each household (through the Community Project Fund Support Programme

(CPF-SP)). In the Free State area, the provision of water is the most critical problem, as there are no overall plans for the utilisation of water on communal land, despite the high rainfall in the area. The water taps in the area are correctly placed for household consumption, but not for livestock. In many cases, cattle have to travel long distances of  $\pm 3$ km to the streams and rivers for water. Boreholes need to be repaired, and new ones should be properly placed.

#### **4.6.2 Water sources**

The National Water Act, 36 of 1998, outlines a national water resource strategy, which provides the framework for the protection, use, development, conservation and management of water resources for the country as a whole, as well as within regional and catchment areas. Surface runoff is more variable than rainfall, and this variability increases with decreasing rainfall (Van Averbeke, Scogings, Bally & van Averbeke, 1998). The use of water to satisfy basic needs is permitted under the Act. Whenever water is used for other purposes such as commercial agriculture, then permission has to be obtained in accordance with the applicable catchment management strategy. The pricing of water will encourage conservative use of water resources, and discourage wastage and the excessive use of water in areas where it is scarce (Lent, Scogings & Van Averbeke, 2000 (b)).

According to Lombaard (2003), it is a fact that water is a scarce and unevenly distributed national resource, which occurs in many forms, all of which form part of a unity, an interdependent hydrological cycle. All citizens have the right to access to basic water services (the provision of a potable water supply and the removal and disposal of human excreta and waste water), in order to create a healthy environment on an equitable and economically and environmentally sustainable basis (Plaas, 1999).

Within any grazing system, water must be provided to livestock in adequate quantity and quality. Clean water and ample high-quality forage are essential for improved livestock production. Inadequate development of water resources in pasture areas can contribute to serious livestock losses, prevent efficient use of forage and encourage overgrazing near existing water supplies and undergrazing away from the water sources. Water quality makes a vital contribution to the health of all living organisms. Table 4.10 below shows the different sources of water available to respondents.

**Table 4.10** Different sources of water available to respondents

| <b>SOURCE</b>   | <b>FOR LIVESTOCK USE</b> | <b>MEAN WEIGHTED PERCENTAGE</b> | <b>RANKED ORDER POSITION</b> |
|---|--------------------------|---------------------------------|------------------------------|
| <b>Dams</b><br>Reliability: Average – good            | Fine                     | (27) 39.7%                      | 1 <sup>st</sup>              |
| <b>Groundwater (Boreholes)</b><br>Reliability: good   | Fine                     | (16) 23.5%                      | 2 <sup>nd</sup>              |
| <b>Springs/Streams</b><br>Reliability: Average – good | Fine                     | (11) 16.2%                      | 3 <sup>rd</sup>              |
| <b>River</b><br>Reliability: Average                  | Fine                     | (9) 13.2%                       | 4 <sup>th</sup>              |
| <b>Windmills</b>                                      | Insufficient             | (4) 5.9%                        | 5 <sup>th</sup>              |
| <b>Rainfall harvesting</b><br>Reliability: poor       | Insufficient             | (1) 1.5%                        | 6 <sup>th</sup>              |

Scogings, Van Averbeke, Lent and Bally (2000) found that the management of water in the Eastern Cape Province has, until recently, been highly variable, often involving separate management strategies for different goals (e.g. different levels of quality and quantity). This type of management is usually done by local authorities and therefore lacks cohesiveness and a holistic approach. Table 4.10 shows that water quality varies greatly in the dams (1<sup>st</sup>), ground water (2<sup>nd</sup>), springs/streams (3<sup>rd</sup>) and rivers (4<sup>th</sup>) of the Free State, reflecting the province's many landscapes and multiple approaches to land utilisation. This finding is in line with the findings of Scogings, Van Averbeke, Lent and Bally (2000), who conclude that the provision of drinking water is often an enormous

problem during a drought, and that planning in advance is essential. Photo 6 below shows an example of an electrical pump used for irrigation purposes and for providing water to animals.



**Photo 6**      **Example of an electrical pump used to pump water from a dam for irrigation**

The median of the ranked water sources outlined in Table 4.10 is 3.5. Livestock watering systems and fencing on communal grazing areas are the two main critical issues identified by the Free State Department of Agriculture, and have therefore been given priority. In his research, Hurt (1998) found that poor availability of drinking water for both people and animals is a major problem in the dry season. The study done in the Eastern Cape by Scogings, Van Averbek, Lent and Bally (2000) draws attention to the notion that the ideal water management unit is the catchment area and river basin. Complications arise when a catchment area falls under the jurisdiction of several administrative regions, or where a river is shared by different provinces. In extreme cases, cattle farmers have to take their animals to a dam, which may be more than 30 km

away. There are two main sources of funding to ensure that water is available and that fencing is erected on communal grazing areas. These sources are the Community Project Fund Support Programme (CPF-SP), and the funds transferred from the National Department of Agriculture (NDA) for integrated livestock projects. Most importantly, animals must have access to fresh, clean water at all times.

#### 4.6.3 Perceived problems identified by the farmers

Perception refers to an individual's own interpretation of a situation, and it may be based on past experience. Several questions aimed at identifying the perceived problems of the targeted group and testing these against the actual problems experienced by farmers, were asked. The viewpoints of respondents on a number of issues were obtained via several open-ended questions.

Taking contextual factors into account, respondents were asked to name, in order of preference, the most important management problems they faced in their working situation. There are many constraints in the communal farming system, including small farm size, population pressure, land tenure problems, distance from markets and poor transport and infrastructure. Due to the fact that small-scale farmers' activities are performed in the rural areas and usually not close to any large towns or cities, there are a number of constraints that need to be addressed. The study reveals the following facts:

- ◆ **The lack of a reliable water supply** is a constraining factor, as farmers are concerned about the lack of reliable water sources in their working areas. Existing dams and water points for livestock should be upgraded.
- ◆ **Electrification** is needed, as farmers interviewed on the commonage land have indicated that the lack of electricity in their farming areas has prevented them from implementing technological innovations that require electrical power.
- ◆ The grazing areas on communal lands are **not properly fenced off**. From the extension point of view, extensively grazed camps need to be rested and used in rotation, and thus fencing is needed to ensure that rotational grazing is employed. The farmers felt that communally grazed land must be properly developed, managed and fenced off, and that camps must be developed.

Livestock farmers are of the opinion that proper management of communal land will improve its condition, and that there are sound economic reasons to do so. The infrastructure on communal land near cattle posts and homesteads is poorly developed, as shown in Photo 7.



**Photo 7**      **Backyard kraal and forage stores**

The NDA funding could, in terms of the allocation, be spent on community kraals, handling facilities (for example crush-pens and loading ramps), dairy facilities, fences, the development of water resources and stock-holding. An example of the latter is shown in Photo 8.



**Photo 8**      **An example of a modern community kraal**

Each community kraal is equipped with 3 stock water troughs, as shown in Photo 8 above. The kraals become the property of the community. The Department of Agriculture, through the Community Project Fund Support Programme (CPF-SP), has made some progress in addressing certain specific problems regarding infrastructure on commonage land. Another potential solution to poor infrastructure development with regard to community kraals in the Free State is the utilisation of funds (R3 million) from the National Department of Agriculture (NDA) for integrated livestock projects.

#### **4.6.4 Management of animal diseases on communal and commonage grazing areas**

John and Van Arendonk (1988) and Van der Westhuizen *et al.* (1999) define the focus of management by the farmer as the maximisation of total profit to be gained from the farm and this, among other factors, is reflected in the criteria for replacing cows. Measures (1990) believes that management is the way in which the breeding, rearing, feeding and housing aspects of cow husbandry are fitted together, how the herd fits into the farming structure and how the herdsman relates to the cows. Rice & Grant (1999) believe that the herd health management programmes recommended by veterinarians must include a way

to prevent metabolic disorders and prevent or control infectious disease. When metabolic diseases increase, opportunistic infectious diseases often also increase at the same time.

In the light of this background information, farmers were asked whether they made use of a specific animal health programme to control external and internal parasites on large and small stock (the findings are set out in Table 4.11). The study of Holden (1995) reveals that the communal grazing area has proven to be a very good vehicle for spreading diseases. Since large and small stock belonging to different members of the community are allowed to graze together freely, different types of parasites can move easily from one animal to another, thereby increasing the risk of diseases spreading. The rising cost of treatment drugs is exacerbating the problem.

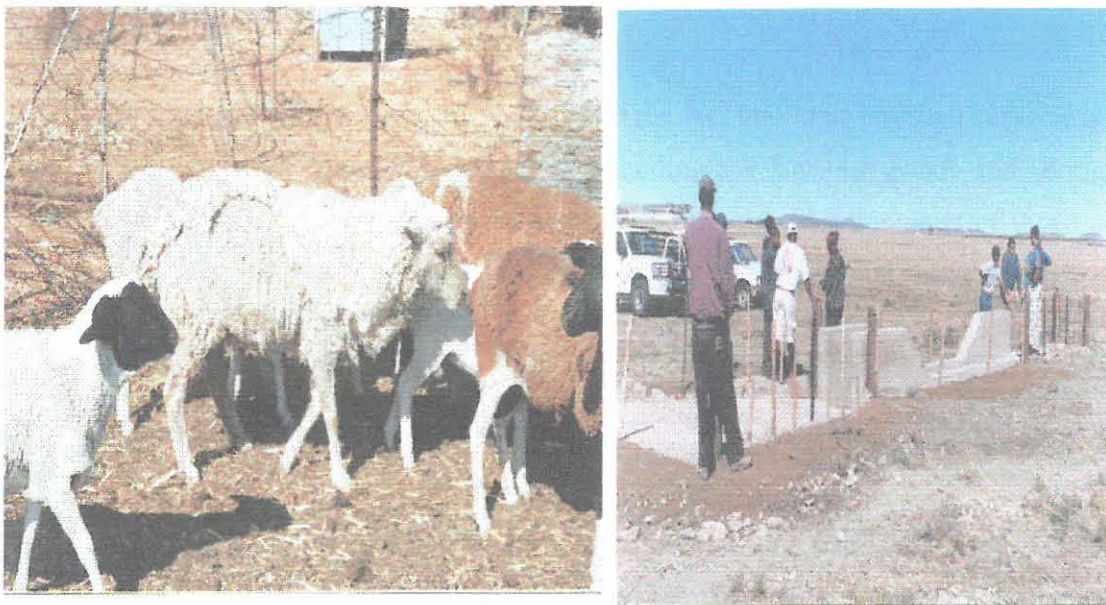
**Table 4.11** Disease control and health management programmes identified by large- and small-stock farmers (n=70)

| ANIMAL HEALTH PROGRAMMES  | Large-stock farmers |            | Small-stock farmers |            | Total      |            |
|---|---------------------|------------|---------------------|------------|------------|------------|
|   | f                   | %          | f                   | %          | f          | %          |
| Dipping   | 28                  | 40.2       | 14                  | 20.0       | 42         | 30         |
| No specific programme   | 20                  | 29.2       | 18                  | 25.7       | 38         | 27.14      |
| Vaccination   | 11                  | 15.3       | 6                   | 8.6        | 17         | 12.14      |
| Dosing  | 7                   | 9.7        | 7                   | 10.0       | 14         | 10         |
| Uses Traditional Herbs  | 3                   | 4.2        | 4                   | 5.7        | 7          | 5          |
| State Veterinary and Animal Health Officer provides yearly programmes | 1                   | 1.4        | 21                  | 30.0       | 22         | 15.71      |
| <b>Total</b>  | <b>70</b>           | <b>100</b> | <b>70</b>           | <b>100</b> | <b>140</b> | <b>100</b> |

Table 5.11 shows that 30.0% of farmers receive animal health programmes from Animal Health Technicians of the Department of Agriculture and the State Veterinarian. The fact that many farmers (25.7%) do not have a specific programme, could lead to poor administrative and managerial practices and ultimately affect production. In some of the communal grazing areas, the management of diseases continues to be traditional. Farmers

(5.7%) also use their own traditional herbs to treat animals. This corresponds with Odell's report (1982) regarding KwaZulu-Natal, which pointed out that small-scale farmers utilise traditional remedies to treat their cattle. In this regard, they used more than 50 species of local plants. The findings in this study confirm the finding of Nel (1998) in Qwaqwa and that of Marfo (2000) in Mopeane, in the Rustenburg district, who reported that local cattle farmers use various forms of disease control and/or medication for a variety of ailments.

The lack of specific animal health programmes can also be ascribed, among other things, to the fact that controlling parasites and ensuring the constant availability of grazing land is a difficult undertaking. Photo 9 below shows animals with sheep scab, as well as a modern sheep-dipping tank constructed to alleviate sheep scab problems in communal areas.



**Photo 9** · **Example of sheep with sheep scab and a newly erected small-stock dipping tank on communal grazing land**

A most encouraging factor is the fact that farmers have access to animal health care and production programmes that include routine vaccination, dosing for internal parasites, dipping or spraying against external parasites, and dehorning of calves. In the communal farming system, lack of control over communal grazing land is not only unproductive, but also leads to poor livestock performance. Farmers are of the opinion that the services provided by the Department of Agriculture are worthwhile and in line with their approach to the management of small stock, but need to be improved. Suggestions received from farmers with regard to the improvement of the above-mentioned services were too general to be of practical use, e.g. the introduction of small-stock courses and the retraining of farmers and labourers regarding management issues.

#### **4.7 FARMERS' NEEDS AND ASPIRATIONS**

##### **4.7.1 Introduction**

People are often so overwhelmed by poverty and the fact that their physical survival is at stake that they cannot see a way out, notwithstanding the fact that goods and services may be available to assist them. At the same time, meeting the demands of those not mired in poverty may have major environmental consequences (Masiteng & Van der Westhuizen, 2001).

##### **4.7.2 Farmers' needs and aspirations**

The needs/aspirations of farmers regarding commonage projects varied significantly, depending on the type of farming that was practised. With this in mind, farmers were queried about their most important immediate and long-term needs respectively. Farmers identified the following as their most important immediate needs/aspirations (n=70):

- ◆ Financial assistance from the government to buy a farm (23.0%).
- ◆ Generating income (16.9%).

- ◆ Fencing, access roads and water points to facilitate expansion and save money (13.8%).
- ◆ Prevention of veld fires (12.4%).
- ◆ Herd health programme and training on disease control and management (11.4%).
- ◆ Infrastructure development (8.3%).
- ◆ Support services, training and farming knowledge and skills (5.8%).
- ◆ Veld management skills and knowledge (4.2%).
- ◆ More livestock (4.2%).

An important factor that contributes to soil degradation, is the widespread seasonal burning of grass and bushes as part of land preparation for cultivation or rejuvenation of pastures (Thomas, 1994; Lynam & Dangerfield, 1999). Veld fires may be started by lightning, which is common in the Free State. People have used veld fires for thousands of years to improve the quality of their grazing. Veld fires can be a useful veld management practice, but can also cause great damage to the veld if applied incorrectly. All farmers interviewed (100%) agree that uncontrolled, untimely or indiscriminate veld fires pose a threat to healthy grasslands and good grazing in the Free State, particularly during the winter months. Many protected areas have been damaged by runaway veld fires sweeping into parks from adjacent land, while large tracts of valuable grazing on farms have been destroyed. Indiscriminate or untimely burning can have a seriously detrimental effect on the palatability and nutrition levels of veld grasses (Photo 10).



**Photo 10** Grassland is burned annually in communal areas during the winter months

Farmers (9.05% where  $n=221$ ) described veld fires as the cause of serious management problems. Veld fires and burning are mainly used to improve the grazing value of land by removing old or dead plant material. Unfortunately, even veld that is in a poor condition is burned. Most communal grazing areas are already under stress, and burning leads to further deterioration of the veld. This, in turn, means that greater grazing pressure is brought to bear on areas where grasslands are still healthy. Eldridge & Freudenberger (1999) report that veld fires destroyed thousands of hectares of winter grazing in the Eastern Free State in 2003. About 10 commercial farmers were affected, and between 3000 and 4000 hectares were destroyed. An estimated 1200 hectares in the former Qwaqwa homeland area were also destroyed, affecting 51 newly settled farmers (Land Redistribution for Agricultural Development (LRAD) beneficiaries).

The respondents' most important long-term needs/aspirations are summarised in Table 4.12 below.

**Table 4.12 Commonage farmers' most important long-term needs/aspirations**

| FARMERS' NEEDS/ASPIRATIONS |  | TOTAL<br>(n=70) |
|----------------------------|--|-----------------|
| 1.                         | Improved support services from DoA                           | 24 (34.3%)      |
| 2.                         | To be developed, known, successful, recognised and organised | 17 (24.3%)      |
| 3.                         | Security of tenure   | 8 (11.4%)       |
| 4.                         | Improved links with other service providers and farmers      | 8 (11.4%)       |
| 5.                         | Co-operation among farmers grazing on communal land          | 7 (10.0%)       |
| 6.                         | Owning a farm and farming commercially                       | 3 (4.3%)        |
| 7.                         | Farming with quality livestock breeds                        | 3 (4.3%)        |

The answers to the question reflect the respondents' perceptions, and therefore a variety of opinions can be expected. It is also difficult to judge just how realistic these expressed needs are.

#### 4.7.3 Agricultural training needs and extension services

Government and donor efforts to promote small businesses have, until now, focused mainly on credit schemes and training. Training brings about a marked change in African people's approach to problem solving, and leads to increased productivity. A lack of skill can often be ascribed to a lack of training (Van Reenen & Davel, 1991). It should be noted that the list of training needs that have been identified, is comprehensive and extremely diverse. The Department of Agriculture's support programmes for enhancing farming skills include (Olivier, 2001):

- Access to finance;
- Access to markets;
- Infrastructure development and value adding;
- Provision of appropriate information;
- Development of small, medium and micro enterprises (SMME's);
- Including women, youths and people with disabilities;
- Utilising research to develop markets;
- Supporting public and animal health; and
- Conservation of natural resources.

Respondents on commonage land require access to a wide range of support services and professional advice. In order to determine their specific needs, respondents were asked to list their agricultural training needs. These needs are summarised in Table 4.13.

**Table 4.13** Agricultural training needs (n = 132)

| FARMERS' AGRICULTURAL TRAINING NEEDS | MEAN WEIGHTED PERCENTAGE | RANKED ORDER POSITION |
|--------------------------------------|--------------------------|-----------------------|
| Grazing management                   | 23 (17.4%)               | 1 <sup>st</sup>       |
| Livestock management                 | 21 (15.9%)               | 2 <sup>nd</sup>       |
| Veld management                      | 19 (14.4%)               | 3 <sup>rd</sup>       |
| Pasture management                   | 18 (13.6%)               | 4 <sup>th</sup>       |
| Animal disease control and treatment | 14 (10.6%)               | 5 <sup>th</sup>       |
| Management skills                    | 11 (8.3%)                | 6 <sup>th</sup>       |
| Others                               | 9 (6.8%)                 | 7 <sup>th</sup>       |
| Production and marketing strategies  | 7 (5.3%)                 | 8 <sup>th</sup>       |
| Bookkeeping                          | 5 (3.9%)                 | 9 <sup>th</sup>       |
| Crop production                      | 3 (2.3%)                 | 10 <sup>th</sup>      |
| Implement maintenance                | 2 (1.5%)                 | 11 <sup>th</sup>      |

It appears that the most frequently mentioned type of training or assistance and/or support required by respondents relates to grazing management (17.4%), followed by livestock management (15.9%), veld management (14.4%), pasture management (13.6%), animal disease control and treatment (10.6%) and bookkeeping (3.9%). The implication is that farmers perceive training in livestock management, veld/pasture management and feeding to be very important. Agricultural extension officers are providing extension services and technical input to farmers on commonage areas and at project level.

From the respondents' point of view, the integration of services is essential in order to provide effective extension services to farmers on commonage land. The key role of local Extension Officers (EO's) is to ensure that farmers on commonage land know what to do during each part of the season. Extension Officers provide valuable hands-on assistance and also help with the evaluation of alternative farming practices and potential improvements to farming systems. The majority of the farmers on commonage land feel

that the government should play a leading role with regard to the following: streamlining the market process, the development of infrastructure and the provision of financial assistance and training and extension services to developing farmers. The government is seen as playing an important role in providing financial assistance (through CPF-SP) to expand current activities.

#### **4.7.4 Farmers' opinions regarding the management of commonage land**

Due to population pressure and overgrazing in communal areas, environmental degradation is taking place on a large scale. Even households with land and livestock struggle in the face of land shortages and the high costs of ploughing, planting and harvesting. Households typically make ends meet by engaging in multiple livelihoods, and these livelihood strategies will need to be supported by sensitive and clearly defined and targeted programmes. The involvement of farmers is of paramount importance for the implementation of measures to minimise the risks associated with small-scale farming, particularly during the first few years. Table 4.14 gives an overview of farmers' opinions regarding the management of communal grazing areas.

**Table 4.14** Farmers' opinions regarding the management of communal grazing areas (n=108)

| FARMERS' OPINIONS REGARDING THE MANAGEMENT OF COMMUNAL GRAZING AREAS | MEAN WEIGHTED PERCENTAGE | RANKED ORDER POSITION |
|--|--------------------------|-----------------------|
| Grazing on land with a high potential for crop production            | 33 (30.6%)               | 1 <sup>st</sup>       |
| Adequate handling facilities for livestock products                  | 18 (16.7%)               | 2 <sup>nd</sup>       |
| Improved productivity on communal land                               | 14 (12.9%)               | 3 <sup>rd</sup>       |
| Well organised   | 12 (11.1%)               | 4 <sup>th</sup>       |
| More control and better management of communal grazing resources     | 10 (9.3%)                | 5 <sup>th</sup>       |
| Training in environmental protection                                 | 9 (8.3%)                 | 6 <sup>th</sup>       |
| Good-quality livestock   | 5 (4.6%)                 | 7 <sup>th</sup>       |
| Effective communal tenure system                                     | 4 (3.7%)                 | 8 <sup>th</sup>       |
| Information on animal health hazards                                 | 2 (1.9%)                 | 9 <sup>th</sup>       |
| Adequate marketing systems (to generate income)                      | 1 (0.9%)                 | 10 <sup>th</sup>      |

Farmers are of the opinion that the services provided by the Department of Agriculture are worthwhile and in line with their approach to the management of large- and small-stock projects, but need to be improved. Suggestions received from farmers with regard to the improvement of the above-mentioned services include the introduction of small-stock courses and the retraining of farmers and labourers regarding management issues. In general, farmers feel that their self-image has been boosted since they have become involved in cattle farming on commonage land.

#### 4.7.5 Preferences regarding different roles, responsibilities and management

##### 4.7.5.1 The role of the government

A stronger commitment from government and its agencies is needed to tackle policy issues regarding land ownership and thereby increase agricultural production and assure greater equity and self-employment in agriculture (Greyling, 1999; Mathivandlela, 1999).

As stated in the Agricultural Policy of South Africa in 1998, the role of the government in agriculture is to create an enabling environment for the development of the sector. This must be done in such a way that the overall economic, social and environmental objectives can be achieved. This approach has three aspects (Ministry for Agriculture and Land Affairs, 1998):

- ◆ Establishing principles for government support for agriculture;
- ◆ Building partnerships with the private sector and farmers' organisations; and
- ◆ Establishing accountability for services rendered.

Against this background, farmers were queried about their expectations regarding the government's role in their farming and/or project activities. The results are further summarised in Table 4.15 below.

**Table 4.15** The role of the government as seen by the respondents with regard to their projects (n=130)

| ROLE OF GOVERNMENT  | MEAN WEIGHTED PERCENTAGE | RANKED ORDER POSITION |
|---|--------------------------|-----------------------|
| Provide more grazing areas  | 47 (36.2%)               | 1 <sup>st</sup>       |
| Provide training to farmers   | 28 (21.5%)               | 2 <sup>nd</sup>       |
| Financial assistance: CPF-SP infrastructure development   | 9 (6.9%)                 | 3 <sup>rd</sup>       |
| Speed up Land Reform process  | 9 (6.9%)                 | 3 <sup>rd</sup>       |
| Assistance and support to developing farmers: dipping and prevention of veld fires                          | 9 (6.9%)                 | 3 <sup>rd</sup>       |
| Establish community pastures  | 7 (5.4%)                 | 4 <sup>th</sup>       |
| Establish camps for rotational grazing  | 7 (5.4%)                 | 4 <sup>th</sup>       |
| Construct dipping tanks   | 5 (3.9%)                 | 5 <sup>th</sup>       |
| Establish community kraals  | 4 (3.1%)                 | 6 <sup>th</sup>       |
| Land care: construction of contours and soil erosion prevention   | 2 (1.5%)                 | 7 <sup>th</sup>       |
| Subsidies to buy land (grants), to buy medicine for livestock, and to buy agricultural input and implements | 2 (1.5%)                 | 7 <sup>th</sup>       |
| Prevention of stock theft   | 1 (0.8%)                 | 8 <sup>th</sup>       |

These results reveal that many respondents (36.2%) feel that the government can play a major role in making more grazing areas available. Farmers (6.9%) feel that the government should play a leading role in the development of infrastructure and the provision of financial assistance and training and extension services to developing farmers (21.5%). The government is seen as playing an important role in subsidising farmers to purchase input and veterinary services. The Department of Agriculture has made R25000.00 available in non-refundable grants to each household in order to address specific infrastructural problems with regard to fencing, water reticulation and roads. To access the funds the policy requires people to form groups, each group consisting of at least five households. Additional funds for purchasing farms can be obtained from the Land Bank as long-term loans. The maximum loan amount is R250 000.00 (Land Bank, 1998). An essential function of the government must be to supply public services such as basic agricultural research, market information, appropriate legal regulations and environmental protection. The government must also seek to strengthen the efficiency of service provision by targeting those most in need of support, principally the resource-poor and upcoming farmers (Ministry for Agriculture and Land Affairs, 1998). As stated in the Agricultural Policy of South Africa in 1998, the government will no longer provide drought relief as in the past. Instead, it will promote other options for reducing risk.

#### **4.7.5.2 The role of other farmers and neighbours**

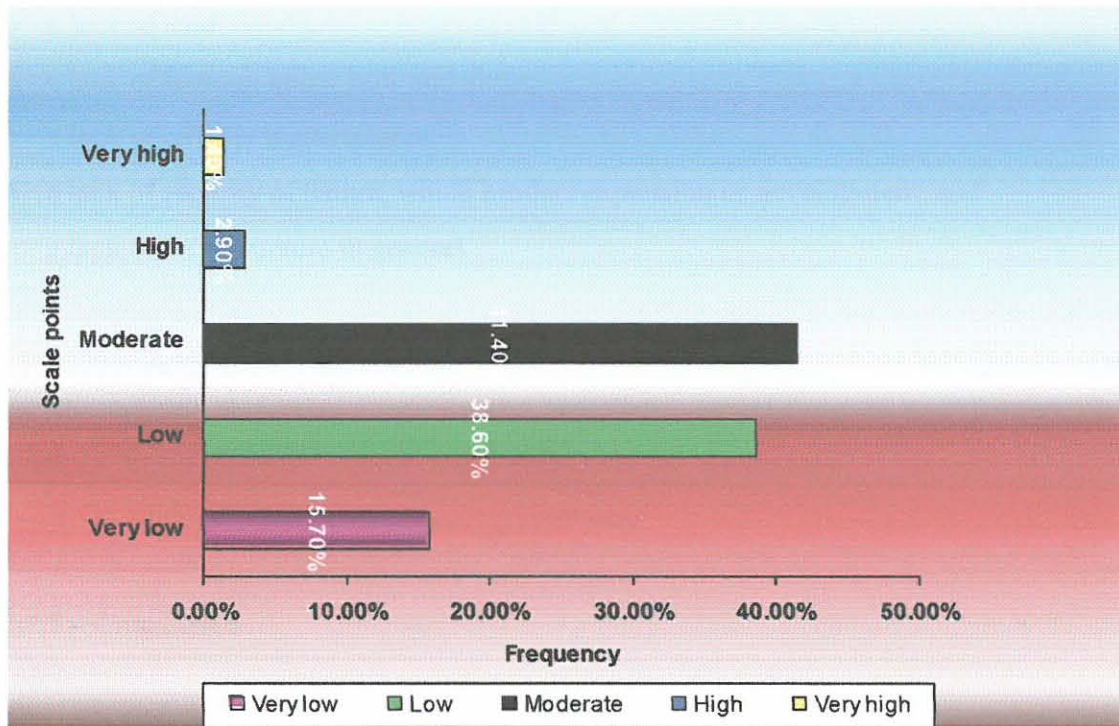
In most cases, the relationships between farmers, farm workers and consumers range from being highly unequal and exploitative to being mutually beneficial. Within the context of a "farmer to farmer" approach, farmers in this study expressed the following expectations with regard to the role other farmers and neighbours can play to ensure the success of projects in the Free State (n=126):

1. Form associations: fight stock theft, vandalism of property and veld burning (50.8%).
2. Corporations: neighbourhood and good working relationship (38.1%).
3. Farming, technical and financial development; share quality bulls (6.4%).
4. Technical advice from experienced and other farmers (3.9%).
5. Regular meetings with other farmers to share farming experiences (0.8%).

The role of co-operatives can also be expanded, particularly with regard to small-scale farmers. Appropriate incentives should be provided by the DoA to enable co-operatives to adopt new roles that will accommodate small-scale farmers. Co-operatives should be encouraged to assist farmers with marketing, advice and maintenance. Co-operatives should become the channel for local micro-finance, and should make inputs available by means of well-located sale points. This is, in fact, what the farmers reported on. The fact that 38.1% of the participants felt strongly that co-operation is the key to success, shows that farmers know that it is through a mutual understanding between them and the consumers that their businesses can operate economically and be sustainable, and that other important objectives can be achieved when approached as a multidisciplinary team. Farmers also recognise the fact that co-operation encourages the dissemination of information from one farmer to another.

#### **4.7.6 Level of success**

The n-value in Figure 4.8 below reflects the successful projects established on communal and commonage land, and is not necessarily an indication of the responses of the sample. Successful agriculture depends substantially on inheriting land and/or having other sources of income to sustain the farm during difficult years. Sophisticated management skills are required for successful farming (White Paper on Rural Development, 1999). In order to practise sustainable agriculture on communal rangelands, the utilisation of land must be ecologically sound, economically viable, socially acceptable and politically supported (Scogings *at al.*, 1999).

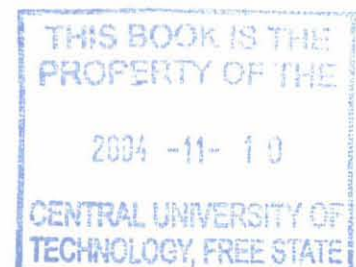


**Figure 4.8** Farmers' perceptions of their own level of success

About 41.4% of the cattle farmers ranked their level of success as *moderate* (1<sup>st</sup>). In terms of scale points, *very low* was ranked 3<sup>rd</sup>, *low* 2<sup>nd</sup>, *moderate* 1<sup>st</sup>, *high* 4<sup>th</sup> and *very high* 5<sup>th</sup>. In the sample size of 70 respondents, the mean scale point is 11, with a standard deviation of 13.4.

A large proportion of respondents were uncertain about the eventual viability of their projects, since most of the projects on communal and commonage areas were still running. However, the majority of the respondents rated the outcomes of the projects as reasonable. Most of the farmers were found to depend chiefly on the grants from the Government. It is difficult to be sure whether or not they will function independently in the long run. It seems unlikely that projects can survive if hit by a sudden disaster such as fire or drought. The most common reasons for the failure of projects were:

- ◆ a lack of funds;
- ◆ a lack of water;



- ◆ a lack of land;
- ◆ a lack of farming know-how and skills;
- ◆ a lack of reliable marketplaces;
- ◆ a lack of security of tenure, which hinders expansion or development; and
- ◆ a lack of infrastructure in general.

Other stumbling blocks that seem to erode the success of projects on communal land are the shortage of veterinary surgeons and unrealistic expectations of new farmers (for instance, some farmers expect the Department of Agriculture to pay for monthly expenses arising from their own farming practices).

#### **4.7.7 Conclusion**

The results discussed in this chapter indicate that institutional changes with regard to land tenure arrangements and control are not properly recognized as a precondition for sustainable livestock development. The dissemination of information and communication with livestock owners are not properly promoted. Most of the present communal grazing areas are severely degraded as a result of unsustainable use. Livestock production is not based on ecological sustainability or economic viability, and there is a lack of understanding of the socio-economic implications of intervention. Cattle owners and committees in communal grazing areas do not participate fully in the planning and decision-making processes with regard to livestock development on communal land. Practical veterinary and livestock research as well as technology development are not conducted in fields, which has a bearing on livestock farming in communal grazing areas in the Free State. Marketing, processing and quality control are not promoted in communal grazing areas.

Environmental protection is not an integral part of livestock production in communal areas. Livestock development is not promoted in areas best suited to communal grazing and pasture, and other forms of land utilisation are not properly taken into account.

Selection and breeding in communal grazing areas affect the quality of herd. The nutritional status of livestock is not improved, since feed resources and supplementary feeding programmes are not properly utilised or cannot be accessed. Programmes to improve disease prevention and institute animal health care services are still lacking in most communal grazing areas. The training of livestock owners in grazing management is critically important. In Chapter 5, attention will be given to the conclusions and recommendations in this regard.

## CHAPTER 5

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1 SUMMARY

During the literature review it became evident that there is much literature available on livestock and rangeland technology transfer, but that little research has been done on communal grazing systems and the integration of environmental issues into communal and rangeland management. To overcome this dearth of research, it was decided to target communal grazing areas. In this regard, the following important role players were identified: cattle-farming communities; communal grazing and livestock management committees and organisations; the Department of Agriculture (animal scientists, researchers and extension officers); the Department of Land Affairs (planners); local municipalities (officials dealing with environmental issues and livestock production in the Free State), and others who may contribute to a reliable and predictive understanding of natural resource management. The idea was to establish how natural resources in communal grazing areas would be affected in the future. A broad, collaborative programme, which integrated the control of communal grazing areas into natural resource management, was created to address this issue. Thus, with predictive understanding, appropriate management practices were developed to promote the integration of environmental issues into the communal grazing system in the Free State. In the light of all the available facts, it is extremely important that environmental issues should be monitored and integrated into communal grazing systems - especially in the years ahead.

In order to sustain development, cultural constraints, indigenous knowledge and socio-economic issues need to be studied, incorporated into the planning process and clearly understood in communal grazing areas.

The implementation of planned grazing systems, combined with proven grazing management techniques, could bring about significant improvements. Such a new approach to grazing management would increase production, reduce erosion potential and replenish deteriorated soil carbon levels. Recognition should be given to the fact that the diversity of natural resources influences the adoption of practices and technologies. The financial risk of adopting new technologies may also inhibit the rate of adoption because the technologies may depend on site-specific conditions. Identifying constraints and barriers can reduce adoption costs and targeting public policy can improve sustainability.

## **5.2 CONCLUSIONS**

The following conclusions can be drawn from the results discussed:

### **5.2.1 General profile**

This study has not only outlined the significant problems of adult illiteracy in the communal grazing areas in the Free State, but has also identified skills, capabilities and advantages that could be adapted to the local situation. Behind the statistics of illiteracy there are individual lives, and in every case there is the prospect of a higher quality of life for a child or an adult (MacKay, 2002). The respondents' profile was quite diverse, namely:

- households in this study ranged from those headed by men (94.3%) to those headed by women (4.3%) or children (1.4%);
- respondents varied from old to young farmers, with an average age of 57 years;
- the group contained qualified as well as uneducated people, with 64.4% of the farmers being able to read and write and 35.6% who have not mastered these skills;

- some of the respondents were unskilled, while others could perform marketable tasks such as sewing, knitting, shoe repair, building and handicrafts (making brooms and mats out of local grasses);
- the group included newcomers to farming as well as well-established farmers with an average of 7 years farming experience on the current grazing area and a total of 15 years' farming experience;
- respondents ranged from those farming intensively with pigs to those farming extensively with sheep and cattle;
- the group included farmers with enough grazing land for livestock, as well as farmers with a lack of grazing land and capital. On average, farmers had 381.64 hectares of natural grazing land and 135.83 hectares of arable land. There is significant evidence ( $\alpha = 0.05$ ) that the average size of natural grazing land, which figures in this study, is larger than the average size of arable land.

### 5.2.2 Access to land in the Free State

Land ownership in South Africa has long been a source of conflict. Our history of conquest and dispossession, of forced removals and racially-skewed distribution of land resources has left us with a complex and difficult legacy (Minister of Land Affairs, 1997). Inhabitants of informal "urban" settlements on the periphery of towns and cities have brought their cattle with them from the rural areas. Apart from the fact that sometimes there simply is no prime grazing land, what land there is, in and around the settlement, is often overgrazed and poorly managed (Belsky, 1994). In the light of South Africa's history and the challenges, which loom large, the following overview of land allocation in the Free State can be given:

- Land tenure arrangements in communal areas breed insecurity. In communal areas, land rights are still vested in traditional authorities. The conflict over land, which can be viewed as a power struggle between the chief (or headman) and his subjects, is the major issue. Without resolving this conflict, all initiatives regarding land reform, service standards, infrastructure planning, management of grazing, cultivation of land and natural resources will be severely compromised. In the absence of a rapidly

implemented tenure reform programme, the potential for conflict will continue to exist.

- Most of the respondents (54.3%) graze their livestock on land allocated to them by the local municipality. Because of its ownership of commonage land, the municipality also plays an important role in the management of the natural resources in communal grazing areas. In the former homeland of Qwaqwa, grazing land is surrounded by a number of informal settlements. Local authorities and other service providers find it difficult to upgrade communal grazing areas and informal settlements when no secure rights are in place. In order to develop these areas, they require a title deed. Of cattle farmers, 11.4% utilise land allocated by the District Chiefs of the Tribal Council. Since these communal grazing areas are primarily in tribal regions, conflicts often arise regarding the administration and allocation of land for grazing purposes by traditional authorities. In most cases, the democratically-elected local authority (i.e. local councillors) is not aware of what is going on. Communal grazing areas in most tribal regions run a high risk of sustaining environmental damage because of their open-access nature, leading to rapid degradation of the natural resources on the land. Individual ownership in the context of the traditional land tenure system cannot be obtained, as the land rights are vested in the tribe in terms of communal ownership. Those farmers (14.3%) utilising the land allocated by the government, are surrounded by a number of informal settlements. The natural resources on the land are under enormous pressure and conflict occurs on a regular basis in the area.

### **5.2.3 Management of communal grazing areas**

Agriculture in communal areas is practised on marginal land, and this leads to erosion and water pollution. Cattle and other livestock are also not isolated from water consumption points used by humans, which increases health risks (Belsky, 1994; Beukman, 1999). The pattern of livestock grazing intensity on communal land is very patchy due to the distribution of water points and stock posts (Todd, 1997). On average,

the current stocking rate with regard to this study has been maintained for a period longer than 7 years. However, the consequences of continued heavy grazing or increases in the stocking rate are unknown.

- The mixed farming system practised in the Free State has three components: livestock production, consisting mainly of cattle; crop production on one or more fields; and vegetable production in home gardens.
- Both the soil and vegetation that were studied give clear indications that most communal land is seriously overgrazed. A combination of overgrazing and poor management practices has resulted in unproductive vegetation and soil that is susceptible to erosion. Although communal grazing in the Free State has continued successfully for a long period of time, deterioration is taking place. In the Free State, communal grazing land is dominated by *Cymbopogon-Themeda* veld. Improvement of grazing areas through removal of this species is unlikely to take place, since *Cymbopogon-Themeda* is used as thatching material by villagers and sold to generate some income. Similar conclusions were reached by Trollope (1984) in the former homeland of Ciskei.

#### **5.2.4 The core farming activities on commonage areas**

Although livestock converts range resources into useful products, there is concern that high stocking rates may lead to long-term range degradation and reduced range productivity (Hatch & Zacharias, 1995). Livestock is important in the communal grazing areas. It represents an investment that plays an important economic role in the Free State, both in terms of wealth distribution and as a source of income.

- Among cattle farmers in the Free State, many farming operations are still based on the traditional way. Smallholders practising mixed farming and other traditional groups, own cattle breeds in the Free State for various reasons. The priorities of the small-scale and traditional livestock owners in the study area are:

1. Generating income;
  2. Producing milk and eventually meat, irrespective of the cattle breed;
  3. Fulfilling social, cultural and religious requirements and obligations;
  4. Generating and accumulating capital;
  5. Providing status within the community; and
  6. Providing power and fuel.
- The poor management practices of farmers are due to the high levels of poverty, lack of support services for prospective farmers which take account of the realities of the cattle-farming industry, limited animal feed and finance, poor herd health management, and uncontrolled activities on communal farm land.
  - In communal grazing areas, cattle farmers keep dual-purpose breeds that produce a fair amount of milk and meat. The Brahman breed is the breed most preferred by a large number of cattle farmers (42.9%) because of its potential, if managed properly, to produce more meat than other breeds like the Bonsmara (14.3%) and the Drakensberger (9.5%). As far as dairy breeds are concerned, the Holstein-Friesland (60.0%) is the breed most preferred by cattle farmers. A smaller percentage chose the Jersey (26.7%). Beef breeds are also milked in communal grazing areas once a day. Indigenous crossbreeds and beef breeds, as well as other local breeds, are relatively well adapted to the environment. They conserve grazing, have a low rate of infection by ticks and parasites, and most probably would outperform other types of stock under similar levels of management.
  - Regarding small stock, 50.0% of the farmers keep mutton sheep, 37.5% keep the Dorper breed and 12.5% prefer other sheep breeds. Of the respondents, 25.0% farm with Angora and Boer goats respectively. The most important reasons for keeping small stock concern the meat, wool and mohair. Wool and mohair are the primary sources of income for cattle farmers.

- Almost all cattle farmers on communal grazing lands rear female calves until they enter the production stream. It takes a minimum of twenty-four months before farmers expect to see a return on their investment in calves. The tendency among cattle farmers is to home breed young sires to be future bulls, and not to buy registered bulls. This tendency may result in a low yield. From the communal farming system's point of view, poor management of communal grazing land is unproductive and results in poor livestock performance.
- In a communal farming system, breed choice is influenced by the fact that grazing is generally over-utilised due to a lack of access control. The best choice is therefore a low-maintenance, easy-to-care-for and disease-resistant animal with the ability to utilise roughage with very little or no supplementation. The local breeds are well-adapted to the utilisation of crop residues.
- Farmers' record-keeping systems have certain shortcomings that may have negative financial implications for the projects they are involved in, and may also have a negative impact on the productivity of their cows.

### **5.2.5 Availability of infrastructure and facilities**

Infrastructure delivery on communal grazing land remains a primary concern of local government. Integrated development plans, drawn up by Rural Councils, represent a crucially important method to identify needs and to plan interventions. The farming community is involved in local government, and their participation is vitally important. The support and co-operation of local farmers' associations are also essential for a successful outcome (White Paper on Rural Development, 1999).

- A lack of infrastructure and the subsequent conflict over the use of existing resources have greatly hampered agricultural development in these areas. Due to the high population and lack of a grazing system, environmental degradation is taking place at an increasing rate.

- Water quality is vital to the health of all living organisms, from fish and aquatic insects to wildlife and humans. Water quality varies greatly in the streams, rivers, fountains and ground waters of the Free State, reflecting the province's many landscapes and land uses.

The major constraints on farmers are a shortage of land, a lack of investment and working capital and limited access to markets, as well as the restricted security of tenure of land, a high stocking rate (mainly on communal land) and the seasonal nature of feed supply in the Free State area. Farmers experience problems and frustrations with regard to the allocation and administration of the Community Project Fund Support Programme (CPF-SP). Before 1827, water resources management was in the hands of "Landdrost en Heemrade", which were groups of farmers whose function was to regulate water use. These bodies were also in charge of settling disputes where there were competing claims. With regard to the subjects of this study, the majority of the households farming on communal land lack access to agricultural resources such as land, agricultural input and water.

- Access to water is poor in most communal grazing areas. Most cattle farmers rely on dams (39.7%) as a source of water in most communal grazing areas. Drought in the Free State is the single most prevalent natural disaster, and it has a marked effect on agriculture every few years. Ground dams are more susceptible to the effects of drought in the Free State. Drought management does not form part of the management of communal grazing land to ensure that climatic risks are minimised. An important consequence of droughts is poor cash flow, which increases the indebtedness of farmers and leads to declining land prices as well as loss of employment (White Paper on Rural Development, 1999). Another problem is that borehole pumps, of which 23.5% are located in communal grazing areas, often break down. This problem is compounded by the fact that there is little clarity about who is responsible for maintaining the boreholes. Some cattle drink the water in springs/streams (16.2%). In most cases, springs/streams supply higher quality water.

### 5.2.6 Farmers' needs and aspirations

Sustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life. In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are all in harmony and enhance both current and future potential to fulfil human needs and aspirations (Beukman, 1999).

- Many cattle farmers admit to using veld burning to remove dead grass or unacceptable plants. Veld burning, however, is mostly applied to stimulate grass growth during the end of the winter months or immediately after the first spring rains. Cattle farmers all agree that uncontrolled, untimely or indiscriminate veld fires pose a threat to healthy grasslands and good grazing in the Free State, especially during the winter months.
- Cattle farmers (34.3%) on communal grazing land view a number of government support services other than the subsidy as important. The following support services were mentioned: effective extension services; assistance to diversify crops; identification of markets; improvement of labour management practices and assistance with environmental conservation. Some cattle farmers (11.4%) on communal grazing lands view full title as the way to obtain secure tenure, which will allow them to have greater security and better opportunities. Cattle farmers (11.4%) believe that farmers in the Free State should work in a co-ordinated manner with other service providers to ensure productivity and effective farming. Only 10.0% see co-operation as a key to productivity and effective farming, while 4.3% want to have their own farms. Another 4.3% want to farm with high-quality livestock breeds.

- Farmers on commonage land need comprehensive training to facilitate the development of managerial and technical skills.
- As could be expected from the respondents, better funding as well as more extensive and intensive training were the two main suggestions for the improvement of cattle projects, since these two aspects were directly related to the failure of some cattle projects on communal land.
- Poor extension services, inadequate veterinary support, lack of financial assistance and a lack of market information have resulted in low numbers of animals being produced on small-scale farms in the Free State.
- The types of assistance or support respondents require from the government, can be summarised as follows:
  - financial assistance;
  - training;
  - technical advice;
  - marketing skills and technical advice on marketing skills;
  - continued assistance on existing cattle projects, and
  - assistance in obtaining farms or additional land.
- Small-scale farmers mostly require the following services:
  - training in farm management;
  - financial assistance, and
  - training in marketing skills.
- All farmers have a personal interest in effective drought risk management strategies.
- Those respondents (41.4%) who are of the opinion that living conditions have improved since the introduction of cattle projects, refer mainly to increased food

security and the fact that farmers can sell their surplus milk, thereby creating income and job opportunities.

- Apparently, the two main stumbling blocks impeding the progress of cattle farmers on communal grazing land, are their lack of skills with regard to financial planning and management and their inability to successfully manage projects.

### **5.3 RECOMMENDATIONS**

In the light of what has been said, it is evident that strategies and plans need to be developed to improve the situation in communal grazing areas. Policies will have to be formulated and further research conducted. Applicable recommendations are discussed in the following paragraph.

#### **5.3.1 Strategic proposals**

##### **5.3.1.1 General profile**

- Several key aspects of the general profile of cattle farmers in the Free State are of importance. This study generalises the data collected on communal grazing land near small towns and dense rural settlements. Conditions in these settings may differ markedly. It is recommended that further research on the demographic and socio-economic profile of communal grazing land in the Free State be conducted. The local academic community can make a contribution in this regard.
- Guidance in farming matters should not only be given to household heads, but also to spouses and children. The involvement of wives and successors in the decision-making process will ensure the success of cattle projects and the implementation of long-term plans and programmes.

- A low level of formal educational training and a lack of independent experience impact negatively on the managerial skills and farming know-how of farmers. To overcome this obstacle, it is recommended that farmers undergo managerial training and receive technical assistance.
- The level of basic technical knowledge and skills with regard to agriculture and livestock is high amongst those farmers who have been working as farm labourers for some time. However, there is a need to upgrade these farmers' expertise in specific subjects, for example in the spheres of farm management, marketing and record-keeping, and to adapt it to the requirements of managing a cattle farm.

#### **5.3.1.2 Access to land in the Free State**

- The areas presently used for farming activities should be reserved for that purpose. Tenure reform is particularly important in communal areas and on peri-urban land that falls under local government control, in that it is designed to improve the security and the tradability of individual rights to land. This encourages responsible management. De facto rights to production, which could include land security and contracts, are essential.
- Commonage development has the potential to make a very significant contribution towards development in the rural areas of the Free State province, in particular with regard to the following: the creation of household food security; wealth creation by means of market gardens; the creation of opportunities for micro- entrepreneurs; securing land for stockowners within the townships; land reform by means of establishing smallholders as well as commercial farmers; job creation; participation in development at Local Council level; optimal utilisation of existing services/infrastructure; ensuring income for the Local Council (e.g. via the leasing of land and fresh-produce stalls, grazing fees and the selling of water); creating a culture of payment for services provided by the Local Council;

ensuring that all the relevant governmental institutions play their role optimally at grass-roots level; creating conditions for peace, stability and development, not only in "townships", but also in the adjacent "dorps" and on the "platteland" at large; and curbing the influx of people to the major cities, which has detrimental effects in terms of socio-economic decline (Free State Department of Agriculture, 1998).

- Planning for environmental management must be done in a participative, inclusive way, involving all participants in decision-making, and not just officials. Commonage land should be utilised in such a way that the beneficiaries' livelihoods are derived from multiple sources, and not a single source.
- Farmers and community members who need access to grazing and cultivated land in communal areas, must be part of grazing committees at a local level. This is equally true with respect to the use of land-based natural resources, most notably firewood, water, wild vegetables and medicinal plants.
- With the increased emphasis on cattle production as a result of changes in programmes, the development of projects to improve pasture and forage management is essential.
- Currently, no grazing permits are issued to farmers. Grazing permits should be issued in areas where land is unsurveyed and no correct legal description is available.
- It is therefore important that any initiatives on communal land are thoroughly planned, that the land itself is used in an orderly fashion, and that the control of these areas is assigned to a specific local or tribal authority. For those people who keep cattle for production purposes, it is recommended that a commonage grazing system be introduced and the number of animals per household be restricted.

### 5.3.1.3 Management of communal grazing areas

- Soil erosion causes redistribution of soil due to the action of wind, water and tillage. Many communal areas and commonages are affected by all three agents of erosion. Erosion reduces the soil's capacity to grow crops, decreases crop yield variability and negatively impacts on water and air quality.
- Projects on communal and commonage land must be sustainable, and therefore they should be demand-driven, socially acceptable, economically viable, technologically sound, environmentally friendly and organisationally stable, and they should comply with the applicable legal and political requirements.
- Properly managed livestock grazing is a sustainable form of agriculture, and is compatible with a wide array of other sustainable uses of rangeland. Society recognizes the cultural and economic importance of livestock grazing, especially to rural communities. Livestock grazing is an efficient method for converting low-quality forages into high-quality agricultural products that supply human needs worldwide. Managed grazing may be used to expedite desired changes in the structure and function of rangeland ecosystems. Livestock grazing can be complementary to, and synergistic with, other rangeland restoration technologies. Livestock grazing may not be appropriate in certain fragile and highly erodible areas, while the removal of livestock grazing in other regions may be of no benefit (The Society for Range Management, International Board of Directors, 2000).
- Through improved management, commonage land has the potential to significantly increase its present carrying capacity, thereby providing a service to the livestock industry.

- Animal management is essential, and consideration should be given to practices that conform to the desired stock flow, such as breeding season, culling and marketing policy.

#### **5.3.1.4 The core farming activities in commonage areas**

- To be successful and make a profit, farmers should make the right financial decisions with regard to the cost of the following: production, reproduction, culling rate, heifer management, herd distribution, housing and environment, animal feed and feeding, and somatic cell count. Farmers must be able to formulate objectives, formulate well-considered plans and implement them. The implementation strategy must include a timetable of events to identify priorities, and enable the farmer to set goals and target dates for development needs. The following must be borne in mind: finances, overhead costs, capital development expenses, labour and machinery, cash-flow budget, livestock flow and other factors such as the availability of markets and transport facilities, as well as restrictions such as quotas.
- Increasing the costs of grazing in order to reduce animal pressure would promote a more rapid turnover. The perception of pastoral people keeping livestock for wealth and social status has been abandoned, and there is now a general acceptance that pastoralists' behaviour is, as may be expected, economically rational. This economic rationale should induce herders to move their focus away from liveweight gains of their almost mature and only slowly growing animals and sell them earlier, since the cost of the grazing would outweigh the benefits of the final liveweight gain. However, cost recovery must be combined with the decentralized management of the proceeds by the beneficiaries, to provide appropriate feedback mechanisms to producers and cover levying grazing fees for communal areas. Such fees have been proposed often, but little experience exists of them in practice. A system of progressive fees, with larger herds paying more per head (Taylor, 1995) is attractive, particularly for many of the dry areas in

Africa where livestock are increasingly concentrated in the hands of outside owners, such as civil servants, traders and crop farmers.

- Before starting a cattle enterprise, it is essential to plan ahead and decide how the objectives will be achieved. The first task of a cattle farmer is to set some objectives. Objectives must be clarified and perhaps ranked in terms of priority as planning takes place. It is essential to note that circumstances may vary, and decisions should be made accordingly. Aspects to be considered include the following:
  - Marketing opportunities;
  - Sources of feed;
  - Labour required;
  - Business skills;
  - Capital required;
  - Availability and purchase of equipment;
  - Productivity of animals, and
  - Other facilities.
  
- It is recommended that farmers create "Bull Projects" to use all registered bulls to improve the fertility in the herds. Farmers who purchased state-registered bulls, should rotate these among other farmers in order to improve the fertility of the herd in the greater Qwaqwa area.
  
- Special attention should also be given to relevant topics such as heifer rearing, selection policy, marketing arrangements and herd health programmes. Good procedures and the necessary techniques to ensure good quality conserved feeds, must be adopted.
  
- It is therefore recommended that calf rearers should specialise in raising calves to maturity. A group separate from cattle farmers can undertake this activity on farms that have been specially set aside and planned for calf rearing. However, it

is only natural and sensible that those cattle farmers who do not want to part with the offspring of their quality-producing cows, should build up the history of the cattle and sustain the interest.

- It is therefore recommended that a more reliable record-keeping format be developed for sound management decisions. It is important for farmers to note that a high level of management can only be maintained by keeping proper and complete records.
- It is recommended that farmers should have good working relationships with their fellow farmers and neighbours. Farmers should form organised bodies to fight stock theft, veld fires and crime. Farm watch organisations should be promoted. Rural safety networks should be established with the assistance of the government and the private sector. These networks should include rural councils, farmers' associations and non-governmental organisations involved in farm welfare.
- The removal of price distortions of other agricultural input in order to reduce the conversion of pastoral key resources into marginal cropland.
- It is acceptable that profit maximisation should be an important farm management objective, especially if it contributes to the attainment of other objectives such as growth or the financial survival of the cattle enterprise. Natural resources (land, water and veld) should always be left in such a condition as to permanently ensure satisfactory results. Technical assistance is needed in identifying conservation problems and supporting small-scale farmers to work together to solve problems.

#### **5.3.1.5 Availability of infrastructure and facilities**

- A key requirement for sustainable commonage development is the integration of commonage planning with the municipal planning process, such as the Integrated Development Plans (IDP's) and Land Development Objectives (LDO's). Firstly,

the spatial or land-use planning process of a municipality, including a district municipality, will determine where infrastructure investments are to be made and where opportunities for livelihood generation will be the greatest. These will be key indicators as to where commonage projects should be implemented. Secondly, the planning process will provide an important way to monitor and evaluate the effects of commonage implementation over time, as the planning process will include *status quo* assessments of environmental and settlement issues within the municipal area. In order to achieve sustainable agriculture in the commonage areas, land use must be ecologically sound, economically viable, socially acceptable and politically supported.

- As the population pressure increases on land and water resources, unemployment and inflation take their toll in a region not generously endowed with any resources other than people. The demand that agriculture should make a major contribution to the household economy, can no longer be ignored.
- Problems regarding limited natural resources and unresolved land tenure systems require widespread investment in local capacity building.
- When planning and implementing projects, investment in rural and peri-urban infrastructures that make greater use of local knowledge, management, labour and contractors will have a poverty alleviation effect of its own during the implementation of projects. The participation of farmers in such planning exercises will be crucial, and will require effective representation of the farming community in local government.
- Addressing the problems and needs of commonage grazing farmers in the Free State area requires detailed and lengthy community facilitation and negotiation.
- The provision of key information on managing risks is essential to farmers.

- The productivity of land, labour and capital depends mostly on the cattle farmer's approach to management.
- Full cost recovery, especially for water supply and animal health services, is important. In many cases, water has been a free resource supplied by the public sector (and frequently financed by the international donor community). Full cost recovery, including construction costs, will probably reduce the number of large boreholes, and therefore reduce local degradation around these water points.

#### **5.3.1.6 Farmers' needs and aspirations**

- The service delivery system should become more responsive to the needs and aspirations of cattle farmers. Development activities directed towards cattle-farming operations should therefore be based upon sound technical, financial and administrative procedures. The needs and aspirations of farmers should be identified and prioritised by means of a uniform needs analysis.
- Training directed at cattle farmers should basically focus on helping them to achieve self-reliance and economically and environmentally sound practices.
- The success of projects may be enhanced by emphasising training and ensuring the availability of funds.
- A detailed survey and evaluation of the extension services available to farmers grazing on commonage land, needs to be done.
- Available extension services from the Department of Agriculture are insufficient and ineffective due to lack of capacity.
- Extension can play a supportive role in informing farmers of the availability and accessibility of such services. It must be emphasised that a dependable and viable

market for cattle sales is very important for the economic viability of cattle projects. Market opportunities should be identified to allow for offloading during drought periods.

- Extension Officers focus on cattle projects, but lack the capacity to attend to the needs of the farmers involved in these projects.
- Veld management research and extension education, as well as training and practice in general, have to take cognisance of and reflect the tendency towards more participatory approaches to extension.
- Technological information and science must be translated into accessible texts, enabling farmers to attain awareness and wisdom. The old style of deciding what is good for black farmers is no longer applicable. Local knowledge and materials must be utilised as much as possible, since research has shown that farmers are reluctant to imitate international trends.
- The overriding need is to stop the build-up of further human pressure. As discussed, rangelands are already efficiently used and no significant increases in productivity can be envisaged. Since populations in these areas experience a downward spiral of declining livestock/people ratios and increased vulnerability to drought, employment generation outside the dry rangelands is the most critical component of developing sustainable rangeland resource use in the arid zones. As the second priority, and also crucially important, external interventions in the system need to take account of the non-equilibrium status of pastoral systems in arid zones and enhance, rather than restrict, flexibility and mobility. This means that attempts to regulate the stocking rate should be stopped. Firstly, the carrying capacity of rangelands in these non-equilibrium environments cannot be estimated with any acceptable degree of reliability. Secondly, such estimates can even be dangerous, as they may lead to incorrect intervention in an attempt to control stocking rates. Thirdly, even apart from the technical flaws in the estimation of

the carrying capacity, experience has shown that it is almost always impossible to enforce stocking rates. The third priority should be the strengthening of traditional pastoral institutions and resource management practices. "Getting the institutions right" by empowering pastoral people, is now generally considered the main challenge in pastoral and arid land development. Furthermore, there is a growing acknowledgment of the multiple uses that arid rangelands provide to a wide variety of users (De Wet & Mcallister, 1983; Taylor, 1995).

- A strong emphasis has to be placed on bush encroachment control and harvesting management techniques. These are the areas that can have a positive impact on the carrying capacity of land, and are also in need of technological development. These techniques also promote opportunities to expand haying and grazing on commonage land.
- Uncontrolled, untimely or indiscriminate veld fires pose a threat to healthy grasslands and good grazing in the Free State province. Large parts of protected areas have been destroyed as a result of runaway veld fires sweeping into parks from adjacent land, while large tracts of valuable grazing have been destroyed on neighbouring farms under similar circumstances. Indiscriminate or untimely burning can have a seriously negative effect on the palatability and nutrition levels of veld grasses. This, in turn, means that greater grazing pressure is brought to bear on areas where grasslands are still healthy.
- It is essential to have a strategic plan for developing and implementing extension plans and programmes for agricultural improvement. By drawing up scientifically-based plans and programmes, attention will be drawn to the short-, medium- and long-term objectives or needs and problems of small-scale cattle farmers and their families. Provision of regular on-farm extension support with regard to production technology, as well as farm management advice, is essential to small-scale cattle farmers. This will enable multidisciplinary teams to identify the needs of farmers.

- Training directed at cattle farmers should basically focus on helping them to achieve self-reliance and economically and environmentally sound practices. According to Berliner (1999), the level of risk acceptance may depend on many factors, including the willingness to provide supplementary feed, the desired level of production and the inherent sensitivity of the area to degradation.
- It is essential that access to finance should also be facilitated via private financial institutions, and not only via the government. It should be mentioned that financial institutions mostly give financial assistance only to entrepreneurs with sound financial records, growing assets and a history of business development. An intensive publicity campaign to introduce the CPF-SP project idea is essential, taking into account that the DoA has limited experience of support programmes and working with clients, as well as limited financial resources.
- For commercial cattle farmers, government assistance should not primarily be in the form of a subsidy, but should rather focus on effective extension work, which could include assistance to farmers to diversify crops, identify markets, improve labour management practices and enhance environmental conservation. The government can play a major role in establishing links between the formal channels of marketing and small-scale producers through small farmer groups. It can also encourage the development of local markets and informal marketing systems. Access to markets should be fair and adequate, and provision for specific arrangements, if required, must be made. However, for the market to function effectively, land tenure arrangements should ensure security of land use and the tradability of land rights.
- Unless cattle farmers on communal land are well equipped with good management practices and skills, their cattle may prove to be unprofitable.

- Peak labour and machinery requirements with regard to the livestock enterprise must be determined and checked to ensure that the requirements are met.
- To improve the success rate of cattle projects in the Free State, special attention should be given to proper training of cattle farmers, proper management of funds and good co-operation between parties in general.
- The ratings of respondents' working relationships with various institutions display much uncertainty, most probably because many farmers never had any prior contact with these institutions. The working relationships with non-governmental organisations, community-based organisations, technikons and universities are even worse. The working relationships with the Department of Land Affairs, the Department of Agriculture, banks (Land Bank and Development Bank of South Africa), co-operatives (Central East Co-operative) and the private sector are better. These working relationships with various institutions are the most notable aspects of the informal findings that need to receive attention.
- The knowledge of farmers should be utilised properly, and they should be encouraged to be responsible for their own destinies. The concept among cattle farmers that "the government will help", must be dealt with systematically.
- Major changes are required in agricultural research and extension if South Africa's agriculture is to be sustainable and productive. Given the current need to develop sustainable livelihoods and small farming systems in South Africa, attention must be paid to strategies that will reorientate research and extension policies to better redress the needs of small-scale farmers who are farming in a relatively complex, diverse and risk-prone environment.
- Department of Agriculture officials can present/offer courses to improve the skills and knowledge of small-scale cattle farmers, while non-formal training at Glen Agricultural College should be functional.

- To make extension effective, staff at provincial and regional level will in future co-operate with farmers' representatives such as farmers' unions, farmers' associations, commodity organisations, university groups and non-governmental organisations, to determine the target of the extension. This will, in fact, determine what level of support the different groups of farmers need. Departments will then decide on the kind of extension service for the various groups. Upcoming and small-scale farmers will then be the main targets of extension.
- It is essential for extension workers developing a strategic management plan for farmers, to bring farmers into the fold in order to identify a starting point for a programme of improvement. Time and energy need to be devoted to achieve the desired short-, medium- and long-term objectives of small-scale cattle farmers.
- Multidisciplinary teams at ward level must work systematically with small-scale cattle farmers with regard to planning and marketing.
- Evaluating the quantitative impact of extension services on emerging dairy farmers is complex. Despite that complexity, extension services should distinguish between subsistence, semi-commercial and commercial farming. Extension services should then be rendered accordingly. Non-provision of services to small-scale cattle farmers is a problem.
- Apart from marketing and pricing problems, several technical factors affect the development of small-scale cattle farming in the Free State. These include: (1) limited access to credit; (2) the unavailability of veterinary services; (3) inadequate training and extension services to compensate for the limited experience of farmers regarding the relatively complex activities involved in cattle farming; and (4) the frequent undernourishment of cattle and the variable genetic quality of milk, the latter being the result of poor breeding practices.

- Farmers often run into marketing problems. Marketing channels and services catering for all aspects relating to storage, packaging and transport pose major problems to small-scale cattle farmers.
- The solution proposed to remedy these problems is generally to provide training in marketing skills so as to gain valuable information on demand, supply and price. However, initiatives other than training in marketing techniques should also be considered, such as value adding and product presentation. Value-adding activities are very popular among small-scale cattle farmers. It is therefore recommended that this farming division be further investigated, especially amongst the cattle sections involved in the selling of vegetables and live animals.
- Specific initiatives to support these strategy elements include the development of effective co-management regimes. This means forging partnerships between the State and a wide variety of users, with the State carrying the overall responsibility for arbitrating conflicting interests at national level, and facilitating negotiation. Practical management decisions and negotiations between competing users should, however, be delegated to local level (Herrero, 1996).
- Most donor agencies now accept these as basic elements of their pastoral strategy, as shown, for example, by the excellent review by IFAD (1995), of common property resources. In addition, African and Middle Eastern government authorities are increasingly adopting participatory and decentralized approaches, with a greater degree of cost recovery, although there is still considerable apprehension about allowing pastoral groups any great degree of independence.
- Veld must be cared for so that the grass and soil are not damaged and animals can get enough food. Soil and grass support each other. If grass is overgrazed by animals, the sun will dry up the soil so that grass roots cannot hold the soil. Such grass will not grow again, and animals will have less food (Plaas, 1999). There are two kinds of veld grass, namely sourveld and sweetveld. Practices such as

conservation tillage, precision farming, integrated pest management and range management systems are playing an important role in reducing the negative environmental consequences of agricultural intensification. Proper land management, with the aim of reducing the risks of environmental degradation associated with some agricultural practices, is always important. Among farmers the purpose of cattle production is mainly to produce milk and, to a lesser degree, meat of high quality with the lowest possible input of food and labour costs. The social and economic importance of livestock production to people should be recognised, since some farmers' reasons for keeping livestock may differ from those of commercial farmers.

- The knowledge of farmers should be utilised properly and they should be encouraged to be responsible for their own destinies. The concept among cattle farmers on commonage land that "the government will help", must be dealt with systematically.

### **5.3.2 Policy issues**

The Minister for Agriculture and Land Affairs has been identified as the responsible Minister for national land legislation. It is the responsibility of the national government to ensure a more equitable distribution of land, to support the work of the Commission on Restitution of Land Rights and to implement a programme of land tenure and land administration reform. On the other hand, it is the responsibility of provincial governments to provide complementary development support (for example, infrastructure and agricultural support services) to those participating in the land reform programme. In this respect, there must be close co-operation between national and provincial governments to ensure that the beneficiaries of land reform enjoy services provided by the provinces, as envisaged by Schedules 4 and 5 of the Constitution. Continued overall population increases, combined with rapid movement off the farms, has resulted in a

staggering growth in the effectively urban population of the Free State (White Paper on Rural Development, 1999).

Until the 1990's, government policy forbade ownership of land by black people. Land for black occupation was registered as property of the government or the South African Development Trust (Belsky, 1994; Beukman, 1999).

- Special measures need to be taken to prevent soil erosion, water pollution, desertification and depletion of soil nutrients. District councils should be encouraged to incorporate fire management issues into their district planning. Rural councillors and farmers should be educated in fire management. Rural councils should take the lead in establishing Fire Protection Associations. Farmers have a responsibility to prevent water pollution. Support of programmes that encourage the productive and sustainable use and care of land in the environmentally fragile areas of Qwaqwa, Thaba-Nchu and Botshabelo, is essential. The establishment of a Land Care Programme by the National Department of Agriculture in the Qwaqwa, Thaba-Nchu and Botshabelo areas is of paramount importance.
  
- The process of delegating and assigning the relevant legislation has been facilitated by the passage of the Land Administration Act, 2 of 1995, which provides a mechanism through which the delegation of legislation to Premiers and officials in the service of both the national and provincial government, can take place. In addition to this, the State Land Disposal Acts that were in force in the former homelands have been repealed and replaced by the (RSA) *State Land Disposal Act*, 48 of 1961. This Act was amended to allow the power of the President to dispose of state land in these areas, to be assigned to the Minister for Agriculture and Land Affairs and then delegated to a Premier. A number of key pieces of land administration legislation have been delegated in particular parts of the country, in terms of the *Land Administration Act*. The most important of these is Proclamation R188 of 1969 and its derivatives, which govern land

administration outside proclaimed towns in the former homelands. Proclamation R293 of 1962, which provides for the administration of land in proclaimed townships in these areas, has been assigned to provinces, but it also contains non-schedule 6 functions, which require consideration. These assignments and delegations have provided the means for administrative continuity in the areas affected. Proclamation R188 still needs to be delegated to outstanding areas.

- The Bill of Rights in the new Constitution guarantees existing property rights, but it simultaneously places the state under a constitutional duty to take reasonable steps to enable citizens to gain equitable access to land, to promote security of tenure, and to provide redress to those who were dispossessed of property after 19 June 1913 as a result of past discriminatory laws or practices.
- A structure that will present an opportunity to farmers to learn and be fully aware of the physical, sociocultural and socio-economic environment of their farming areas, should be developed by farmers themselves and by policy-makers, planners and implementers.
- It is essential that a comprehensive policy be introduced to reduce overstocking to arrest soil degradation. Such a policy must raise the private cost of livestock ownership to something approaching the social cost, whether through the development of commonage grazing fees or by other means. The formulation of local by-laws to regulate the number of stock per household will enable cattle farmers to be productive. Decisions on stocking rates have to be taken at grass-roots level by the local community and the grazing committees, under the guidance of government extension services. The government needs to move away from its role as a regulator to that of a facilitator, empowering communities to manage their own resources in a responsible and sustainable way.
- Water quality monitoring is likely to play a more important role in environmental management than the monitoring of air quality, as it is an indicator of poor land

management within catchment areas; water is also one of life's basic necessities. South African Water Quality Guidelines is a compilation of all relevant target water quality ranges for different water use sectors. Water use sectors identified include:

- Recreational water use
  - Industrial water use
  - Irrigation water use
  - Livestock watering
  - Aquaculture water use
  - Aquatic ecosystems
- 
- For historical reasons, there are few economic links between commercial farming areas, small rural towns and the economies of the former homelands. A policy to bridge the gap must be developed, so that more resource-poor people can have a stake in the economy of the Free State province.
  
  - Veld management, stocking rates and burning and resting policies should be checked by the planners, implementers and policy-makers in the Eastern Free State.

It is essential to establish an efficient and sustainable livestock industry contributing to the overall economic development of the province. The policy dealing with the development of livestock and livestock products must be properly communicated to cattle farmers in communal grazing areas. The policy provides detailed policies and strategies to improve livestock production, with a strong emphasis on the following technical solutions:

1. Livestock production should be based on ecological sustainability, economic viability and an understanding of the socio-economic implications of interventions.

2. Livestock development should be promoted in areas best suited for establishing ranges and pastures, and should be in overall balance with other forms of land utilisation.
  - The Management and Control of Veld Fires Act provides for the control, management and prevention of mountain, forest and veld fires, while allowing Fire Control Committees to be more effective and providing training and support to rural communities in the management and control of veld fires. Within any grazing system, water must be provided to livestock in adequate quantity and quality. Clean water and ample high-quality forage are essential for improved livestock production. Inadequate livestock water developments in pasture areas can contribute to serious livestock losses and prevent the efficient use of forages. It may also encourage overgrazing near existing water supplies and under-grazing away from the water sources.
  - The fourth priority is the identification of effective drought management policies. Irreversible land degradation in arid zones, if it occurs, originates as a result of high stocking rates during droughts. The appropriate drought strategy is to de-stock as early and rapidly as possible, rather than seeking to maintain maximum stock numbers. Policies and subsequent investments, which support such rapid de-stocking, are the development of savings and credit schemes and infrastructure investments in roads, markets, slaughterhouses and cold storage. However, little experience has been gained of the application of these concepts in imbalanced systems. The only notable exception is Australia. Incentive policies also play an important role in arriving at sustainable rangeland use.

A great responsibility rests on the agricultural sector to maintain the fragile, semi-arid environment that characterises much of the Free State. Wetlands and ponds need to be protected. The policies described below are the main ones likely to impact on the delivery and planning of communal grazing areas. It is envisaged that the government and the

relevant role players can play a leading role in sensitising cattle farmers on communal grazing land to the need to obey and adhere to the following policy issues:

- National Environmental Management Act, 107 of 1998 (NEMA). The department responsible for implementation is the Department of Environmental Affairs and Tourism. NEMA creates a number of structures and procedures for improving co-operative environmental governance. These include the requirement that the national and provincial government produce Environmental Implementation Plans and Environmental Management Plans. The Act promotes integrated environmental management by allowing a Department such as the Department of Land Affairs to draw up its own procedures for assessing the environmental impact of its activities, provided that the procedures comply with certain basic requirements set out in the Act. NEMA also provides for improved enforcement of environmental legislation.
- Environment Conservation Act, 73 of 1989 (ECA). The department responsible for implementation is the Department of Environmental Affairs and Tourism. The most far-reaching aspect of the Act is the requirement that an Environmental Impact Assessment (EIA) is done before approval is given for a range of specified activities or land-use changes. Where areas have been set aside under this Act as Protected Natural Environments, Special Nature Resources or Limited Development Areas, these will have to be taken into account in any planning process.
- Conservation of Agricultural Resources Act, 43 of 1983 (CARA). The department responsible for implementation is the Department of Agriculture. CARA empowers the Minister of Agriculture to take wide-ranging steps to protect the natural agricultural resource base of

the country. In particular, it aims to combat and prevent soil erosion, protect water sources and combat invader plants and weeds. The Act provides that land users at all times (except where the Act or a scheme provides otherwise) must maintain soil conservation at their own expense. The Minister may also authorise one of his or her officials to access an owner's land in order to advise on the better conservation of agricultural resources, or perform any act on their land in order to ensure compliance with the Act.

- The National Veld and Forest Fire Act, 101 of 1998. The Department responsible for implementation is the Department of Water Affairs and Forestry. The Act primarily deals with the institutional arrangements necessary for dealing with fire risks. These include the establishment of Fire Protection Associations and the establishment of a fire danger rating system. The Act places a duty on owners of land to prepare and maintain firebreaks on their land. The Act creates a range of criminal offences, ranging from leaving a fire unattended, through failing to prepare a firebreak as required by the Act, to failing to take reasonable steps to put out a fire that threatens other people's land. All these offences are punishable by imprisonment/or a fine.
  
- The National Water Act, 36 of 1998. The Department responsible for implementation is the Department of Water Affairs and Forestry. The Act gives the Minister of Water Affairs and Forestry the power to regulate the use, flow and control of all water in the country and establishes that water may only be used by people in accordance with the Act. No individual person or groups of persons can own water. Catchment management agencies in catchment areas must then formulate catchment management strategies for those areas. A catchment management strategy must determine how water resources

in the catchment management area will be protected, used, developed, conserved and controlled.

- **Local Government: Municipal Systems Act, 2000.** The Department responsible for implementation is the Department of Local and Provincial Government (DPLG). The Act aims to regulate and guide a wide range of local and district government systems, including the integrated development planning system. The Systems Act provides that each municipality must adopt a single, inclusive integrated development plan (IDP) for the development of the municipality.

### **5.3.3 Integration of environmental planning into communal grazing systems**

Effective common property resource management systems are critical for sustainable development in communal grazing areas. Scientifically-based information must be an integral part of public and private decision-making. Where information is inadequate, government and the private sector have a responsibility to support appropriate research activities. Means to ensure that the results of the research are effectively communicated to farmers and decision-makers are necessary. In rural areas, poor residents need access to grazing land and small tracts of arable land to supplement their income and to enhance household food security. Legislative competence with regard to municipal commonage and tribal communal land is the responsibility of both provincial and local authorities.

Managing communal grazing areas remains a challenge for many local authorities, and environmental issues need to be integrated into the management of communal grazing areas. In the light of these circumstances, the following recommendations can be made:

1. The focus should be on the organisational development of projects, which includes communal grazing management committee training up to a point at which unity among the cattle farmers is maintained;

2. The vision of cattle farmers need to be revisited through workshops and the development of production plans;
3. Local by-laws should be made for management of communal cattle grazing;
4. Structures should be created to manage communal areas; and
5. Guidelines on the structure and management of local bodies that control land use, should be drawn up.

The type of facilitation and liaison support rendered to cattle farmers is critical to the future sustainability of the communal grazing areas. Important benefits can be realised by concentrating on practices that build upon ecological principles such as diversity and system resilience. A model was developed (Table 5.1) that describe the proposed steps in the process required for the establishment of communal cattle grazing management committees, the land use type, the guiding legislation, the implications for cattle owners and the management cycle.

**Table 5.1: Model for establishment of an integrated communal grazing system**

|  |   |
|--|---|
| <p><b>Communal cattle grazing management committee</b></p> | <p>Preparation:</p> <ol style="list-style-type: none"> <li>1. Department of Agriculture and Land Affairs meets with local authorities to discuss the establishment of grazing committee</li> <li>2. Communication with cattle farmers on communal grazing areas</li> <li>3. Election of cattle farmers management committee</li> <li>4. Cattle farmers management committees constitution and code of conduct</li> </ol> <p>The management plan should include the following:</p> <ol style="list-style-type: none"> <li>1. Description of communal land to be managed</li> <li>2. Carrying capacity</li> <li>3. General principles regarding how the land should be managed</li> <li>4. Grazing fees</li> <li>5. Administration of grazing land</li> <li>6. Grazing regulations</li> <li>7. Adoption of management plan by the Local Authority</li> </ol> <p>Strengthening of the cattle farmers:</p> <ol style="list-style-type: none"> <li>1. Capacity building and training in committee management</li> </ol> <p>Monitoring and evaluation of implementation of the plan by the Local Authorities and the Department of Agriculture.</p> |
| <p><b>Land use type</b></p>                                | <p>Communal natural veld grazing</p>  |
| <p><b>Guiding legislation</b></p>                          | <p>Conservation of Agricultural Resource Act, 43 of 1983.</p>   |
| <p><b>Implications</b></p>                                 | <p>Cattle owners required to carry out as many of the following practices in order to ensure the conservation of the communal grazing areas:</p> <ol style="list-style-type: none"> <li>1. Rotationally graze and rest according to the physiological requirements of the vegetation</li> <li>2. Maintain a balance of different types of grazing animals to avoid overgrazing</li> <li>3. Restrict the number of animals kept on the veld to a number determined as being the maximum for the particular communal veld type</li> <li>4. Burn veld only to remove old moribund vegetation that restricts new growth</li> <li>5. Burn before the desired grasses (decreaser species) begin to grow.</li> <li>6. Avoid grazing burnt veld until it has sufficiently recovered</li> </ol>  |
| <p><b>Management cycle</b></p>                             | <p>Grazing land identification:</p> <ul style="list-style-type: none"> <li>▪ Identify/assess needs and prioritise (environment included).</li> </ul> <p>Pre-feasibility planning:</p> <ul style="list-style-type: none"> <li>▪ Identify environmental issues/impacts and assess opportunities and constraints.</li> </ul> <p>Development/planning:</p> <ul style="list-style-type: none"> <li>▪ Identify significant issues and possible mitigation measures</li> <li>▪ Modify plans to address environmental issues and mitigation</li> <li>▪ Identify key environmental factors</li> </ul> <p>Select preferred plan:</p> <ul style="list-style-type: none"> <li>▪ Detailed design of mitigation measures</li> </ul> <p>Implementation:</p> <ul style="list-style-type: none"> <li>▪ Implement mitigation measures and environmental management plans</li> <li>▪ Monitor environmental performance</li> </ul> <p>Monitoring and evaluation:</p> <ul style="list-style-type: none"> <li>▪ Monitor environmental performance</li> <li>▪ Modify indicators, policies and programmes</li> </ul>  |

Sustainability development should be viewed against the background of the following three interrelated key components: economic viability, environmental stewardship, and social and equity issues. The concept of sustainability as discussed in this study, with particular reference to the management and the establishment of communal and commonage land, is based on a set of principles that include economic, environmental and social conditions, which must be integrated into public and private decision-making. More specifically, all relevant role players should pay attention to the following key issues when establishing or managing communal grazing land:

1. The concept of stewardship is paramount, that is, today's decisions must be balanced with tomorrow's impacts.
2. The long-term productive capability and quality of our natural resources must be maintained.
3. Economic returns from production should enable an adequate standard of living to be maintained; furthermore, it should be sufficient to continue to attract replacement farmers.
4. Economic activity should not detract from human health or the quality of land and water; a balance must be struck between the size of production units consistent with technology and a social structure acceptable to all stakeholders.
5. There must be sufficient transparency for stakeholders with regard to production, processing, and regulation activities in the agricultural industry to instil confidence that food is being produced in a safe and sustainable manner.

The environmental planning guidelines for grazing land are presented in Annexure D, while Annexure E presents the communal and commonage functionality assessment (Department of Land Affairs, 2001).

#### **5.3.4 Further research**

Further research on the following issues is necessary:

- **Veterinary research and technology transfer should be conducted in fields relevant to the livestock industry:** Research on veterinary technology transfer in communal grazing areas is essential, since cattle farmers would do well to increase farming efficiency. More research is needed in this regard, especially concerning the effectiveness and efficiency of veterinary services.
  
- **Efficiency of traditional livestock medication (Nel, 1998):** Traditional livestock medication as well as its efficiency, were aspects not specifically attended to in this study. Both small-stock and large-stock farmers believe it to be effective and efficient. More research is needed on the effectiveness and the efficiency of locally used herbs and plants.
  
- **Livestock research and technology transfer should be conducted in fields relevant to the livestock industry.** It should be taken into account that the present communal grazing areas need to be appraised with regard to suitability for major utilisation and national priorities.
  
- **Livestock processing and value adding:** Research should be conducted on the essential facilities and procedures of the livestock industry, such as marketing, processing and quality control. Such research is essential to enable cattle farmers to generate more income.
  
- **Effectiveness of training and extension services rendered to cattle farmers on communal grazing lands:** Comparative studies on the effectiveness of training and extension services rendered to cattle farmers on communal grazing lands, as well as comparative studies which involve municipal district areas and the province, are essential when advising decision-makers and policy developers. The

following policy-practical and policy-supportive elements should be taken into account:

**Policy-practical elements:**

1. Environmental protection should become an integral part of livestock production.
2. Priority should be given to the rehabilitation of degraded communal grazing lands by the most appropriate measures, including changes to other forms of land utilisation.

**Policy-supportive elements:**

1. Active participation of livestock owners in the planning of and decision-making on livestock development on communal land.
2. Dissemination of information to and communication with livestock owners should be promoted.

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**ANNEXURE A**

**QUESTIONNAIRE ON THE INTEGRATION OF  
ENVIRONMENTAL PLANNING INTO COMMUNAL  
GRAZING SYSTEMS IN THE FREE STATE**

# QUESTIONNAIRE ON THE INTEGRATION OF ENVIRONMENTAL PLANNING INTO COMMUNAL GRAZING SYSTEMS IN THE FREE STATE

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October 2001

SCHOOL OF ENVIRONMENTAL DEVELOPMENT AND  
AGRICULTURE  
TECHNIKON FREE STATE  
BLOEMFONTEIN

## GENERAL OBJECTIVES OF THE QUESTIONNAIRE:

- To evaluate the environmental issues related to communal grazing systems and development.
- To identify and evaluate range management and grazing associations and committees.
- To evaluate the experience of grazing land management at various demonstration land reform projects.
- To establish institutional arrangements, procedures and guidelines for integrating environmental planning into a communal grazing system, and to have these incorporated in appropriate policies.

**The questions included will be grouped under the following categories:**

- Classifying questions.
- Specific questions related to communal grazing management.

***NB: Anything you tell us will be kept in strict confidence.***

**Mark applicable options (yes/no) with an “X”, or encircle your answer.**

**1. BIOGRAPHICAL INFORMATION**

1.1 Interviewer:..... 1

1.2 Date of interview:..... 2

1.3 Region/District: 

|             |              |              |
|-------------|--------------|--------------|
| <b>East</b> | <b>North</b> | <b>South</b> |
|             |              |              |

 (Mark applicable options with an "X") 3-5

1.4 Name of a Town/Village/District:..... 6

1.5 Name of respondents:..... 7

1.6 Age:.....(years) 8

1.7 What is the last grade or highest level of education passed?..... 9  
(a) Can you read? Yes/No. (b) Can you write? Yes/No. 10

1.8 What is your position in your household? (Mark applicable options with an "X").  
1. Head:\_\_\_\_\_ 2. Wife:\_\_\_\_\_ 3. Child:\_\_\_\_\_ 4. Relative:\_\_\_\_\_ 11-14  
5. Others, specify:\_\_\_\_\_ 15

1.9 How many people are directly dependent on you?..... 16

1.9.1 Household composition (Fill in the number of dependants in the applicable space):  
Children: ≤ 4 yrs. \_\_\_\_\_ 5-9 yrs. \_\_\_\_\_ 10-18 yrs. \_\_\_\_\_ 17-19  
Females/Males 19-44 yrs. \_\_\_\_\_ Females/Males ≥ 65 yrs. \_\_\_\_\_ 20-21

**2. FARM/COMMUNAL LAND SPECIFICATIONS**

2.1 Name of the farm/communal area:..... 22

2.2 What is the size of the land you are farming on? (Actual size:..... ha).  
Size of arable land? .....hectares 24  
Size of natural grazing land? .....hectares 25

2.3 Are you satisfied with the location of the grazing area/your farm? Yes/No. 26

2.3.1 If not satisfied, what are the main reasons?..... 27  
..... 28  
..... 29  
..... 30-31

2.4 Who allocated the land you are farming on? (Mark applicable options with an "X").  
1. Allocated by a chief:..... 2. Allocated by government:..... 32-33  
3. Municipal property:..... 4. Legally purchased and owned:..... 34-35  
5. Rented:..... 6. Unauthorised occupation:..... 7. Other:..... 36-39

2.5 Are you farming in a group or as an individual? ..... 40

2.5.1 and if in a group, how many members are there?..... 41

2.6 If farming in a group, how is your group organised? (Mark possible options with an "X").  
1. Closed Corporation (CC):..... 2. Trust:..... 3. Company:..... 42-43  
4. Others:..... 44

2.7 Have you gained access to land within a grazing area? Yes/No. 45

2.8 Are you a member of grazing committee(s) or organisation(s) in your area? Yes/No. 46

2.8.1 If "Yes", give the name of the committee and its role..... 47  
..... 48  
..... 49  
..... 50  
..... 51-52



|           |  |                          |                          |         |
|-----------|--|--------------------------|--------------------------|---------|
| 2.9       | Do you have a constitution? <b>Yes/No</b>  | <input type="checkbox"/> | <input type="checkbox"/> | 53      |
| 2.9.1     | How long have you been farming yourself, in total?.....  | <input type="checkbox"/> | <input type="checkbox"/> | 54      |
| 2.10      | How long have you been farming on this piece of land?.....   | <input type="checkbox"/> | <input type="checkbox"/> | 55      |
| 2.11      | Do you own any livestock? <b>Yes/No.</b>   | <input type="checkbox"/> | <input type="checkbox"/> |         |
| 2.11.1    | If "Yes", supply the following information.  | <input type="checkbox"/> | <input type="checkbox"/> |         |
|           | Beef cattle breed:..... Number:.....   | <input type="checkbox"/> | <input type="checkbox"/> | 56-57   |
|           | Dairy cattle breed..... Number:.....   | <input type="checkbox"/> | <input type="checkbox"/> | 58-59   |
|           | Sheep breed:..... Number:.....   | <input type="checkbox"/> | <input type="checkbox"/> | 60-61   |
|           | Goats breed:..... Number:.....   | <input type="checkbox"/> | <input type="checkbox"/> | 62-63   |
|           | Pig breed:..... Number:.....   | <input type="checkbox"/> | <input type="checkbox"/> | 64-65   |
|           | Others.....  | <input type="checkbox"/> | <input type="checkbox"/> | 66-67   |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 68-69   |
| 2.11.2    | Are you contributing financially for grazing your animals on this land? <b>Yes/No</b>  | <input type="checkbox"/> | <input type="checkbox"/> | 70      |
| 2.11.3    | How much are you contributing as a grazing fee (per animal/month):   | <input type="checkbox"/> | <input type="checkbox"/> | 71      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 72      |
| 2.12      | What are your objectives regarding your livestock?.....  | <input type="checkbox"/> | <input type="checkbox"/> | 73      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 74      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 75-76   |
| 2.13      | Would you like to farm with something other than livestock? <b>Yes/No.</b>   | <input type="checkbox"/> | <input type="checkbox"/> | 77-78   |
| 2.13.1    | If "Yes", what would you like to farm with and why?.....   | <input type="checkbox"/> | <input type="checkbox"/> | 79      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 80      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 81      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 82-83   |
| 2.14      | Who looks after the cattle and the infrastructure during the day, and during the night?.....                                     | <input type="checkbox"/> | <input type="checkbox"/> | 84      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 85      |
| 2.15      | In your opinion, what are the advantages and disadvantages of communal grazing?.....   | <input type="checkbox"/> | <input type="checkbox"/> | 86      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 87-89   |
|           | and what are the sources of water for animals on this land?.....   | <input type="checkbox"/> | <input type="checkbox"/> | 90-91   |
| <b>3.</b> | <b><u>ENVIRONMENTAL AND GRAZING MANAGEMENT</u></b>   |                          |                          |         |
| 3.1       | Do you have a specific programme that you follow to run your project, e.g. dipping, dosing, vaccinating, etc.?<br><b>Yes/No.</b> | <input type="checkbox"/> | <input type="checkbox"/> | 92      |
| 3.1.1     | If "Yes", describe your programme:.....  | <input type="checkbox"/> | <input type="checkbox"/> | 93      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 94      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 95      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 96      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 97      |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 98-99   |
| 3.2       | On average, how much do you spend per year on treating livestock against diseases, or on spray or remedies?.....                 | <input type="checkbox"/> | <input type="checkbox"/> | 100     |
| 3.3       | What type of agricultural training would you like to receive regarding grazing and natural resource management?.....             | <input type="checkbox"/> | <input type="checkbox"/> | 101     |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 102-103 |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 104-105 |
|           | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 107     |



|        |  |                          |                          |         |
|--------|--|--------------------------|--------------------------|---------|
| 3.4    | Are you prepared to pay an expert to improve your own skills and perform certain tasks such as artificial insemination on the cows, to ensure better quality? <b>Yes/No.</b> | <input type="checkbox"/> | <input type="checkbox"/> | 108-109 |
| 3.5    | How many women does the project employ permanently?....., and temporarily?.....  | <input type="checkbox"/> | <input type="checkbox"/> | 110     |
| 3.6    | How many men does the project employ permanently?....., and temporarily?.....  | <input type="checkbox"/> | <input type="checkbox"/> | 111     |
| 3.7    | Are you familiar with the term conservation of natural resources? <b>Yes/No.</b>   | <input type="checkbox"/> | <input type="checkbox"/> | 112     |
| 3.7.1  | If "Yes", explain what it means to you.....  | <input type="checkbox"/> | <input type="checkbox"/> | 113     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 114-115 |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 116     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 117     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 118-119 |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 120     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 121-122 |
| 3.8    | What do you expect from the government regarding grazing areas and your own situation in this area?.....   | <input type="checkbox"/> | <input type="checkbox"/> | 123     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 124-125 |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 126     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 127     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 128-129 |
| 3.9    | What do you expect from your fellow farmers and neighbours regarding grazing areas and the conservation of natural resources?.....   | <input type="checkbox"/> | <input type="checkbox"/> | 130     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 131-132 |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 133-134 |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 135-137 |
| 3.10   | Do you have a specific feeding programme for livestock at different levels of production? <b>Yes/No.</b>   | <input type="checkbox"/> | <input type="checkbox"/> | 138-139 |
| 3.11.1 | Explain how you feed them:.....  | <input type="checkbox"/> | <input type="checkbox"/> | 140     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 141     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 142     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 143     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 144     |
| 3.12   | Do you have adequate infrastructure in your grazing areas? <b>Yes/No.</b>  | <input type="checkbox"/> | <input type="checkbox"/> | 145-146 |
| 3.12.1 | Name the infrastructure you have, and the infrastructure that is lacking:.....   | <input type="checkbox"/> | <input type="checkbox"/> | 147     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 148     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 149     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 150     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 151-152 |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 153-154 |
| 3.13   | What do you use to mate your cows?..... If a bull, it is a state-registered bull or not,.....and how do you mate them?   | <input type="checkbox"/> | <input type="checkbox"/> | 156-155 |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 156     |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 157-158 |
|        | .....  | <input type="checkbox"/> | <input type="checkbox"/> | 159-160 |
| 3.14   | Do you feed your livestock the following?: (Mark possible options with an "X").  | <input type="checkbox"/> | <input type="checkbox"/> |         |
|        | 1. Hay:.....2. Licks:.....3. Concentrates:.....  | <input type="checkbox"/> | <input type="checkbox"/> | 161-163 |
|        | 4. Others, specify:.....   | <input type="checkbox"/> | <input type="checkbox"/> | 164     |
| 3.15   | Do you plant your own fodder or do you buy it, or both?.....   | <input type="checkbox"/> | <input type="checkbox"/> | 165     |



| 3.15.1   | Where do you buy?.....   | <input type="checkbox"/>   | <input type="checkbox"/> | 166-167 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|--|--|--|--------------------------|---------|------|--|--|-----------------|--|-----|----|-----|----|-------------------|--|--|--|--|-------------------------|--|--|--|--|-------------------|--|--|--|--|-------------------|--|--|--|--|--|
| 3.16   | How much do you spend on additional feeds per month?.....  | <input type="checkbox"/>   | <input type="checkbox"/> | 168     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.17   | Do you encounter any serious management problems in your work situation?<br>Yes/No.  | <input type="checkbox"/>   | <input type="checkbox"/> | 168-169 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.18.1   | If "Yes", list the five most important problems in order of significance.<br>.....<br>.....<br>.....<br>.....<br>.....   | <input type="checkbox"/>   | <input type="checkbox"/> | 170     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 171     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 172     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 173     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 174-175 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.19   | Are veld fires a serious problem in your area? Yes/No.   | <input type="checkbox"/>   | <input type="checkbox"/> | 176-177 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.19.1   | If "Yes", explain why and how often it takes place.....<br>.....   | <input type="checkbox"/>   | <input type="checkbox"/> | 178     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 179-181 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.20   | Do you think conserving grazing areas is a good thing? Yes/No.<br>If "No", why not?.....<br>.....<br>.....   | <input type="checkbox"/>   | <input type="checkbox"/> | 182-183 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 184     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 185-186 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 187     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.21   | Are you familiar with the word overgrazing? Yes/No.  | <input type="checkbox"/>   | <input type="checkbox"/> | 188-189 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.21.1   | If "Yes", explain what do you understand about it?.....<br>.....<br>.....  | <input type="checkbox"/>   | <input type="checkbox"/> | 190     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 191-192 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 193-194 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.22   | What do you think communal grazing land should be used for?<br>Grazing:..... Cultivation:.....<br>Hunting:..... Housing:.....<br>Community tourism:.....<br>Others:..... | <input type="checkbox"/>   | <input type="checkbox"/> | 195     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 196     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 197     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 198     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.22.1   | How is the grazing of animals organised on this<br>land?.....<br>.....   | <input type="checkbox"/>   | <input type="checkbox"/> | 199-200 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.23   | In your opinion, how should the grazing areas be managed?.....<br>.....<br>.....<br>.....<br>.....   | <input type="checkbox"/>   | <input type="checkbox"/> | 201-202 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 203-204 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 205-206 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 207     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 208     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| <b><u>ENVIRONMENTAL AND GRAZING PLANNING</u></b> |  |  |                          |         |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.1  | Do you have any source/form of income? Yes/No.   | <input type="checkbox"/>   | <input type="checkbox"/> | 209     |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.1.1  | If "Yes", explain the source/form of income:.....<br>.....   | <input type="checkbox"/>   | <input type="checkbox"/> | 210-211 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 212-213 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.2  | Are you aware of other means of generating income in this area? Yes/No.  | <input type="checkbox"/>   | <input type="checkbox"/> | 214-215 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.2.1  | If "Yes", supply the following:  | <table border="1"> <thead> <tr> <th rowspan="2">List</th> <th colspan="2"></th> <th colspan="2">Income received</th> </tr> <tr> <th>Yes</th> <th>No</th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>Soil conservation</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Control of black wattle</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Cutting of thatch</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Cutting of fodder</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> |                          |         | List |  |  | Income received |  | Yes | No | Yes | No | Soil conservation |  |  |  |  | Control of black wattle |  |  |  |  | Cutting of thatch |  |  |  |  | Cutting of fodder |  |  |  |  |  |
| List   |  |  | Income received          |         |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  | Yes  | No   | Yes                      | No      |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| Soil conservation                                |  |  |                          |         |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| Control of black wattle                          |  |  |                          |         |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| Cutting of thatch                                |  |  |                          |         |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| Cutting of fodder                                |  |  |                          |         |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 216-217 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 218-219 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 220-221 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
|  |  | <input type="checkbox"/>   | <input type="checkbox"/> | 222-223 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.3  | Do you have any produce you sell? Yes/No.  | <input type="checkbox"/>   | <input type="checkbox"/> | 224-225 |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |
| 3.3.1  | If "Yes", name the produce and state how much you get per month for the  | <input type="checkbox"/>   | <input type="checkbox"/> |         |      |  |  |                 |  |     |    |     |    |                   |  |  |  |  |                         |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |

produce.....

|  |  |  |  |  |         |
|--|--|--|--|--|---------|
|  |  |  |  |  | 226-227 |
|  |  |  |  |  | 228-229 |
|  |  |  |  |  | 230     |
|  |  |  |  |  | 231-232 |
|  |  |  |  |  | 233     |
|  |  |  |  |  | 234-235 |
|  |  |  |  |  | 236-237 |
|  |  |  |  |  | 238-239 |
|  |  |  |  |  | 240-241 |
|  |  |  |  |  | 242     |
|  |  |  |  |  | 243-244 |
|  |  |  |  |  | 245-247 |
|  |  |  |  |  | 248     |
|  |  |  |  |  | 249     |
|  |  |  |  |  | 250     |
|  |  |  |  |  | 251-253 |
|  |  |  |  |  | 254     |
|  |  |  |  |  | 255     |
|  |  |  |  |  | 256-257 |
|  |  |  |  |  | 258-259 |
|  |  |  |  |  | 260     |
|  |  |  |  |  | 261-262 |
|  |  |  |  |  | 263-264 |
|  |  |  |  |  | 265     |
|  |  |  |  |  | 266-267 |
|  |  |  |  |  | 268-269 |
|  |  |  |  |  | 270     |

- 4.5 Do you slaughter and sell animals? **Yes/No.**  
 4.5.1 If "Yes", what do you do with the hide and meat?.....

- 4.6 Do you generate income from selling meat? **Yes/No.**  
 4.7 Do you generate income from selling hide? **Yes/No.**  
 4.8 Do you keep records of the activities taking place on the project? **Yes/No.**  
 4.8.1 If "Yes", what do you use to record activities on the project,.....

- and how often do you update your records?.....  
 4.9 What do you need to see, or what would you like to see, happening on this grazing area?.....  
 4.10 What are your aspirations for the future regarding grazing areas?.....

- 4.11 **General comments from the interviewer:**  
 Please rank and list the three major immediate needs of this household.  
 a.  
 b.  
 c.  
 Please rank and list the three major long-term needs of this household.  
 a.  
 b.  
 c.

**The interviewer's impressions after the interview (Mark applicable options with an "X").**

|                                  | Level of success (very low) | Level of success (low) | Level of success (moderate) | Level of success (high) | Level of success (very high) |
|----------------------------------|-----------------------------|------------------------|-----------------------------|-------------------------|------------------------------|
| Impression gained by interviewer |                             |                        |                             |                         |                              |

# **ANNEXURE B**

## **CODE LIST**

## ANNEXURE B - CODE LIST

| 1.  | <u>Biographical Information</u> | <u>Number</u> | <u>Code</u> |
|-----|---------------------------------|---------------|-------------|
| 1.1 | M.M. Mofokeng                   | 1             | 1           |
|     | Mantombi Ntsapo                 | 2             |             |
|     | Mapule Rampai                   | 3             |             |
|     | Msibi M.J                       | 4             |             |
|     | SA Nhlapo                       | 5             |             |
|     | MJ Msibi                        | 6             |             |
|     | BA Setlopo                      | 7             |             |
|     | SA Motshabi                     | 8             |             |
|     | TA Lose                         | 9             |             |
|     | M Moqoaqo                       | 10            |             |
|     | M Mbongo                        | 11            |             |
|     | Mahadi Radebe                   | 12            |             |
|     | G Motaung                       | 13            |             |
|     | G Lebeea                        | 14            |             |
|     | Abraham Ntje                    | 15            |             |
|     | XI Mbi                          | 16            |             |
|     | TJ Masiteng                     | 17            |             |
| 1.3 | East                            | 1             | 3           |
|     | North                           | 2             | 3           |
|     | South                           | 3             | 3           |
| 1.4 | Mangaung Village                | 1             | 6           |
|     | Maluti A Phofung                | 2             |             |
|     | Sebokeng village (Qwaqwa)       | 3             |             |
|     | Clarens                         | 4             |             |
|     | Bethlehem                       | 5             |             |
|     | Kestell                         | 6             |             |
|     | Qwaqwa                          | 7             |             |
|     | Thaba – Tsoeu                   | 8             |             |
|     | Makeneng                        | 9             |             |
|     | Warden / Ezenzeleni             | 10            |             |
|     | Thabang                         | 11            |             |
|     | Monontsha                       | 12            |             |
|     | Mabolela                        | 13            |             |
|     | Bluegubush                      | 14            |             |
|     | Tshirela                        | 15            |             |
|     | Bolata                          | 16            |             |
|     | Tshiame “A”                     | 17            |             |
|     | Tshiame “B”                     | 18            |             |
|     | Makgoelokoeng Tribal Authority  | 19            |             |
|     | Intabazwe                       | 20            |             |
|     | Kroonstad                       | 21            |             |
|     | Hennenman                       | 22            |             |
|     | Ventersburg                     | 23            |             |
|     | Odendaalsrus                    | 24            |             |
|     | Tumahole (Parys)                | 25            |             |
|     | Mokwallo                        | 26            |             |
|     | Viljoenskroon                   | 27            |             |
|     | Steynsrus                       | 28            |             |
|     | Edenville                       | 29            |             |
|     | Petrusburg                      | 30            |             |

|     |                             |    |   |
|-----|-----------------------------|----|---|
|     | Bolokanang Township         | 31 |   |
|     | Botshabelo                  | 32 |   |
|     | Raastfontein                | 33 |   |
|     | Dewetsdorp                  | 34 |   |
|     | Rocklands                   | 35 |   |
| 1.5 | M.J. Matla                  | 1  | 7 |
|     | G. Shabalala                | 2  |   |
|     | Moses                       | 3  |   |
|     | Teboho Qhekwane             | 4  |   |
|     | Mastephen Adelize Mashinini | 5  |   |
|     | Twala S.M.                  | 6  |   |
|     | G.P. Didebe                 | 7  |   |
|     | Motaung Sello               | 8  |   |
|     | Petrus Mojalefa Motlounq    | 9  |   |
|     | Samuel Setai                | 10 |   |
|     | Mr Motaung                  | 11 |   |
|     | Mphuthi, M                  | 12 |   |
|     | Boom Lekgafayane            | 13 |   |
|     | Thato Mokgwetse             | 14 |   |
|     | Job Mohale                  | 15 |   |
|     | Peit Hbhele                 | 16 |   |
|     | Frances Sebata Thola        | 17 |   |
|     | Kleinbooi Mapetwana         | 18 |   |
|     | Mrs Khombelako              | 19 |   |
|     | Fanyani Vilakazi            | 20 |   |
|     | Green Mohale                | 21 |   |
|     | MR Mopeli                   | 22 |   |
|     | DP Seetsi                   | 23 |   |
|     | Eric Serabela               | 24 |   |
|     | Molahlehi Khotha            | 25 |   |
|     | Mhlambe, K                  | 26 |   |
|     | Masaballa Mnculwane         | 27 |   |
|     | MJ Mokoena                  | 28 |   |
|     | MB Mithethwa                | 29 |   |
|     | MP Mokoena                  | 30 |   |
|     | Simon Selepe                | 31 |   |
|     | Richard Radebe              | 32 |   |
|     | Japie Selepe                | 33 |   |
|     | EJ Moloji                   | 34 |   |
|     | A Moloji                    | 35 |   |
|     | Makubu Soli Simon           | 36 |   |
|     | Peter Molaba                | 37 |   |
|     | S Sefofotha                 | 38 |   |
|     | Mrs Khodumo                 | 39 |   |
|     | Otto Tau                    | 40 |   |
|     | T.S. Morakabi               | 41 |   |
|     | QJ Dumako                   | 42 |   |
|     | Teboho Mariti               | 43 |   |
|     | Petrus Mbenvana             | 44 |   |
|     | TZ Mokodutlo                | 45 |   |
|     | Alfred Nzeke                | 46 |   |
|     | Maletsatsi Molefe           | 47 |   |
|     | David Maloka                | 48 |   |
|     | Steven Nale                 | 49 |   |
|     | Petrus Colephi              | 50 |   |
|     | TP Sithole                  | 51 |   |
|     | Petrose Lenkwane            | 52 |   |

|           |   |                      |                    |
|-----------|---|----------------------|--------------------|
|           | Mr Mofokeng                                     | 53                   |                    |
|           | Mr Ramaele                                      | 54                   |                    |
|           | Mr Nthle  | 55                   |                    |
|           | Willem Moremi                                   | 56                   |                    |
|           | Eric Louw                                       | 57                   |                    |
|           | Mr Mpongwana                                    | 58                   |                    |
|           | Jakob Thekiso                                   | 59 (2x)              |                    |
|           | Jakob Thekiso                                   | 60                   |                    |
|           | Mr Ntebele                                      | 61                   |                    |
|           | Mr Mahanele                                     | 62                   |                    |
|           | Mr Lehana                                       | 63                   |                    |
|           | Mrs Pakiso                                      | 64                   |                    |
|           | Mrs Mohoane                                     | 65                   |                    |
|           | Mr Mokathi                                      | 66                   |                    |
|           | Unknown   | 67                   |                    |
|           | Mr Moholo                                       | 68                   |                    |
|           | Mr Mashee                                       | 69                   |                    |
|           | B Gwagwa  | 70                   |                    |
| 1.7       | None  | 0                    | 9                  |
|           | Grade 1-7 (Sub A – Std 5)                       | 1                    | 9                  |
|           | Grade 8-10 (Std 6 – Std 8)                      | 2                    | 9                  |
|           | Grade 11&12 (Std 9 – Std 10)                    | 3                    | 9                  |
|           | Tertiary  | 4                    | 9                  |
| 1.7 a     | Yes   | 1                    | 4                  |
|           | No  | 0                    | 4                  |
| 1.7 b     | Yes   | 1                    | 10                 |
|           | No  | 0                    | 10                 |
| 1.8       | Head  | 1                    | 11                 |
|           | Wife  | 2                    | 11                 |
|           | Child   | 3                    | 11                 |
|           | Relative  | 4                    | 11                 |
|           | Others, specify                                 | 5                    | 11                 |
| 1.9.1     | ≤ 17 male children                              | 17                   |                    |
|           | ≥ 17 female children                            | 18                   |                    |
|           | ≤ 18 male adults                                | 20                   |                    |
|           | ≥ 18 female adults                              | 21                   |                    |
| <b>2.</b> | <b><u>Farm/Communal Land Specifications</u></b> | <b><u>Number</u></b> | <b><u>Code</u></b> |
| 2.1       | Mangaung  | 1                    | 22                 |
|           | Vaalkop   | 2                    |                    |
|           | Sebokeng  | 3                    |                    |
|           | Clarens Commonage                               | 4                    |                    |
|           | Volgelfontein Commonage                         | 5                    |                    |
|           | Ha Ramaele                                      | 6                    |                    |
|           | Mphuthi's Farm                                  | 7                    |                    |
|           | Vaaiwel   | 8                    |                    |
|           | Mabolela  | 9                    |                    |
|           | Thaba – Tsoeu                                   | 10                   |                    |
|           | Varwil  | 11                   |                    |
|           | Langpunt (Commonage)                            | 12                   |                    |
|           | Thabang area                                    | 13                   |                    |

|       |                                      |    |    |
|-------|--------------------------------------|----|----|
|       | Qwaqwa                               | 14 |    |
|       | Young Farmer Co-operative            | 15 |    |
|       | Tshirela                             | 16 |    |
|       | Monontsha                            | 17 |    |
|       | Tshiame "A"                          | 18 |    |
|       | Tshiame "B"                          | 19 |    |
|       | Makgoelokoeng                        | 20 |    |
|       | Intabazwe                            | 21 |    |
|       | Kroonstad Comm.                      | 22 |    |
|       | Riverdale                            | 23 |    |
|       | Verblyding                           | 24 |    |
|       | Strydfontein & Avondster             | 25 |    |
|       | Groenpunt Commonage                  | 26 |    |
|       | Kutlwanong Farmers Trust             | 27 |    |
|       | Wildehondekop Farm                   | 28 |    |
|       | Spitskop Farm                        | 29 |    |
|       | Rammulutsi                           | 30 |    |
|       | Nqwathe                              | 31 |    |
|       | Mareon                               | 32 |    |
|       | Bolokanang Camps                     | 33 |    |
|       | Thusanang Trust                      | 34 |    |
|       | Raastfontein                         | 35 |    |
|       | Pakfontein                           | 36 |    |
|       | Botshabelo                           | 37 |    |
|       | Vlakland                             | 38 |    |
| 2.3   | Yes                                  | 1  | 26 |
|       | No                                   | 0  | 26 |
| 2.3.1 | Too small                            | 1  | 27 |
|       | Cattle destroying local crop         | 2  |    |
|       | Grazing area not large enough        | 3  |    |
|       | Far from township                    | 4  |    |
|       | Overgrazed                           | 5  |    |
|       | Veld fires                           | 6  |    |
|       | Stock theft                          | 7  |    |
|       | No water                             | 8  |    |
|       | Lack of fencing                      | 9  |    |
|       | Too close to the township            | 10 |    |
|       | Land is not officially ours          | 11 |    |
|       | Lack of infrastructure / necessities | 12 |    |
|       | Safety for animals                   | 13 |    |
|       | Security of tenure                   | 14 |    |
|       | Health                               | 15 |    |
| 2.4   | Allocated by a chief                 | 1  | 32 |
|       | Allocated by Government              | 2  | 32 |
|       | Municipal property                   | 3  | 32 |
|       | Legally purchased and owned          | 4  | 32 |
|       | Rented                               | 5  | 32 |
|       | Unauthorised occupation              | 6  | 32 |
|       | Other                                | 7  | 32 |
| 2.5   | Group farming                        | 1  | 40 |
|       | Individual farming                   | 2  | 40 |
| 2.6   | Closed Corporation (CC)              | 1  | 42 |
|       | Trust                                | 2  | 42 |

|        |  |    |    |
|--------|--|----|----|
|        | Company                                      | 3  | 42 |
|        | Other  | 4  | 42 |
|        | Association                                  | 5  | 42 |
|        | Individual                                   | 6  | 42 |
|        | Group  | 7  | 42 |
|        | Co-operative                                 | 8  |    |
|        | Not organised                                | 9  |    |
|        | Organisation                                 | 10 |    |
| 2.7    | Yes  | 1  | 45 |
|        | No   | 0  | 45 |
| 2.8    | Yes  | 1  | 46 |
|        | No   | 0  | 46 |
| 2.8.1  | <b>If Yes:</b>                               |    |    |
|        | Re-Llela-Makguo                              | 1  | 48 |
|        | Kqubetswana Kakana Clarens Owners' Ass.      | 2  |    |
|        | Bohlokong Cattle Owners' Ass                 | 3  |    |
|        | Thiba Kgomo                                  | 4  |    |
|        | Re Llela Makguo                              | 5  |    |
|        | Bambanai Forum                               | 6  |    |
|        | Tribal Council                               | 7  |    |
|        | Thibakgomo                                   | 8  |    |
|        | Belemi                                       | 9  |    |
|        | Dihwai                                       | 10 |    |
|        | Maokeng Commonage Man. Committee             | 11 |    |
|        | Makhulo Association                          | 12 |    |
|        | Ithabele Thuo                                | 13 |    |
|        | Tshwaranang Trust                            | 14 |    |
|        | Zenzeleni Executive Committee                | 15 |    |
|        | Nqwathe Cattle Organisation                  | 16 |    |
|        | Community Kraal Committee                    | 17 |    |
|        | Naledi                                       | 18 |    |
|        | <b>Role:</b>                                 | 49 |    |
|        | Prevent stock theft                          | 1  |    |
|        | Improve herd                                 | 2  |    |
|        | Control grazing                              | 3  |    |
|        | Manage the grazing area                      | 4  |    |
|        | Link between the municipality & government   | 5  |    |
|        | Facilitate co-operation between role players | 6  |    |
|        | Negotiate for lease agreement                | 7  |    |
|        | Regulate grazing area, theft, fire           | 8  |    |
|        | Administer the land                          | 9  |    |
|        | Help to become commercial farmers            | 10 |    |
| 2.9    | Yes  | 1  | 53 |
|        | No   | 0  | 53 |
| 2.11   | Yes  | 1  | 56 |
|        | No   | 0  | 56 |
| 2.11.1 | Bonsmara                                     | 1  | 68 |
|        | Mixed  | 2  | 68 |
|        | Vleis Merino                                 | 3  | 60 |
|        | Friesland                                    | 4  |    |
|        | Angora                                       | 5  |    |

|        |   |    |     |
|--------|---|----|-----|
|        | Calves  | 6  |     |
|        | Poultry                                       | 7  |     |
|        | Drakensberg                                   | 8  |     |
|        | SA Merino                                     | 9  |     |
|        | Landrace                                      | 10 |     |
|        | Ordinary                                      | 11 |     |
|        | Merino & Dorper                               | 12 |     |
|        | Fries & Jersey                                | 13 |     |
|        | Dorper  | 14 |     |
|        | Berkshire                                     | 15 |     |
|        | Brahman                                       | 16 |     |
|        | Merino & Persian                              | 17 |     |
|        | Boer goats                                    | 18 |     |
| 2.11.3 | Yes   | 1  | 82  |
|        | No  | 0  | 82  |
| 2.12   | Increase income                               | 1  | 90  |
|        | Improve dairy herd                            | 2  |     |
|        | Improve production                            | 3  |     |
|        | Find a good grazing area                      | 4  |     |
|        | Improve condition                             | 5  |     |
|        | Generate income                               | 6  |     |
|        | Supply the market                             | 7  |     |
|        | Increase carrying capacity of stock & farm    | 8  |     |
|        | Provide milk                                  | 9  |     |
|        | Supply members with kraal manure              | 10 |     |
|        | Establish a dairy business                    | 11 |     |
|        | Sell at auctions                              | 12 |     |
|        | Sell to community / marketing                 | 13 |     |
|        | Breed cattle in large numbers                 | 14 |     |
|        | Traditional purposes                          | 15 |     |
|        | Improve stock by mating                       | 16 |     |
|        | Provide meat for family                       | 17 |     |
|        | Helps sons with lobola                        | 18 |     |
|        | Add value & contribute to economy             | 19 |     |
|        | Own a farm / commercial farming               | 20 |     |
| 2.13   | Yes   | 1  | 101 |
|        | No  | 0  | 101 |
| 2.13.1 | Crop  | 1  | 103 |
|        | Chickens                                      | 2  |     |
|        | Maize   | 3  |     |
|        | Beans   | 4  |     |
|        | Wheat   | 5  |     |
|        | Sheep   | 6  |     |
|        | Vegetables                                    | 7  |     |
|        | Grains  | 8  |     |
|        | Fruit trees for production of fruit           | 10 |     |
|        | Horses  | 11 |     |
|        | Goats   | 12 |     |
|        | Pigs  | 13 |     |
|        | Plant fodder and sell to neighbouring farmers | 14 |     |
|        | Mixed farming – large stock, small stock      | 15 |     |
|        | Small stock                                   | 16 |     |

|        |   |    |     |
|--------|---|----|-----|
|        | <b>Why:</b>   |    |     |
|        | Quick cash / income   | 1  | 104 |
|        | Help maintaining cattle   | 2  |     |
|        | Vegetable production  | 3  |     |
|        | Travelling and collecting cattle  | 4  |     |
|        | Selling for traditional feasts  | 5  |     |
|        | Selling wool en getting meat  | 6  |     |
|        | Continuing with other enterprise if problems are<br>encountered with this one | 7  |     |
|        | Highly in demand  | 8  |     |
|        | Marketing   | 9  |     |
| 2.14   | Shepherd  | 1  | 110 |
|        | Labourer  | 2  |     |
|        | Owner   | 3  |     |
|        | Nobody  | 4  |     |
|        | Herdsman  | 5  |     |
|        | Other farmers   | 6  |     |
|        | Farmer  | 7  |     |
|        | Herd-boys   | 8  |     |
|        | Assistance  | 9  |     |
|        | Members of the group  | 10 |     |
|        | Son   | 11 |     |
|        | Project manager   | 12 |     |
| 2.15   | Yes   | 1  | 114 |
|        | No  | 0  | 114 |
| 2.15.1 | During the day  | 1  | 116 |
|        | Totally separated   | 2  |     |
|        | Only at night   | 3  |     |
| 2.16.1 | Very poor   | 1  | 121 |
|        | Poor  | 2  | 121 |
|        | Reasonable  | 3  | 121 |
|        | Good  | 4  | 121 |
|        | Very good   | 5  | 121 |
| 2.16.2 | Very poor   | 1  | 128 |
|        | Poor  | 2  | 128 |
|        | Reasonable  | 3  | 128 |
|        | Good  | 4  | 128 |
|        | Very good   | 5  | 128 |
| 2.17   | Increasing level of farming   | 1  | 135 |
|        | Money/income/supply family  | 2  |     |
|        | Milking   | 3  |     |
|        | Selling   | 4  |     |
|        | Living / own consumption  | 5  |     |
|        | Income  | 6  |     |
|        | Milk for children   | 7  |     |
|        | Meat  | 8  |     |
|        | Funeral   | 9  |     |
|        | Status  | 10 |     |
|        | Run a diary business  | 11 |     |
|        | Traditional purposes  | 12 |     |
|        | Supply the community / market   | 13 |     |

|      |   |    |     |
|------|---|----|-----|
|      | For lobola                                | 14 |     |
|      | Pay municipal accounts                    | 15 |     |
|      | Provide education to children             | 16 |     |
|      | Interest in farming                       | 17 |     |
| 2.18 | <b>Advantages of communal grazing:</b>    |    |     |
|      | Makes control of grazing easy             | 1  | 155 |
|      | Committee presence                        | 2  |     |
|      | Better-controlled grazing                 | 3  |     |
|      | Better control of stock theft             | 4  |     |
|      | Help one another to look after the cattle | 5  |     |
|      | Share costs                               | 6  |     |
|      | Share costs for auctions                  | 7  |     |
|      | None                                      | 8  |     |
|      | Not easy to manage veld                   | 9  |     |
|      | Grazing many animals                      | 10 |     |
|      | No payment needed for grazing animals     | 11 |     |
|      | To prevent theft                          | 12 |     |
|      | Dip                                       | 13 |     |
|      | Vaccinate                                 | 14 |     |
|      | Saving money                              | 15 |     |
|      | No need to feed animals permanently       | 16 |     |
|      | Take care of grazing by water             | 17 |     |
|      | Build good relationship                   | 18 |     |
|      | Share responsibility                      | 19 |     |
|      | Open access to grazing                    | 20 |     |
|      | Share bulls                               | 21 |     |
|      | <b>Disadvantages of communal grazing:</b> |    |     |
|      | Little water available                    | 1  | 157 |
|      | Grazing is poor in winter                 | 2  |     |
|      | Animals eat inferior material             | 3  |     |
|      | Animals get injured by locals             | 4  |     |
|      | Lack of co-operation                      | 5  |     |
|      | Power struggle                            | 6  |     |
|      | Unable to reach agreement                 | 7  |     |
|      | Lack of commitment                        | 8  |     |
|      | Lack of control                           | 9  |     |
|      | Don't practise correct grazing            | 10 |     |
|      | Difficult to control diseases             | 11 |     |
|      | Conditions deteriorate                    | 12 |     |
|      | Theft                                     | 13 |     |
|      | Veld fires                                | 14 |     |
|      | Poor-quality bulls and rams               | 15 |     |
|      | Fighting / conflict                       | 16 |     |
|      | Problems with parasites & disease control | 17 |     |
|      | Problems with overgrazing control         | 18 |     |
|      | Problems with breeding control            | 19 |     |
|      | Using one bull for everyone               | 20 |     |
|      | Shifting of responsibility                | 21 |     |
|      | No proper management                      | 22 |     |
|      | Lack of fencing                           | 23 |     |
|      | Area too small for all the animals        | 24 |     |
|      | Livestock management                      | 25 |     |
|      | Slow development as individual farmer     | 26 |     |
|      | Travelling distance                       | 27 |     |

|           |   |                      |                    |
|-----------|---|----------------------|--------------------|
| 2.18.1    | Small rivers  | 1                    | 161                |
|           | Pumped from underground with windmill                     | 2                    |                    |
|           | Running tap water   | 3                    |                    |
|           | None  | 4                    |                    |
|           | Spruit water through township                             | 5                    |                    |
|           | Two earth dams  | 6                    |                    |
|           | Windmill  | 7                    |                    |
|           | Dams  | 8                    |                    |
|           | River   | 9                    |                    |
|           | Streams   | 10                   |                    |
|           | Valleys   | 11                   |                    |
|           | Natural fountain  | 12                   |                    |
|           | Swamps  | 13                   |                    |
|           | Boreholes   | 14                   |                    |
|           | Municipal water   | 15                   |                    |
|           | Rainwater   | 16                   |                    |
| <b>3.</b> | <b><u>Environmental and grazing management</u></b>        | <b><u>Number</u></b> | <b><u>Code</u></b> |
| 3.1       | Yes   | 1                    | 165                |
|           | No  | 0                    | 165                |
| 3.1.1     | <b>If Yes:</b>  |                      |                    |
|           | <b>for Cattle-</b>  |                      |                    |
|           | Dipping for ticks   | 1                    | 167                |
|           | Dosing for worms  | 2                    |                    |
|           | Vaccination for viral diseases                            | 3                    |                    |
|           | Dipping for worms   | 4                    |                    |
|           | No specific programme                                     | 5                    |                    |
|           | Quarter-evil  | 6                    |                    |
|           | Dipping   | 7                    |                    |
|           | Vaccination for Quarter-evil/Anthrax/tapeworm             | 8                    |                    |
|           | Vaccination for lumpy-skin disease/styfsiekte/blue tongue | 9                    |                    |
|           | Depending on season and type of disease                   | 10                   |                    |
|           | Parasites prevailing at that time                         | 11                   |                    |
|           | Vitamins  | 12                   |                    |
|           | Eye powder for treating eyes                              | 13                   |                    |
|           | Rot foot  | 14                   |                    |
|           | Ad hoc  | 15                   |                    |
|           | Traditional herbs   | 16                   |                    |
|           | Pour-on to control ticks & fleas                          | 17                   |                    |
|           | Dosing with liquid paraffin                               | 18                   |                    |
|           | Epsom salts, vinegar & brown sugar                        | 19                   |                    |
|           | Working with state veterinarian                           | 20                   |                    |
|           | <b>for small stock-</b>                                   |                      |                    |
|           | Dosing  | 1                    | 171                |
|           | Dipping   | 2                    |                    |
|           | Vaccination for viral diseases                            | 3                    |                    |
|           | Dipping for internal parasites                            | 4                    |                    |
|           | Pulpy kidney  | 5                    |                    |
|           | Vaccination for worms, ticks                              | 6                    |                    |
|           | Blue tongue   | 7                    |                    |
| 3.3       | Yes   | 1                    | 179                |
|           | No  | 0                    | 179                |

|      |  |    |     |
|------|--|----|-----|
| 3.4  | Veld management training                         | 1  | 181 |
|      | Erosion prevention training                      | 2  |     |
|      | Pasture management training                      | 3  |     |
|      | Grazing management                               | 4  |     |
|      | Identifying good and bad grass                   | 5  |     |
|      | Animal diseases and treatment                    | 6  |     |
|      | Species identification                           | 7  |     |
|      | Fodder flow                                      | 8  |     |
|      | Animal husbandry                                 | 9  |     |
|      | Production and marketing                         | 10 |     |
|      | Disease control                                  | 11 |     |
|      | Management skills                                | 12 |     |
|      | Bookkeeping                                      | 13 |     |
|      | Veld assessment                                  | 14 |     |
|      | Camping management                               | 15 |     |
|      | Controlling veld fires                           | 16 |     |
|      | Taking care of water                             | 17 |     |
|      | Feeding programme                                | 18 |     |
|      | Stocking rates                                   | 19 |     |
|      | Livestock management                             | 20 |     |
|      | Poultry production                               | 21 |     |
|      | Wool-classing                                    | 22 |     |
|      | Crop production management                       | 23 |     |
|      | None   | 24 |     |
|      | Maintenance of implements                        | 25 |     |
|      | Branding   | 26 |     |
|      | Tree species to be planted to combat erosion     | 27 |     |
|      | Safety   | 28 |     |
|      | Disaster management                              | 29 |     |
| 3.10 | Providing more grazing                           | 1  | 207 |
|      | Providing grazing area outside village           | 2  |     |
|      | Government subsidies for farmers                 | 3  |     |
|      | Protection against veld fires                    | 4  |     |
|      | Funds / financial assistance                     | 5  |     |
|      | Providing quality breeding stock and training    | 6  |     |
|      | Providing necessary infrastructure               | 7  |     |
|      | Training, e.g. veld management                   | 8  |     |
|      | Speeding up land reform process                  | 9  |     |
|      | Cultivating grasses                              | 10 |     |
|      | Establishing camps                               | 11 |     |
|      | Establishing kraals                              | 12 |     |
|      | Building a dip                                   | 13 |     |
|      | Building a loading bay                           | 14 |     |
|      | More land  | 15 |     |
|      | Providing remedies for disease control           | 16 |     |
|      | Municipality must not rent overgrazed camps      | 17 |     |
|      | Government must introduce fines for veld burning | 18 |     |
|      | Preventing theft                                 | 19 |     |
|      | Advising on the rationing of grazing             | 20 |     |
|      | Preventing soil erosion                          | 21 |     |
|      | Allocating state land                            | 22 |     |
|      | Proper management and security of grazing area   | 23 |     |
|      | Security of tenure                               | 24 |     |
|      | Fencing for camps                                | 25 |     |

|        |  |    |     |
|--------|--|----|-----|
|        | More water for animals                       | 26 |     |
|        | Providing roads                              | 27 |     |
|        | Nothing                                      | 28 |     |
|        | Free medication for cattle                   | 29 |     |
|        | Introducing plot system                      | 30 |     |
| 3.11   | Help to control veld fires                   | 1  | 224 |
|        | Grazing area protection plan                 | 2  |     |
|        | Follow rules and regulations of Constitution | 3  |     |
|        | Talk to children and neighbours about fires  | 4  |     |
|        | Stop stealing of fences                      | 5  |     |
|        | Co-operation                                 | 6  |     |
|        | Commitment                                   | 7  |     |
|        | Solve problems and reach agreements          | 8  |     |
|        | Take care of natural resources               | 9  |     |
|        | To have quality bulls and rams               | 10 |     |
|        | Good relationship                            | 11 |     |
|        | Hard work                                    | 12 |     |
|        | Combat stock theft                           | 13 |     |
|        | Firebreaks                                   | 14 |     |
|        | Give advice                                  | 15 |     |
|        | Reduce stock                                 | 16 |     |
|        | Maintain fencing                             | 17 |     |
|        | Prevent soil erosion                         | 18 |     |
|        | Take care of stock, e.g. dipping, etc.       | 19 |     |
|        | Buy own land                                 | 20 |     |
|        | Rotate stock                                 | 21 |     |
| 3.12   | Yes  | 1  | 244 |
|        | No   | 0  | 244 |
| 3.12.1 | Different programme for each season          | 1  | 246 |
|        | Extensively in summer                        | 2  |     |
|        | Intensively in winter                        | 3  |     |
|        | Dry cow –out of camp                         | 4  |     |
|        | About to calf –feed intensively              | 5  |     |
|        | When it has calved –feed concentrates        | 6  |     |
|        | Preventing soil erosion                      | 7  |     |
|        | Stop chopping down trees                     | 8  |     |
|        | Prevent veld fires                           | 9  |     |
|        | Lucern                                       | 10 |     |
|        | Fodder                                       | 11 |     |
|        | Hay  | 12 |     |
|        | Licks  | 13 |     |
|        | Summer- limited supplements / concentrates   | 14 |     |
|        | Winter – more concentrates / supplements     | 15 |     |
|        | Veld   | 16 |     |
|        | Natural pastures                             | 17 |     |
|        | Green fodder                                 | 18 |     |
|        | No plan                                      | 19 |     |
|        | Cow meal mixture                             | 20 |     |
|        | Maize straws & vegetable peels               | 21 |     |
| 3.13   | Yes  | 1  | 259 |
|        | No   | 0  | 259 |
| 3.13.1 | <b>Infrastructure you have:</b>              |    |     |
|        | Water  | 1  | 261 |

|      |  |    |     |
|------|--|----|-----|
|      | Kraals   | 2  |     |
|      | Milking shed                                     | 3  |     |
|      | Water grabs                                      | 4  |     |
|      | Feeding grabs                                    | 5  |     |
|      | Sheds  | 6  |     |
|      | Neck clamp                                       | 7  |     |
|      | Crush-pen  | 8  |     |
|      | Loading area                                     | 9  |     |
|      | Store-room                                       | 10 |     |
|      | Fences   | 11 |     |
|      | Windmill   | 13 |     |
|      | None   | 14 |     |
|      | Schools  | 15 |     |
|      | Roads  | 16 |     |
|      | Dipping facilities                               | 17 |     |
|      | House  | 18 |     |
|      | Land   | 19 |     |
|      | <b>Infrastructure lacking:</b>                   |    |     |
|      | Camps / land                                     | 1  | 266 |
|      | Electricity                                      | 2  |     |
|      | Milking machinery                                | 3  |     |
|      | Water troughs                                    | 4  |     |
|      | Kraals   | 5  |     |
|      | Handling facilities                              | 6  |     |
|      | Fencing  | 7  |     |
|      | Water  | 8  |     |
|      | Dipping tank                                     | 9  |     |
|      | Drugging   | 10 |     |
|      | Loading facilities                               | 11 |     |
|      | Store-room                                       | 12 |     |
|      | Stalls   | 13 |     |
|      | Stables  | 14 |     |
|      | Grazing area                                     | 15 |     |
|      | Crush-pens                                       | 16 |     |
|      | Telephones                                       | 17 |     |
|      | Roads  | 18 |     |
|      | Schools for children                             | 19 |     |
|      | Neck clamps                                      | 20 |     |
|      | Feeding pens/troughs                             | 21 |     |
|      | Safety   | 22 |     |
|      | Inspections by the government                    | 23 |     |
| 3.14 | Bull   | 1  | 272 |
|      | Yes  | 1  | 274 |
|      | No   | 0  | 274 |
|      | <b>How:</b>                                      |    |     |
|      | Take the bull to the cow in heat                 | 1  | 276 |
|      | Mating occurs at any time while grazing together | 2  |     |
|      | Natural  | 3  |     |
|      | Separate and mate at the right time              | 4  |     |
|      | Stays with cows at night                         | 5  |     |
|      | 8 months after calf's birth                      | 6  |     |
| 3.15 | Hay  | 1  | 280 |
|      | Licks  | 2  | 281 |

|        |  |    |     |
|--------|--|----|-----|
|        | Concentrates                             | 3  | 282 |
|        | Other                                    | 4  | 283 |
|        | Fodder                                   | 5  | 283 |
|        | Grass                                    | 6  |     |
| 3.16   | Buys it                                  | 1  | 284 |
|        | Plants it                                | 2  |     |
|        | Both                                     | 3  |     |
|        | None                                     | 4  |     |
| 3.16.1 | Local farmers                            | 1  | 285 |
|        | Commercial farmers                       | 2  |     |
|        | Surrounding farms                        | 3  |     |
|        | Neighbouring farmers                     | 4  |     |
|        | In town                                  | 5  |     |
|        | Co-operation                             | 6  |     |
|        | Next to national roads                   | 7  |     |
|        | Anywhere                                 | 8  |     |
|        | Aberfeldy                                | 9  |     |
|        | OTK                                      | 10 |     |
|        | Cut it along the road                    | 11 |     |
|        | SenWes                                   | 12 |     |
|        | Kgotsofolong                             | 13 |     |
|        | Tri-pot Co-operative                     | 14 |     |
| 3.18   | Yes                                      | 1  | 291 |
|        | No                                       | 0  | 291 |
| 3.18.1 | Veld fires                               | 1  | 293 |
|        | Management skills                        | 2  |     |
|        | Infrastructure                           | 3  |     |
|        | Income / financial constraints           | 4  |     |
|        | Help from experts                        | 5  |     |
|        | Knowledge of farm management             | 6  |     |
|        | Uncontrolled breeding programme          | 7  |     |
|        | Difficulty during birth process          | 8  |     |
|        | Erosion                                  | 9  |     |
|        | Importance of meetings                   | 10 |     |
|        | Overgrazing                              | 11 |     |
|        | Diseases                                 | 12 |     |
|        | Feeding programme                        | 13 |     |
|        | Theft                                    | 15 |     |
|        | Overstocking                             | 16 |     |
|        | Lack of skills                           | 17 |     |
|        | Lack of equipment                        | 18 |     |
|        | Labour problems                          | 19 |     |
|        | No facilities                            | 20 |     |
|        | Climate: snow / heat                     | 21 |     |
|        | No shelter                               | 22 |     |
|        | Parasites                                | 23 |     |
|        | Bad roads                                | 24 |     |
|        | Training                                 | 25 |     |
|        | Lack of money for vaccines, dosing, feed | 26 |     |
|        | Lack of fencing                          | 27 |     |
|        | Water                                    | 28 |     |
|        | Safety                                   | 29 |     |
|        | Electricity                              | 30 |     |
|        | No security of tenure                    | 31 |     |

|        |   |    |     |
|--------|---|----|-----|
|        | Animal production                                     | 32 |     |
|        | No co-operation amongst farmers                       | 33 |     |
|        | Not enough land                                       | 34 |     |
|        | Hazardous materials, e.g. plastics, steel, wire, etc. | 35 |     |
|        | Chopping down of bush                                 | 36 |     |
|        | Distance from town                                    | 37 |     |
|        | Means of communication                                | 38 |     |
|        | Vehicles  | 39 |     |
|        | Cattle get lost                                       | 40 |     |
| 3.19   | Available resources to remain in good condition       | 1  | 303 |
|        | Avoid veld fires                                      | 2  |     |
|        | Make firebreaks                                       | 3  |     |
|        | Do not overgraze                                      | 4  |     |
|        | Take good care of grazing water                       | 5  |     |
|        | Take care of natural resources (water, grass, etc.)   | 6  |     |
|        | Proper veld management                                | 7  |     |
|        | Minimize overgrazing                                  | 8  |     |
|        | Rotational grazing                                    | 9  |     |
|        | Management  | 10 |     |
|        | Feeding animals                                       | 11 |     |
|        | To attract tourism                                    | 12 |     |
|        | Protection from wild animals                          | 13 |     |
|        | Traditional healing                                   | 14 |     |
|        | Natural vegetation management                         | 15 |     |
|        | Keep grazing land and water safe                      | 16 |     |
|        | Do not contaminate water                              | 17 |     |
|        | Keep wild game safe                                   | 18 |     |
|        | No understanding                                      | 19 |     |
|        | Control erosion                                       | 20 |     |
| 3.20   | Yes   | 1  | 315 |
|        | No  | 0  | 315 |
| 3.20.1 | <b>If Yes:</b>  |    |     |
|        | Every year in winter                                  | 1  | 317 |
|        | Villagers do not care                                 | 2  |     |
|        | Labourers do not put out their cooking fires          | 3  |     |
|        | People/kids burn veld without reason                  | 4  |     |
|        | Uncontrolled kids burn veld during winter             | 5  |     |
|        | Do not burn veld                                      | 6  |     |
|        | Do not chop down trees                                | 7  |     |
|        | Overgrazing   | 8  |     |
|        | Twice a year  | 9  |     |
|        | End of autumn   | 10 |     |
|        | Often   | 11 |     |
|        | Careless people                                       | 12 |     |
|        | Spring  | 13 |     |
|        | Annually  | 14 |     |
|        | Grass is dry  | 15 |     |
|        | Controlled burning takes place                        | 16 |     |
| 3.21   | Yes   | 1  | 320 |
|        | No  | 0  | 320 |
| 3.21.1 | Have enough grazing throughout the year               | 1  | 322 |
|        | Save money  | 2  |     |
|        | Control veld fires                                    | 3  |     |

|      |   |    |     |
|------|---|----|-----|
|      | Control unpalatable species             | 4  |     |
|      | Manage grazing area                     | 5  |     |
|      | Spend less money on fodder - save costs | 6  |     |
|      | Enough feeding/grazing during winter    | 7  |     |
|      | Enough for future generations           | 8  |     |
|      | For animals                             | 9  |     |
|      | Increase production                     | 10 |     |
|      | Do not have to feed animals permanently | 11 |     |
|      | Good condition of cattle                | 12 |     |
|      | Get good price at auctions              | 13 |     |
|      | Protect palatable species               | 14 |     |
|      | Control soil erosion                    | 15 |     |
| 3.22 | Seboku                                  | 1  | 328 |
|      | Llooko                                  | 2  |     |
|      | Erograstis                              | 3  |     |
|      | Red grass                               | 4  |     |
|      | Don't know                              | 5  |     |
|      | Motalo                                  | 6  |     |
|      | Tswane                                  | 7  |     |
|      | Lehol                                   | 8  |     |
|      | Methala                                 | 9  |     |
|      | Tslane                                  | 10 |     |
|      | Themeda Triandra                        | 11 |     |
|      | Pasoalun Dilatatum                      | 12 |     |
|      | Kikuyu                                  | 13 |     |
|      | Thorn grass                             | 14 |     |
|      | Bohome                                  | 15 |     |
|      | Sweet grass                             | 16 |     |
| 3.23 | Khaki-bush                              | 1  | 335 |
|      | Mokaola                                 | 2  |     |
|      | Not sure / Unknown                      | 3  |     |
|      | None                                    | 4  |     |
|      | Black-jack                              | 5  |     |
|      | Diphalahala                             | 6  |     |
|      | Mesea                                   | 7  |     |
|      | Seboku                                  | 8  |     |
|      | Acacia                                  | 9  |     |
|      | Diesel bush                             | 10 |     |
|      | Buttle bush                             | 11 |     |
|      | Ganna bush                              | 12 |     |
|      | Red grass                               | 13 |     |
| 3.24 | Yes                                     | 1  | 363 |
|      | No                                      | 0  | 363 |
|      | If Yes:                                 |    |     |
|      | Controlled burning methods              | 1  | 365 |
|      | Cut & burn                              | 2  |     |
|      | Mechanical                              | 3  |     |
|      | Chop them up                            | 4  |     |
|      | Using chemicals if available            | 5  |     |
|      | Cut it when it is green                 | 6  |     |
|      | Burn                                    | 7  |     |
|      | Don't have any bush                     | 8  |     |
|      | Digging out                             | 9  |     |

|        |  |    |     |
|--------|--|----|-----|
|        | If No:                                     |    |     |
|        | Cutting what is not needed                 | 1  | 366 |
| 3.25   | Yes  | 1  | 371 |
|        | No   | 0  | 371 |
|        | <b>If yes:</b>                             |    |     |
|        | Winter                                     | 1  | 378 |
|        | To avoid overgrazing                       | 2  |     |
|        | Winter & summer                            | 3  |     |
|        | Germinate grass                            | 4  |     |
|        | Summer                                     | 5  |     |
|        | Autumn                                     | 6  |     |
|        | One year                                   | 7  |     |
|        | Not rested                                 | 8  |     |
|        | Sometimes                                  | 9  |     |
|        | <b>What purpose:</b>                       |    |     |
|        | Give grass a chance to grow                | 1  |     |
|        | For summer, if there is a shortage of seed | 2  |     |
|        | For animals during winter                  | 3  |     |
|        | Not rested                                 | 4  |     |
|        | Soil erosion                               | 5  |     |
| 3.26   | No understanding at all                    | 0  | 398 |
|        | Long time grazing in one camp              | 1  |     |
|        | Nothing left of the veld                   | 2  |     |
|        | All good species struggle to germinate     | 3  |     |
|        | Leads to soil erosion                      | 4  |     |
|        | Unwanted species start to grow             | 5  |     |
|        | Overstocking / overgrazing                 | 6  |     |
|        | Destroys grass                             | 7  |     |
|        | Conserving of grass species for future use | 8  |     |
| 3.27   | Grazing                                    | 1  | 405 |
|        | Cultivation                                | 2  | 406 |
|        | Hunting                                    | 3  | 407 |
|        | Housing                                    | 4  | 408 |
|        | Community tourism                          | 5  | 409 |
|        | Other                                      | 6  | 411 |
|        | Fodder                                     | 7  | 412 |
|        | Poultry                                    | 8  | 412 |
|        | Plots                                      | 9  |     |
| 3.27.1 | Not organised                              | 1  | 413 |
|        | Allocated camps                            | 2  |     |
|        | Veld                                       | 3  |     |
|        | All over, throughout the year              | 4  |     |
|        | Headman drives cattle to best spot         | 5  |     |
|        | Normal                                     | 6  |     |
|        | Divided into camps                         | 7  |     |
|        | Not in building area                       | 8  |     |
|        | Not in cultivated field                    | 9  |     |
|        | Have a meeting every month                 | 10 |     |

|           |  |     |                      |                    |
|-----------|--|-----|----------------------|--------------------|
| 3.28      | Rotate camps                                     |     | 1                    | 416                |
|           | Do not overstock camps                           |     | 2                    |                    |
|           | All infrastructure needed                        |     | 3                    |                    |
|           | Properly fenced                                  |     | 4                    |                    |
|           | Divided into camps                               |     | 5                    |                    |
|           | Resting of camps                                 |     | 6                    |                    |
|           | Do not overgraze                                 |     | 7                    |                    |
|           | Close up dongas to prevent erosion               |     | 8                    |                    |
|           | Theft  |     | 9                    |                    |
|           | Camps  |     | 10                   |                    |
|           | Resting of veld                                  |     | 11                   |                    |
|           | Control veld fires                               |     | 12                   |                    |
|           | Rotational grazing                               |     | 13                   |                    |
|           | Proper camps                                     |     | 14                   |                    |
|           | Practise veld management                         |     | 15                   |                    |
|           | Do not contaminate water resources               |     | 16                   |                    |
|           | Managed by co-farmers                            |     | 17                   |                    |
|           | Don't know                                       |     | 18                   |                    |
|           | By the municipality                              |     | 19                   |                    |
|           | One manager, with shareholders                   |     | 20                   |                    |
| <b>4.</b> | <b><u>Environmental and Grazing Planning</u></b> |     | <b><u>Number</u></b> | <b><u>Code</u></b> |
| 4.1       | Yes  |     | 1                    | 437                |
|           | No   |     | 0                    | 437                |
| 4.1.1     | <b>If Yes:</b>                                   |     |                      |                    |
|           | Pension  |     | 1                    | 439                |
|           | Pre-school teacher                               |     | 2                    |                    |
|           | Husband's salary                                 |     | 3                    |                    |
|           | Sale of milk                                     |     | 4                    |                    |
|           | Vegetables                                       |     | 5                    |                    |
|           | Employed   |     | 6                    |                    |
|           | Retired teacher                                  |     | 7                    |                    |
|           | Helped by children                               |     | 8                    |                    |
|           | Loans from time to time                          |     | 9                    |                    |
|           | Selling livestock                                |     | 10                   |                    |
|           | Self-employed                                    |     | 11                   |                    |
|           | Piece jobs / temporary jobs                      |     | 12                   |                    |
|           | Taxi   |     | 13                   |                    |
| 4.2       | Yes  |     | 1                    | 447                |
|           | No   |     | 0                    | 447                |
| 4.2.1     | <b>If Yes:</b>                                   |     |                      |                    |
|           | Soil Conservation                                | Yes | 1                    | 449                |
|           |  | No  | 0                    | 449                |
|           | Income received                                  | Yes | 1                    | 453                |
|           |  | No  | 0                    | 453                |
|           | Control of black wattle                          | Yes | 1                    | 454                |
|           |  | No  | 0                    | 454                |
|           | Income received                                  | Yes | 1                    | 459                |
|           |  | No  | 0                    | 459                |
|           | Cutting of thatch                                | Yes | 1                    | 460                |
|           |  | No  | 0                    | 460                |
|           | Income received                                  | Yes | 1                    | 463                |

|       |                                   |     |    |     |
|-------|-----------------------------------|-----|----|-----|
|       |                                   | No  | 0  | 463 |
|       | Cutting of fodder                 | Yes | 1  | 464 |
|       |                                   | No  | 0  | 464 |
|       | Income received                   | Yes | 1  | 468 |
|       |                                   | No  | 0  | 468 |
| 4.3   | Yes                               |     | 1  | 469 |
|       | No                                |     | 0  | 469 |
| 4.3.1 | <b>If yes:</b>                    |     |    |     |
|       | Vegetables                        |     | 1  | 471 |
|       | Milk                              |     | 2  |     |
|       | Wheat                             |     | 3  |     |
|       | Sunflower                         |     | 4  |     |
|       | Chickens                          |     | 5  |     |
|       | Dry beans                         |     | 6  |     |
|       | Meat (beef, mutton)               |     | 7  |     |
|       | Live animals                      |     | 8  |     |
|       | Pigs                              |     | 9  |     |
|       | Selling trolleys                  |     | 10 |     |
| 4.4   | Yes                               |     | 1  | 483 |
|       | No                                |     | 0  | 483 |
| 4.4.1 | <b>If Yes:</b>                    |     |    |     |
|       | Sell                              |     | 1  | 485 |
|       | Uses some and sells the rest      |     | 2  |     |
|       | Does not slaughter                |     | 3  |     |
|       | Only animals, not hide and meat   |     | 4  |     |
|       | Keeps it                          |     | 5  |     |
| 4.5   | Yes                               |     | 1  | 489 |
|       | No                                |     | 0  | 489 |
| 4.6   | Yes                               |     | 1  | 491 |
|       | No                                |     | 0  | 491 |
| 4.7   | Yes                               |     | 1  | 493 |
|       | No                                |     | 0  | 493 |
| 4.7.1 | <b>If Yes:</b>                    |     |    |     |
|       | Notebook                          |     | 1  | 495 |
|       | Receipt book                      |     | 2  |     |
|       | Piece of paper                    |     | 3  |     |
|       | Files                             |     | 4  |     |
|       | Not on paper (knowledge / memory) |     | 5  |     |
|       | <b>How often:</b>                 |     |    |     |
|       | Every day                         |     | 1  | 498 |
|       | When selling and buying           |     | 2  | 498 |
|       | When activities / events occur    |     | 3  | 498 |
|       | Weekly                            |     | 4  |     |
|       | Annually                          |     | 5  |     |
|       | Regularly                         |     | 6  |     |
|       | Sometimes / not often             |     | 7  |     |
|       | When necessary                    |     | 8  |     |
|       | After branding                    |     | 9  |     |
|       | Before mating                     |     | 10 |     |
|       | Monthly                           |     | 11 |     |

|     |  |    |     |
|-----|--|----|-----|
| 4.8 | To improve/rotate grazing for better livestock quality | 1  | 500 |
|     | Proper fencing   | 2  |     |
|     | Kraals   | 3  |     |
|     | Water  | 4  |     |
|     | Closed dongas  | 5  |     |
|     | Planting   | 6  |     |
|     | Needs long-term lease to manage area properly          | 7  |     |
|     | Veld management  | 8  |     |
|     | Cultivate grasses                                      | 9  |     |
|     | Camps  | 10 |     |
|     | Control of grazing area / good grazing area            | 11 |     |
|     | Tourism  | 12 |     |
|     | Good-looking animals                                   | 13 |     |
|     | Having more animals                                    | 14 |     |
|     | Producing enough milk for family and selling           | 15 |     |
|     | Management of cattle                                   | 16 |     |
|     | Controlling veld fires                                 | 17 |     |
|     | Proper management by well-trained farmers              | 18 |     |
|     | Security to help minimize theft                        | 19 |     |
|     | Organised group with common goals/objectives           | 20 |     |
|     | To get more land                                       | 21 |     |
|     | Financial assistance                                   | 22 |     |
|     | Help from the government                               | 23 |     |
|     | Security of tenure                                     | 24 |     |
| 4.9 | Grazing improvement if needed in future                | 1  | 511 |
|     | Training regarding dangers of veld fires               | 2  |     |
|     | Grazing should be protected                            | 3  |     |
|     | Grazing should be taken care of                        | 4  |     |
|     | Must produce good breeds and dairy                     | 5  |     |
|     | Proper utilisation of facilities to generate income    | 6  |     |
|     | Government assistance with dairy project               | 7  |     |
|     | Well-organised farming community                       | 8  |     |
|     | Selling cultivated grass to farmers in need            | 9  |     |
|     | Camps  | 10 |     |
|     | Grazing area   | 11 |     |
|     | Dip  | 12 |     |
|     | Tourism  | 13 |     |
|     | Proper facilities to be erected                        | 14 |     |
|     | Less overgrazing                                       | 15 |     |
|     | Good breeding stock                                    | 16 |     |
|     | Managing the veld properly                             | 17 |     |
|     | Working together with the municipality                 | 18 |     |
|     | Have own farm / plot                                   | 19 |     |
|     | Proper training before allocating a farm               | 20 |     |
|     | More land  | 21 |     |
|     | Introduction of other enterprises                      | 22 |     |
|     | Availability of tap water for community & animals      | 23 |     |
|     | Take white farmer's land and give it to us             | 24 |     |
|     | Security of tenure                                     | 25 |     |
|     | Livestock management                                   | 26 |     |
|     | Generate income  | 27 |     |
|     | Establish constitution for association                 | 28 |     |
|     | Safety and security                                    | 29 |     |
|     | Fencing  | 30 |     |
|     | Water points   | 31 |     |

|      |   |    |     |
|------|---|----|-----|
| 4.10 | <b>Major immediate needs:</b>                   |    |     |
|      | Infrastructure                                  | 1  | 517 |
|      | Income / money                                  | 2  |     |
|      | Knowledge                                       | 3  |     |
|      | General management training                     | 4  |     |
|      | Financial assistance                            | 5  |     |
|      | Management knowledge                            | 6  |     |
|      | Land  | 7  |     |
|      | Water   | 8  |     |
|      | Proper fences                                   | 9  |     |
|      | Programme to combat erosion                     | 10 |     |
|      | Implementation of projects                      | 11 |     |
|      | Training  | 12 |     |
|      | Management skills                               | 13 |     |
|      | Speed up LRAD                                   | 14 |     |
|      | Water troughs in camps                          | 15 |     |
|      | Dividing land into camps                        | 16 |     |
|      | Land care project                               | 17 |     |
|      | Veld management                                 | 18 |     |
|      | Handling facilities                             | 19 |     |
|      | Cultivating erogratis                           | 20 |     |
|      | Tractors  | 21 |     |
|      | Donga reclamation                               | 22 |     |
|      | Pig market                                      | 23 |     |
|      | Spray garden                                    | 24 |     |
|      | Housing   | 25 |     |
|      | Food  | 26 |     |
|      | Education for children / self                   | 27 |     |
|      | Training regarding disease control & management | 28 |     |
|      | Land ownership                                  | 29 |     |
|      | Livestock management                            | 30 |     |
|      | Medical aid                                     | 31 |     |
|      | Marketing                                       | 32 |     |
|      | Camps   | 33 |     |
|      | Safety  | 34 |     |
|      | Help from experts                               | 35 |     |
|      | Prevention of veld fires                        | 36 |     |
|      | Government support                              | 37 |     |
|      | Electricity                                     | 38 |     |
|      | Supplementary feeding                           | 39 |     |
|      | Health programme                                | 40 |     |
|      | Enough livestock                                | 41 |     |
|      | Shelter   | 42 |     |
|      | Feeding programme                               | 43 |     |
|      | Co-operation                                    | 44 |     |
|      | Joining a farmers' union                        | 45 |     |
|      | <b>Major long-term needs:</b>                   |    |     |
|      | Management                                      | 1  | 523 |
|      | Organised farm                                  | 2  |     |
|      | Record-keeping system                           | 3  |     |
|      | Product marketing                               | 4  |     |
|      | Management skills                               | 5  |     |
|      | Livestock                                       | 6  |     |
|      | Developed farm                                  | 7  |     |
|      | Individual farms                                | 8  |     |
|      | Training skills                                 | 9  |     |
|      | Quality breeds                                  | 10 |     |

|  |    |     |
|--|----|-----|
| Commitment to development              | 11 |     |
| Security of tenure                     | 12 |     |
| Linking up with developed farmers      | 13 |     |
| Machine for bean harvesting            | 14 |     |
| Phone & electricity for the labourers  | 15 |     |
| Truck for delivering cows              | 16 |     |
| Planters                               | 17 |     |
| Co-operation among farmers             | 18 |     |
| Health                                 | 19 |     |
| Housing                                | 20 |     |
| Food                                   | 21 |     |
| Provision of handling facilities       | 22 |     |
| Owning a farm                          | 23 |     |
| Commercial farming                     | 24 |     |
| Infrastructure                         | 25 |     |
| How to control weed & pests            | 26 |     |
| Drinking water for community & animals | 27 |     |
| Schools                                | 28 |     |
| Clinics                                | 29 |     |
| Camps                                  | 30 |     |
| Land                                   | 31 |     |
| Help from experts                      | 32 |     |
| Financial assistance                   | 33 |     |
| Own slaughter-house / abattoir service | 34 |     |
| Shelter                                | 35 |     |
| Safety                                 | 36 |     |
| Prevention of veld fires               | 37 |     |
| <b>Level of success:</b>               |    |     |
| Very Low                               | 1  | 530 |
| Low                                    | 2  | 530 |
| Moderate                               | 3  | 530 |
| High                                   | 4  | 530 |
| Very High                              | 5  | 530 |



**ANNEXURE C**

**MODELS USED IN THIS STUDY**

## ANNEXURE C

### Models used in this study

The following formula was used in this study:

$$Z = \frac{X_i - \bar{X}}{S}$$

Where  $X_i$  = individual score  
 $\bar{x}$  = mean of the population distribution  
 $S$  = standard deviation of the population  
 $Z$  = standard deviation unit scores

The Z-test was used as a means test to identify statistical differences. The critical value of the test is  $z^{***} = 2.57$ . The results were justified by using the following formula:

$$z = \frac{X_1 - X_2}{\sqrt{\left(\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}\right)}}$$

Test Statistic: Decision Rule: At a level of significance  $\alpha$ ,

| Alternative Hypothesis | Decision Rule  |
|------------------------|--|
| $H_1 : \mu \neq \mu_0$ | Reject $H_0$ if $ Z_C  > Z_{\Delta/2}$ . Fail to reject $H_0$ otherwise. |
| $H_1 : \mu > \mu_0$    | Reject $H_0$ if $Z_C > Z_{\Delta}$ . Fail to reject $H_0$ otherwise.     |
| $H_1 : \mu < \mu_0$    | Reject $H_0$ if $Z_C < -Z_{\Delta}$ . Fail to reject $H_0$ otherwise.    |

\* 95% significant ( $\alpha = 0.05$ ):  $z = 1.645$

\*\* 99% significant ( $\alpha = 0.01$ ):  $z = 2.326$

\*\*\* 99.5% significant ( $\alpha = 0.005$ ):  $z = 2.576$

**ANNEXURE D**

**ENVIRONMENTAL REQUIREMENTS FOR  
AGRICULTURAL LAND USE**

## ANNEXURE D

### ENVIRONMENTAL REQUIREMENTS FOR AGRICULTURAL LAND USE

| PARAMETER                        | REQUIREMENTS/STANDARDS  | COMMENTS |
|----------------------------------|---|----------|
| <b>Availability of water</b>     | <ul style="list-style-type: none"> <li>▪ Adaptable due to variable composition of species.</li> <li>▪ Limit set at not less than 150 mm/yr.</li> <li>▪ Livestock watering at 20-45 litres/day/LSU.</li> </ul>   |          |
| <b>Soil nutrients</b>            | <ul style="list-style-type: none"> <li>▪ Very variable due to variety of species.</li> <li>▪ Nitrogen and available phosphorus are critical for most forage species and livestock.</li> <li>▪ Animal traction enhances quality of soil.</li> </ul>                                  |          |
| <b>Slope</b>                     | <ul style="list-style-type: none"> <li>▪ Dependent on soil type, but less relevant when well managed.</li> </ul>  |          |
| <b>Effective soil depth</b>      | <ul style="list-style-type: none"> <li>▪ Lower limit is 15 cm</li> </ul>  |          |
| <b>Erodibility of soil</b>       | <ul style="list-style-type: none"> <li>▪ Very susceptible to erosion, especially on sloping land and particularly in areas of high rainfall.</li> </ul>   |          |
| <b>Drainage of soil</b>          | <ul style="list-style-type: none"> <li>▪ Affects species composition; usually, high species cannot tolerate being waterlogged.</li> <li>▪ Trampling by animals reduces drainage due to soil compaction.</li> </ul>  |          |
| <b>Grazing capacity</b>          | <ul style="list-style-type: none"> <li>▪ Subject to interseasonal and topographical variations.</li> <li>▪ Assessment must be based on worst-case scenario.</li> </ul>  |          |
| <b>Quality of grazing</b>        | <ul style="list-style-type: none"> <li>▪ Palatable grass species of high nutritional value preferable.</li> <li>▪ Invasive bush and toxic species can be lethal.</li> </ul>   |          |
| <b>Soil pH</b>                   | <ul style="list-style-type: none"> <li>▪ Best pH 5.5-8.0.</li> </ul>  |          |
| <b>Altitude</b>                  | <ul style="list-style-type: none"> <li>▪ Below the vegetation line.</li> </ul>  |          |
| <b>Legal status of land</b>      | <ul style="list-style-type: none"> <li>▪ Often treated as communal.</li> <li>▪ Low external input.</li> <li>▪ Grazing regulations/control often conflict with commercial perspective.</li> </ul>  |          |
| <b>Conflicts of land use</b>     | <ul style="list-style-type: none"> <li>▪ Lack of clear boundaries.</li> <li>▪ Rights of use overlap with those of neighbouring communities, especially during droughts.</li> </ul>  |          |
| <b>Marketability of products</b> | <ul style="list-style-type: none"> <li>▪ Livestock play vital role in land-based livelihoods.</li> <li>▪ Access to markets important.</li> </ul>  |          |
| <b>Economic risk</b>             | <ul style="list-style-type: none"> <li>▪ Potentially high in dry periods.</li> <li>▪ Ever-present livestock diseases, degradation of vegetation cover.</li> <li>▪ Lack of institutional support increases risk.</li> <li>▪ Gross margin/LSU if production is commercial.</li> </ul> |          |
| <b>Surveillance</b>              | <ul style="list-style-type: none"> <li>▪ Livestock within areas for which rights are held.</li> <li>▪ Fencing and/or herding may be necessary.</li> <li>▪ Financial implications of fencing.</li> </ul>   |          |

## **ANNEXURE E**

# **COMMUNAL AND COMMONAGE GRAZING AREAS FUNCTIONALITY ASSESSMENT**



## ANNEXURE E

### COMMUNAL AND COMMONAGE GRAZING AREAS FUNCTIONALITY ASSESSMENT

The ability of a communal grazing area to function effectively as an ecosystem, producing goods and services for human use, is a function determined by three factors: the size, condition and regional landscape context of the communal area.

- Size:** The functional size of a particular communal area may differ from the functional size of another communal area. The regional context in which the communal area is located, may also affect the functional size of the area.
- Condition:** Humans, animals, alien invader vegetation, natural and man-made disasters may have a negative impact on the condition of a communal grazing area. This may influence the natural state of balance in the communal area, thereby affecting its ability to function as an ecosystem.
- Regional Landscape Context:** Communal areas that rely on the movement of matter and energy from surrounding areas (most often water-based movement, such as rivers, wetlands and flood plains), may suffer negative effects from changes in land use in surrounding areas or upstream pollution.

**ASSESS THE FUNCTIONALITY OF EACH, USING THE INDICATORS PROVIDED:**

| CYCLE (STATUS QUO) INSTRUCTIONS                                 | CYCLE 2 INSTRUCTIONS  |
|---|---|
| Fill in the functionality score for the “Cycle 1” columns only. | Fill in the score for the changed functionality of each of the communal areas on the land unit, with the proposed land use change in the “Cycle 2” columns. |

## GRASSLANDS (NATURAL AND PASTURE)

| Factor  | Indicators   |  | Functionality<br>(Y/N)<br>Cycle 1 Cycle 2 |  |  | Potential Services  |
|---|--|--|---|--|--|---|
|   | Highly Functional  | Less Functional  |   |  |  |   |
| <b>SIZE</b>                                     | Large, with low edge-area ratio<br>Small, but linked to larger grassland area  | High edge to area ratio<br>Small and isolated  | Small = Low<br>functionality              |  |  | <b>Flood avoidance</b><br><b>Water regulation</b><br><b>Erosion control</b><br><b>Soil formation</b><br><b>Nutrient</b><br><b>Pollination</b><br><b>Refugia</b><br><b>Natural</b><br><b>productions</b> |
| <b>CONDITION</b>                                | No alien vegetation<br>Grasslands with burning programme<br>Low human impact (multi harvesting)<br>No agricultural use (pasture)<br>Area not overgrazed<br>No soil erosion<br>Controlled recreational/cultural use<br>High species diversity<br>Adjacent to other open-space area<br>Rare/protected species (plant and animal) | Infested with alien vegetation<br>No burning programme<br>High human impact<br>High agricultural use<br>Area overgrazed<br>Extensive soil erosion evident<br>Uncontrolled recreational/cultural use<br>Low species diversity<br>Not adjacent to other open-space area<br>No rare/protected species | Medium =<br>Partly<br>functional          |  |  |   |
|   |  |  | Poor = Low<br>functionality               |  |  |   |
|   |  |  | Average =<br>Partly<br>Functional         |  |  |   |
| <b>REGIONAL<br/>LAND-<br/>SCAPE<br/>CONTEXT</b> | Area functionally linked to other grasslands<br>No similar grassland areas in catchment  | Not linked to other grasslands<br>Catchment contains other grassland areas   | Good =<br>functional                      |  |  |   |
|   |  |  | Poor = Low<br>Functionality               |  |  |   |
|   |  |  | Average =<br>Partly<br>Functional         |  |  |   |
|   |  |  | Good =<br>Functional                      |  |  |   |

| Factor  | Indicators  |  | Functionality<br>(Y/N)<br>Cycle 1 Cycle 2                                 |                                   |  | Potential Services  |  |
|---|---|--|---|-----------------------------------|--|---|--|
|   | Highly Functional   | Less Functional  |   |                                   |  |   |  |
| <b>SIZE</b>                                     | Perennial<br>River<br>Low in catchment  | Stream   | Non-perennial<br>Drainage Line<br>High in catchment                       | Small = Low<br>functionality      |  | <b>Water supply</b><br><b>Nutrient cycling &amp;<br/>waste treatment</b><br><b>Pest control</b><br><b>Refugia</b><br><b>Recreational and<br/>cultural use</b> |  |
|   |   |  |   | Medium =<br>Partly<br>functional  |  |   |  |
|   |   |  |   | Large =<br>functional             |  |   |  |
| <b>CONDITION</b>                                | Water flowing<br>Water quality good<br>No nitrification<br>No alien vegetation  | (turbidity, smell & taste)<br>(algae, greenness)<br>(water hyacinth, Salvinia, etc.)   | Water stagnant<br>Water quality poor<br>Nitrification<br>Alien vegetation | Poor = Low<br>functionality       |  |   |  |
|   |   |  |   | Average =<br>Partly<br>Functional |  |   |  |
|   |   |  |   | Good =<br>functional              |  |   |  |
| <b>REGIONAL<br/>LAND-<br/>SCAPE<br/>CONTEXT</b> | High in catchment<br>Pristine upstream catchment<br>No existing pollution sources upstream<br>No potential pollution sources upstream<br>Part of a major river system | Developed upstream catchment<br>Industrial/urban/agricultural sources upstream<br>Potential pollution sources upstream<br>Part of a minor river system | Low in catchment  | Poor = Low<br>Functionality       |  |   |  |
|   |   |  |   | Average =<br>Partly<br>Functional |  |   |  |
|   |   |  |   | Good =<br>Functional              |  |   |  |

| Factor                                    | Indicators   |   | Functionality<br>(Y/N)<br>Cycle 1 Cycle 2 |  |  | Potential Services  |
|---|--|---|---|--|--|---|
|   | Highly Functional  | Less Functional   |   |  |  |   |
| <b>SIZE</b>                               | Deep, with small surface area<br>Small, on a major river system  | Shallow, with large surface area<br>Small, on a minor river system  | Small = Low<br>functionality              |  |  | <b>Flood avoidance</b><br><b>Water regulation</b><br><b>Water supply</b><br><b>Erosion control</b><br><b>Nutrient cycling &amp;<br/>waste treatment</b><br><b>Refugia</b><br><b>Food production</b><br><b>Recreational and<br/>cultural use</b> |
| <b>CONDITION</b>                          | Water quality good (turbidity, taste & smell)<br>No eutrophication (greenness, algae)<br>No alien vegetation (water hyacinth, Salvinia, etc.)<br>Designed to withstand high inflows with gradual release<br>Low sediment inflow<br>Controlled recreational use<br>Dam designed to allow fish migration | Water quality poor<br>Eutrophication evident<br>Infested with alien vegetation<br>Not designed to regulate floods<br>High sediment inflow - dam silted<br>Uncontrolled recreational use<br>Dam prohibits fish migration | Poor = Low<br>functionality               |  |  |   |
|   |  |   | Average =<br>Partly<br>Functional         |  |  |   |
|   |  |   | Good =<br>functional                      |  |  |   |
| <b>REGIONAL<br/>LANDSCAPE<br/>CONTEXT</b> | Regional wildlife refuge   | Local wildlife refuge   | Poor = Low<br>Functionality               |  |  |   |
|   |  |   | Average =<br>Partly<br>Functional         |  |  |   |
|   |  |   | Good =<br>Functional                      |  |  |   |