Assessment and Development of Northern Communal Areas in Namibia

Prepared by International Development Consultancy

for the

Ministry of Lands, Resettlement and Rehabilitation

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FOREWORD

The Ministry of Lands, Resettlement and Rehabilitation as custodian of state land, which includes all communal land initiated this study as part of its programme to promote development in communal areas. These areas were seriously neglected by the successive colonial administrations.

This study concentrates on virgin, un-utilised and under-utilised land in the Kunene, Omusati, Oshana, Ohangwena and Oshikoto Regions. The document provides a wealth of information and valuable recommendations on infrastructural and socio-economic development.

The most important recommendations that will enjoy serious attention by the Ministry are those concerning partial commercialisation of certain rangeland areas and the development of the economic sector through the promotion of small and medium enterprises.

Other ministries, the respective regional councils and development institutions are also expected to benefit from this comprehensive report.

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# ASSESSMENT AND DEVELOPMENT OF UNDER-UTILISED COMMUNAL AREAS IN NAMIBIA

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EXECUTIVE SUMMARY

This document serves to summarise the proposed sectoral development in each of the five regions investigated, as well as to summarise the recommendations made with respect to small-scale economic projects. The sectoral recommendations as visually presented in Figures 14-18 in the main document are a summary of the recommendations made for the five regions investigated.

AGRICULTURE

Agricultural Practices

On average, 64.3% of the population in the five regions investigated are directly or indirectly involved in the agricultural sector. It can further be assumed that up to 80% of the population in the study areas of these regions is directly dependent on the agricultural sector as a source of livelihood. The agricultural activities in the study area comprise of mainly livestock farming with small patches of crop production on suitable soil. In general, the soil in the study area is not very suitable for crop production and the unavailability of sufficient underground or surface water recourse rules out any irrigation projects.

Carrying Capacity

The scientific accepted carrying capacity for sustainable rangeland utilisation of the regions is exceeded by 55% in the Kunene Region and is as high as 100% in the four north-central regions. The figures include an estimated 120 000 donkeys in the 4 ‘O’ Regions. Although the local livestock breeds are hardy and well adapted to the environment, the productivity of the agricultural sector is negatively influenced by uneconomical and outdated practices such as composition of herds and reluctance to sell unproductive animals.

Grazing Conditions in the Study Area

Compared to the general grazing conditions in the five regions, which in some cases deteriorated to the fourth stage of desertification, the conditions in the study area are far better than in the densely populated areas. The main reasons for this are mainly the unavailability of suitable of sustainable water resources, as well as the flooding of certain areas during the rainy season.

Fencing of Certain Areas

Huge portions of land, especially in the 4 ‘O’ Regions are “illegally” fenced off. The fencing off of certain areas, whether illegal or legal in terms of existing practices indicates a desire by individuals to occupy and manage land in terms of economical farming practices. This desire should be acknowledged and properly controlled by the Communal Land Reform Bill once it is generally accepted and promulgated.
Demarcation of small-scale commercial farming Areas

In order to avoid uncontrolled development of communal land, as well as to prevent degradation of the relative conserved rangeland conditions in the study area, certain portions of land in the 4 ‘O’ Regions should be demarcated and reserved for small-scale commercial farming purposes. The areas as indicated in Figures 15-18 in the main document are selected according to specific criteria, while the rest of the land is still available as common grazing areas.

Development of Small-scale Commercial Farming Units

A model for the development of small-scale commercial farming units is proposed. Subject to the availability of funds, the government can implement the model in phases and take the responsibility for all development cost to be paid back over time by the leaseholders. Alternatively, the Government can take the responsibility for the planning, surveying and provision of water while the leaseholder will be responsible for the other infrastructure.

Implementation of Small-scale Commercial Farming Units

The implementation of the small-scale commercial farming model is subject to the promulgation of the Communal Land Reform Bill, the approval of demarcated areas by the local communities and different levels of authority, proper planning and surveying, the implementation of commercial farming practices and strict control by the relevant authorities.

Implementation of Commercial Farming Practices

The contribution of the agricultural sector to the income of rural households in the study area can be dramatically increased by the introduction of commercial farming practices. Such practices may include the restructuring of livestock herds and the doing away of non-productive units and the implementation of plans and strategies on livestock development and marketing.

GENERAL RECOMMENDATIONS: AGRICULTURE

Reduction of Livestock Numbers

It is recommended that livestock numbers in all the northern communal areas be reduced to the proposed stocking rates in order to secure sustainable livestock production in these areas. Livestock numbers can be reduced by means of the implementation of the Communal Livestock Marketing Strategy, together with the implementation of plans and strategies which support the reduction of the livestock population in the communal areas.

Monetary Value of Agricultural Products

It can be accepted that agricultural extension services concentrate on inter alia the betterment of local breeds, animal health, farming practices etc. However, the monetary value of livestock should be emphasised in order to change the traditional view of livestock as a parameter of wealth and to support other livestock reduction strategies and the implementation of commercial farming principles.
Approval of a Model for Small-scale Commercial Farming

It is recommended that the proposed model for small-scale commercial farming in principle be approved.

Demarcation of Small-scale Commercial Farming Areas

It is recommended that the areas as indicated in Figures 9.2 to 9.5 in the main document be demarcated for the implementation of a small-scale commercial farming model.

Control of Livestock Numbers and Implementation of Commercial Farming Principles

It is recommended that the implementation of a small-scale commercial farming model be supported by mechanisms to control livestock numbers in order to avoid overgrazing and the degradation of natural vegetation as well as the implementation of other commercial farming principles to maximise the production potential of the model.

REGIONAL RECOMMENDATIONS: AGRICULTURE

Kunene Region

- It is recommended that the provision of water for agricultural purposes be limited to areas suitable for livestock farming as indicated in Figure 14 in the main document.

- The provision of water for livestock purposes in each area be subject to criteria that minimise a negative impact on the environment.

Omusati Region

It is recommended that the small-scale commercial farming model be implemented in the southwestern part of the Omusati Region stretching from Amarika westwards for a zone of 15 km north of the proposed Ongandjera Community Forest Reserve to the Kamanjab-Ruacana road, and northwards along the border of the Ruacana constituency to the proposed Uukwaluudhi conservancy as indicated in Figure 15 in the main document.

Oshana Region

It is recommended that the small-scale commercial farming model be implemented in the area south of the Etaka channel and 6 km both sides of the Omapala pipeline as indicated in Figure 16 in the main document.

Oshikoto Region

It is recommended that the small-scale commercial farming model be implemented in the southeastern part of the Oshikoto Region north of the border of the present commercial farming area of the Tsumeb district and from the proposed King Kauluma-Okongo road to the Okavango border as indicated in Figure 17 in the main document.
Ongwena Region

It is recommended that the small-scale commercial farming model be implemented in the south-eastern part of the Ongwena Region sough of the Okongo-Rundu road as indicated in Figure 18 in the main document.

FORESTRY

Economic value of Forest Reserves

The economic value of Namibia's forest resources has as yet not been acknowledged and fully utilised as a source of income for rural communities. Various products from forest reserves such as construction poles, firewood, charcoal, crafts and implements, baskets etc. can be manufactured by small-scale entrepreneurs to contribute an estimated N$1000 m per annum to the income of rural households and communities. However, a well-developed strategy for the commercial utilisation of forest resources should be developed whereby specific small-scale projects and entrepreneurs be identified, training in basic business principles be provided and access to finance be secured. This could be done within the model as recommended in Chapter 9 in the main document.

Recommendations

It is recommended that:

- the proposed Community Forest Reserves as indicated in Figures 15 and 18 in the main document be proclaimed as a matter of urgency;
- the commercial value of forest reserves be recognised and propagated as a source of income for rural households and communities;
- a strategy be implemented whereby specific small-scale financial viable projects be identified, selected entrepreneurs be trained and technically assisted with respect to training in basic business principles, drafting of business plans and access to finance.

GEOLOGY AND MINING

General Overview

The mineral resources in the Kunene Region are by far the most promising compared to the four other regions under review as indicated in Figure 11. Numerous exclusive prospecting licences have been issued in the Kunene Region for the exploitation of mainly semi-precious stones, dimension stone, base and rare metals, chalcedony and even precious stones. At present, two investment opportunities are available for private investors namely at Cunene Gem and Dimension Stone (N$500 000) 90 km from Opuwo, and at Orupembe Marble (+ N$600 000) 130 km west of Opuwo.

Although the 4 'O' Regions are not as richly blessed with mineral resources, the appearances of brick clay at different places and soda salt at the Ongandjera and Otjiwallunda pans provide opportunities for small-scale business ventures.
Recommendations

It is recommended that:

- the Kunene Regional Council in collaboration with mining licence holders develop a mechanism to promote investment opportunities in the mining sector;
- small-scale semi-precious stone operations by local communities in the Kunene Region be technically and financially assisted and organised selling points of these products be established at selected sites on the tourism routes;
- small-scale brick clay operations be technically an financially assisted in the 4 ‘O’ Regions for the manufacturing of clay bricks in remote areas as an alternative to cement bricks; and
- small-scale commercial salt operations at Ongandjera and Otjiwalunda be technically and financially assisted for the manufacturing of an “exclusive” salt product.

TOURISM

Tourism Governing Instruments

Tourism has been the fastest growing economic sector in Namibia since independence. On national and regional level, various instruments govern tourism and at least three regional tourism development plans have been drafted.

The Government, through the Ministry of Environment and Tourism, acknowledged the importance of tourism and tourism related activities as a source of income for rural communities in the communal areas which resulted in two policy documents namely “Wildlife Management, Utilisation and Tourism in Communal Areas” and “Promotion of Community-based Tourism”.

Within these two policies, instruments and guidelines are provided to communities in communal areas for the establishment of conservancy areas and community-based tourism enterprises for the benefit of local communities and entrepreneurs.

Tourism in the Kunene Region

The Kunene Region is at present being regarded as one of the prime tourism areas in Namibia. Various conservancies as indicated in Figure 10 in the main document have been established or are in the process of being established and local communities can benefit from the rich and unique wildlife and scenery resources of the region.

However, due to the environmental sensitivity of the region it is of utmost importance that tourism be controlled and infrastructure be provided according to the tourism carrying capacity of the region. For this reason, the communal part of the Kunene Region is divided into three tourism zones and nine management zones as indicated in Figures 12 and 14 in the main document. Based on an environment assessment, recommendations for each zone are been made in Chapter 7 in the main document.

Ample scope and numerous opportunities exist in the Kunene Region for small-scale tourism ventures. However, selected entrepreneurs and communities should be technically and financially assisted to exploit these opportunities.
Tourism in the 4 ‘O’ Regions

At present tourism is almost non-existent in the four north-central regions. However, the reintroduction of wildlife in mainly the Oshana Region and the rich birdlife provide an opportunity for the establishment of at least three tourism areas. This opportunity is enhanced by the incorporation of the Etosha National Park in the Omusati, Oshana and Oshikoto Regions. Figures 13 and 15-17 in the main document give indications of the locations of the Ombuga, Narawandu and Andoni Tourism Areas.

Recommendations

It is recommended that:

- The Kunene Regional Council acknowledges and accepts the tourism sector as a priority in the region, and more specific in Tourism Zones I and II, as indicated in Figure 14 in the main document.
- Tourism development in the Kunene Region be within the guidelines as provided for the different Tourism and Management Zones.
- Additional Conservancies be established in the Kunene Region and the status of the Ombuga, Narawandu and Andoni Tourism Areas in the Omusati, Oshana and Oshikoto Regions be upgraded to conservancies.
- Small-scale and community-based tourism operations such as community-based camps, information centres and entrance gates to conservancies be identified; and
- selected entrepreneurs and communities be technically and financially assisted with respect to training in basic business principles, drafting of business plans and access to finance to exploit the identified small-scale business opportunities in the tourism sector.

INFRASTRUCTURE

General

A direct correlation exists between infrastructural development and population density and distribution. Generally, the development of infrastructure is a direct result of people and communities moving into and occupying under-utilised and unutilised areas. Such developments occur mostly on an ad hoc basis, which emphasises the need for proper regional and land use plans. Although this report is restricted to unutilised and under-utilised parts of the communal land of the five regions under review, note should be taken of infrastructure development on a regional level, as well as existing and proposed regional development plans, land use plans and extensions of existing infrastructure into the unutilised and under-utilised areas.

Budgetary Provision for Infrastructural Development

The specific line ministry in terms of the priorities of such a ministry normally does budgetary provision for infrastructural development. Due to the low population density of the study area and subsequent low consumer use of infrastructure, it may happen that budgetary provision for infrastructural development in the study area does not get the necessary attention. Therefore, the motivations submitted to the National Planning Commission for inclusion of projects in the national budget is of utmost importance.
It would thus be necessary to prioritise the development proposals of each sector within each region as well as within the broader perspective of all the regions under discussion after which well motivated submissions must be submitted to the National Planning Commission.

Needs Assessment

A comprehensive Needs Assessment has been done for each region and is attached to the report as Annexure A to the main document. The Needs Assessment expressed the needs of the different Regional Councils and communities and is not necessarily included as a priority as determined by the specific line ministry. It would therefore be necessary for the Regional Councils to take these needs in terms of infrastructural development into account and prioritise each infrastructural project. To be successful in the process to develop infrastructure in the remote areas it might be necessary to acquire the services of an independent competent professional to assist the Regional Councils in determining priorities and the drafting of project proposals.

Roads

The provision of an adequate road infrastructure of an acceptable standard and at the right time is a prerequisite for sustained economic growth and an impetus for enhanced development in a region. Overall, the five regions under review have been neglected for a long time with respect to the provision of a proper road infrastructure. However, after independence the Department of Transport within the Ministry of Works, Transport and Communications commissioned two major studies to advise on the development of a proper road system in these regions. They are:

- the Owanbo Roads Master Plan (1992) as reviewed and renamed the Oshikote, Oshana Omusati and Ohangwena Roads Master Plan Revision (May 1999); and
- Kavango Roads Master Plan (September 1996).

A third Master Plan, i.e. for the Kunene Region has been commissioned and is in the process of drafting.

Apart from the recommendations as made in the different Regional Master Plans, the Needs Assessments as expressed by the different Regional Councils were taken into account in the recommendations of this report.

Recommendations

It is recommended that the recommendations of this report with respect to each region as indicated in Chapter 8 of the main document be taken into account for the development of roads.

Water

The most important factor in the opening of virgin, unutilised of under-utilised land in the communal areas is the availability and quality of water. Two major programmes have been initiated by the government to provide water to existing developed and underdeveloped areas namely bulk water supply by Namwater and rural water supply by the Directorate of Water within the Ministry of Agriculture, Water and Rural Development. Whereas bulk water is supplied to mainly bulk water consumers, the emphasis of rural water supply is on the provision of water to households and livestock in the more remote areas.
Recommendations

It is recommended that:

- the provision of electricity to rural communities in the study area be subject to the Master Plan for Rural Electrification.

SMALL-SCALE ECONOMIC PROJECTS

Identification of Small-scale Economic Projects

The identification and implementation of small-scale economic projects can greatly enhance the development of under-utilised communal areas. Although some of these small-scale economic projects have been identified in each relevant chapter, a summary of possible economic projects is provided in Chapter 9 of the main document.

However, the list of identified projects is in no way exhaustive and should only be seen as an instrument to raise interest and to stimulate initiatives of entrepreneurs.

Mechanism for Implementation of Small-scale Economic Projects

The implementation of small-scale economic projects as part of the process to develop the under-utilised communal areas is subject to a well-structured mechanism. A mechanism comprising of the identification of financially viable projects, identification and training of prospective entrepreneurs and technical assistance with respect to financing and aftercare is proposed. Although there are different financing products available in the market, it is doubtful whether prospective entrepreneurs in the remote under-utilised communal areas will qualify for financing in terms of the criteria with respect to collateral, own contributions, interest rates etc. It is therefore proposed that a separate fund be established to specifically cater for entrepreneurs in these areas.

Recommendations

It is recommended that:

- the Ministry of Lands, Resettlement and Rehabilitation take the initiative for the implementation of small-scale economic projects in the remote and under-developed areas in the five regions covered in this report.
- Implementation of this small-scale business development project be done in terms of the mechanism as described in Chapter 9 of the main document.
- A project facilitator be identified and appointed to assist the Ministry.
- Budgetary provision be made by the ministry in collaboration with the facilitator.
- A fund, called the Rural Assistance Fund be established within the Ministry of Lands, Resettlement and Rehabilitation to provide technical and financial assistance to small economic development projects in the remote rural areas of the five regions covered by this report.
- If proved successful, the fund be extended to include other identified neglected communal areas.
ASSESSMENT AND DEVELOPMENT OF UNDER-UTILISED COMMUNAL AREAS IN NAMIBIA

1. INTRODUCTION

1.1 BACKGROUND

The Ministry of Lands, Resettlement and Rehabilitation (MLRR) is the responsible Ministry for the administration of state land and land use planning of such land. As custodian of state land, it is also responsible for the development of such state land.

The MLRR has identified the need for a study to be done on virgin, unutilised and under-utilised areas of the five northern regions, namely Kunene, Omusati, Oshana, Oshikoto and Ohangwena.

International Development Consultancy (IDC) was awarded the tender and it has been agreed that:
- the study will concentrate on communal areas in the five regions as specified by the Ministry;
- the study will concentrate on "virgin, unutilised and under-utilised" land.

It was also agreed that the study will include the following steps:

a) Identification of study areas in the regions.

b) Gathering of information:
- collection of data on existing infrastructure;
- identification of virgin, unutilised and under-utilised land in the regions;
- identification of the natural resources in the study areas;
- identification of the development potential of the study areas; and
- investigation of existing methods of production and utilisation of natural resources.

c) Analysis of the above information.

d) Formulation of development proposals.

The Terms of Reference document for the study is attached as Annexure C.

1.2 PROJECT OBJECTIVE

The main objectives of the consultancy are to:
- identify development potential in the virgin, unutilised and under-utilised areas of five regions; and
- to make recommendations on the development of these areas based on the identified potential.
1.3 EXCLUSION OF THE KAVANGO REGION

During the period of the consultancy, and especially during Phase II where field trips were undertaken to the study area, the security situation in the Kavango Region worsened to such an extent that movement in the area became dangerous.

It was therefore mutually agreed that the Kavango Region be temporarily excluded from the consultancy. The Ministry of Lands, Resettlement and Rehabilitation and the consultants will agree on a time and schedule for the completion of the consultancy in the Kavango Region.

As alternative, the consultants have been requested to include some more detail with respect to cost estimates for infrastructural development.

1.4 DEMARCATION OF THE STUDY AREA

As a general guideline, the population distribution as per the 1991 official census was used to outline the study area. A population density of less than 2 people per km² was taken as an initial criterium.

This initial demarcation of virgin, unutilised and under-utilised land was refined by taking the following into account:
- the availability of infrastructure such as water supply, either by pipelines or boreholes, roads etc.;
- present economic activities such as farming, mining, tourism and forestry; and
- social infrastructure such as schools, clinics, settlements, etc.

For easy reference, the border of the study area was mostly drawn along the borders of constituencies or enumeration areas. However, in cases where existing development excludes a certain area from the study area, the border of the study area was adjusted accordingly.

Figure 1 gives an overall view of the five regions included in the consultancy, while Figure 2 reflects the population density and the demarcated study area.

1.4.1 KUNENE REGION

According to the 1991 census, the total population of the Kunene Region is 83,569 with an average population density of 0.44 people per km². Only in eight enumeration areas in the vicinities of greater towns and settlements in the communal area such as Opuno, Khorixas, Epembe and Okatiuru the population density exceeds 2 people per km² as indicated in Figure 2. Although the consultancy will concentrate on the more remote areas, the whole communal part of the Kunene Region is practically included in the consultancy and includes the Khorixas, Opuno, Epupa and Sesfontein constituencies.

1.4.2 OMUSATI REGION

The south-western part of the Omusati Region is included in the consultancy, as can be seen in Figure 2. The study area includes the Okahao and Ruacana constituencies, as well as the western parts of the Tsandi and Onesì constituencies where the population density is less than 2 persons/km² compared to the average of 13.9 for the whole region. The study area of the Omusati Region borders the full length of the Kunene Region to the west and the southern part of the western border of the Oshana Region to the east. To the south it borders the northern border of the Etosha National Park, although the Park is included in the region.
1.4.3 OSHANA REGION

The study area for the Oshana Region includes the southern parts of the Ompundja, Uukwiya and Okatjai constituencies and the biggest part of the Uuvudhiya constituency as indicated on Figure 2. The study area of this region borders the study areas of the Omusati Region in the west and similarly that of the Oshikoto Region in the east, whilst it excludes the Etosha Pan in the south.

1.4.4 OSHIKOTO REGION

The eastern and south-eastern parts of the Oshikoto Region make up the biggest part of the study area of the Oshikoto Region. The south-western part of the region, adjacent to the eastern border of the Oshana Region and including the Andoni plains, is also included in the study area.

The constituencies included in the study area for the Oshikoto Region are the northern part of the Onayena constituency, the eastern parts of the Engodi and Okankolo constituencies and the southern part of the Omuthiyagwilupundi constituency just north of the border of the Etosha National Park as indicated on Figure 2.

1.4.5 OHANGWENA REGION

Although smaller enumeration areas to the west of the Okongo constituency show a population density of less than 2 people per km², the biggest part of the Okongo constituency to the east of the region is included in the study area. However, notice has been taken of the needs of the less populated areas of the Epembe and Omundaungilo constituencies, although the areas are not shown on Figure 2.
2. DEMOGRAPHY

2.1 TOTAL POPULATION AND POPULATION DENSITY

It is commonly known that ± 55% of the population of Namibia lives in the four north-central regions of Oshana, Omusati, Ongwediva, and Oshikoto. In total, ± 60% of the population of Namibia lives in the five regions of the study area. The comparative figures of the population density per region as per the 1991 census are as follows:

Table 1: Total Population of the Five Northern Regions

<table>
<thead>
<tr>
<th>REGION</th>
<th>POPULATION</th>
<th>AREA (km²)</th>
<th>PERSONS/km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kunene</td>
<td>64,017</td>
<td>144,255</td>
<td>0.44</td>
</tr>
<tr>
<td>Omusati</td>
<td>189,919</td>
<td>13,638</td>
<td>13.9</td>
</tr>
<tr>
<td>Oshana</td>
<td>134,884</td>
<td>5,291</td>
<td>25.3</td>
</tr>
<tr>
<td>Ongwediva</td>
<td>179,634</td>
<td>10,582</td>
<td>17</td>
</tr>
<tr>
<td>Oshikoto</td>
<td>128,745</td>
<td>20,607</td>
<td>4.8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>696,212</td>
<td>200,373</td>
<td></td>
</tr>
</tbody>
</table>

Source: 1991 Population Census

Although the most populated regions, i.e., Oshana and Omusati, fall within the area under discussion, huge areas of these regions are virtually unpopulated. A breakdown of the population density of each region per constituency, as well as the activity status and employment statistics, are reflected in Tables 2 to 11.

2.2 KUNENE REGION

Table 2: Distribution and Age of Population per Constituency in the Kunene Region

<table>
<thead>
<tr>
<th>Constituency</th>
<th>Total</th>
<th>&lt;1</th>
<th>%</th>
<th>1-4</th>
<th>%</th>
<th>5-14</th>
<th>%</th>
<th>15-44</th>
<th>%</th>
<th>45-64</th>
<th>%</th>
<th>65+</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kamanjab</td>
<td>5,996</td>
<td>189</td>
<td>3.2</td>
<td>699</td>
<td>11.7</td>
<td>1484</td>
<td>24.7</td>
<td>2,710</td>
<td>45.2</td>
<td>705</td>
<td>11.8</td>
<td>209</td>
<td>3.5</td>
</tr>
<tr>
<td>Khorixas</td>
<td>13,517</td>
<td>378</td>
<td>2.8</td>
<td>1,386</td>
<td>10.3</td>
<td>3,558</td>
<td>26.3</td>
<td>6,108</td>
<td>45.2</td>
<td>1,406</td>
<td>10.4</td>
<td>580</td>
<td>5.0</td>
</tr>
<tr>
<td>Opuno</td>
<td>15,444</td>
<td>656</td>
<td>4.3</td>
<td>2,267</td>
<td>14.8</td>
<td>4,006</td>
<td>26.1</td>
<td>5,943</td>
<td>38.7</td>
<td>1,491</td>
<td>9.7</td>
<td>953</td>
<td>6.2</td>
</tr>
<tr>
<td>Ongwediva</td>
<td>7,239</td>
<td>246</td>
<td>3.4</td>
<td>776</td>
<td>10.7</td>
<td>1,529</td>
<td>21.1</td>
<td>3,473</td>
<td>48.0</td>
<td>859</td>
<td>11.9</td>
<td>351</td>
<td>4.8</td>
</tr>
<tr>
<td>Oshikoto</td>
<td>14,915</td>
<td>573</td>
<td>3.8</td>
<td>2,136</td>
<td>14.3</td>
<td>3,523</td>
<td>23.6</td>
<td>6,234</td>
<td>41.8</td>
<td>1,515</td>
<td>10.2</td>
<td>925</td>
<td>6.2</td>
</tr>
<tr>
<td>Sesfontein</td>
<td>6,558</td>
<td>250</td>
<td>3.8</td>
<td>959</td>
<td>14.6</td>
<td>1,959</td>
<td>29.9</td>
<td>2,180</td>
<td>33.2</td>
<td>723</td>
<td>11.0</td>
<td>473</td>
<td>7.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>63,569</td>
<td>2,292</td>
<td>3.6</td>
<td>8,223</td>
<td>12.9</td>
<td>16,059</td>
<td>25.3</td>
<td>26,648</td>
<td>41.9</td>
<td>6,669</td>
<td>10.5</td>
<td>3,551</td>
<td>5.6</td>
</tr>
</tbody>
</table>

Source: 1991 Population Census

Table 3: Activity Status and Employment Statistics of People 15 Years and Older in the Kunene Region

<table>
<thead>
<tr>
<th>Constituency</th>
<th>Active</th>
<th>Unemployed</th>
<th>Potentially active</th>
<th>Em=ployed</th>
<th>%</th>
<th>Unem=ployed</th>
<th>%</th>
<th>Not active</th>
<th>%</th>
<th>Total</th>
<th>%</th>
<th>Agri fishe</th>
<th>%</th>
<th>Other</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kamanjab</td>
<td>3,852</td>
<td>2,055</td>
<td>56.7</td>
<td>520</td>
<td>14.4</td>
<td>1,041</td>
<td>28.7</td>
<td>2,055</td>
<td>1161</td>
<td>56.5</td>
<td>894</td>
<td>43.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khorixas</td>
<td>8,198</td>
<td>2,778</td>
<td>33.9</td>
<td>1,635</td>
<td>19.9</td>
<td>3,777</td>
<td>46.0</td>
<td>2,778</td>
<td>916</td>
<td>35.0</td>
<td>1,770</td>
<td>63.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opuno</td>
<td>8,463</td>
<td>4,436</td>
<td>52.7</td>
<td>408</td>
<td>4.8</td>
<td>3,654</td>
<td>42.4</td>
<td>4,436</td>
<td>3235</td>
<td>72.9</td>
<td>1,179</td>
<td>26.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ongwediva</td>
<td>4,888</td>
<td>2,346</td>
<td>50.0</td>
<td>816</td>
<td>17.4</td>
<td>1,422</td>
<td>30.3</td>
<td>2,346</td>
<td>748</td>
<td>31.9</td>
<td>1,590</td>
<td>67.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oshikoto</td>
<td>8,866</td>
<td>5,999</td>
<td>65.6</td>
<td>355</td>
<td>4.1</td>
<td>2,622</td>
<td>30.2</td>
<td>5,999</td>
<td>4489</td>
<td>78.8</td>
<td>1,166</td>
<td>20.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sesfontein</td>
<td>3,386</td>
<td>1,612</td>
<td>47.6</td>
<td>520</td>
<td>15.4</td>
<td>1,246</td>
<td>36.8</td>
<td>1,612</td>
<td>1,185</td>
<td>73.5</td>
<td>422</td>
<td>26.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>36,933</td>
<td>18,266</td>
<td>51.2</td>
<td>4,254</td>
<td>11.5</td>
<td>13,965</td>
<td>37.0</td>
<td>18,926</td>
<td>2,0536</td>
<td>55.5</td>
<td>7,021</td>
<td>37.1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: 1991 Population Census NB.: Values do not add to 100% because of a small number of "Unclassified".

D1065/FinRpt(JUN2000)
The average population density of the Kunene Region is 0.44 people per km². Whereas it has been agreed that the study area of this consultancy will include areas where the population density is less than 2 people per km², it means that the whole of the Kunene Region falls within the study area. In terms of Figure 2, small patches of areas, mostly around settlement areas like Eperme, Opuwo and Okoljue should be excluded. The greater part of the Epupa constituency, as well as mainly the western parts of the Opuwo, Sesfontein and Khomas Constituencies are therefore included where the population density is less than 0.2 people per km², while notice should be taken where the population density is between 0.2 and 0.5 people per km². These areas are mainly the eastern parts of the said constituencies.

2.3 OMUSATI REGION

Table 4: Distribution and Age of Population per Constituency in the Omusati Region

<table>
<thead>
<tr>
<th>Constituency</th>
<th>Total</th>
<th>&lt;1</th>
<th>%</th>
<th>1-4</th>
<th>%</th>
<th>5-14</th>
<th>%</th>
<th>15-44</th>
<th>%</th>
<th>45-64</th>
<th>%</th>
<th>65+</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anamulenge</td>
<td>10299</td>
<td>366</td>
<td>3.6</td>
<td>1293</td>
<td>12.6</td>
<td>3284</td>
<td>31.9</td>
<td>3846</td>
<td>37.3</td>
<td>938</td>
<td>9.1</td>
<td>573</td>
<td>5.6</td>
</tr>
<tr>
<td>Elim</td>
<td>17177</td>
<td>625</td>
<td>3.6</td>
<td>2209</td>
<td>12.9</td>
<td>5449</td>
<td>31.7</td>
<td>6166</td>
<td>35.9</td>
<td>1556</td>
<td>9.1</td>
<td>1158</td>
<td>6.7</td>
</tr>
<tr>
<td>Ongono</td>
<td>20343</td>
<td>700</td>
<td>3.4</td>
<td>2552</td>
<td>12.5</td>
<td>6609</td>
<td>32.5</td>
<td>7281</td>
<td>35.8</td>
<td>1951</td>
<td>9.6</td>
<td>1247</td>
<td>6.1</td>
</tr>
<tr>
<td>Okahao</td>
<td>28101</td>
<td>851</td>
<td>3.0</td>
<td>3635</td>
<td>12.9</td>
<td>8550</td>
<td>30.5</td>
<td>10470</td>
<td>37.3</td>
<td>2682</td>
<td>9.5</td>
<td>1911</td>
<td>6.8</td>
</tr>
<tr>
<td>Okalongo</td>
<td>46349</td>
<td>1791</td>
<td>3.9</td>
<td>6595</td>
<td>14.2</td>
<td>15457</td>
<td>33.5</td>
<td>15420</td>
<td>33.3</td>
<td>4051</td>
<td>8.7</td>
<td>3022</td>
<td>6.5</td>
</tr>
<tr>
<td>Onesí</td>
<td>7575</td>
<td>337</td>
<td>4.3</td>
<td>1018</td>
<td>12.9</td>
<td>2384</td>
<td>30.3</td>
<td>2878</td>
<td>36.5</td>
<td>765</td>
<td>9.7</td>
<td>492</td>
<td>6.2</td>
</tr>
<tr>
<td>Tsandi</td>
<td>25384</td>
<td>789</td>
<td>3.1</td>
<td>3086</td>
<td>12.2</td>
<td>7778</td>
<td>30.8</td>
<td>13428</td>
<td>52.1</td>
<td>2614</td>
<td>10.3</td>
<td>1670</td>
<td>6.6</td>
</tr>
<tr>
<td>Uutapi</td>
<td>26124</td>
<td>990</td>
<td>3.8</td>
<td>3222</td>
<td>12.3</td>
<td>7370</td>
<td>28.2</td>
<td>10946</td>
<td>41.9</td>
<td>2290</td>
<td>8.8</td>
<td>1281</td>
<td>4.9</td>
</tr>
<tr>
<td>Oshikuku</td>
<td>8618</td>
<td>294</td>
<td>3.3</td>
<td>1007</td>
<td>11.5</td>
<td>2419</td>
<td>27.1</td>
<td>3918</td>
<td>43.9</td>
<td>710</td>
<td>8.0</td>
<td>552</td>
<td>6.2</td>
</tr>
<tr>
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<td>190570</td>
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<td>24226</td>
<td>12.6</td>
<td>59310</td>
<td>30.6</td>
<td>70355</td>
<td>37.9</td>
<td>17557</td>
<td>9.1</td>
<td>11906</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Source: 1991 Population Census NB.: Values do not add to 100% because of a small number of unclassified cases.

Table 5: Activity Status and Employment Statistics of People 15 Years and Older in the Omusati Region

<table>
<thead>
<tr>
<th>Constituency</th>
<th>Potentially active</th>
<th>Em= employed</th>
<th>%</th>
<th>Un= em= employed</th>
<th>%</th>
<th>Not</th>
<th>%</th>
<th>EMPLOYED BY INDUSTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>--</td>
<td></td>
<td>--</td>
<td></td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Anamulenge</td>
<td>5358</td>
<td>3246</td>
<td>60.6</td>
<td>223</td>
<td>4.2</td>
<td>1884</td>
<td>35.2</td>
<td>3246</td>
</tr>
<tr>
<td>Elim</td>
<td>8894</td>
<td>3484</td>
<td>39.2</td>
<td>597</td>
<td>6.7</td>
<td>4815</td>
<td>54.1</td>
<td>3484</td>
</tr>
<tr>
<td>Ongono</td>
<td>10481</td>
<td>5545</td>
<td>53.9</td>
<td>495</td>
<td>4.7</td>
<td>4331</td>
<td>41.3</td>
<td>5645</td>
</tr>
<tr>
<td>Okahao</td>
<td>15083</td>
<td>6648</td>
<td>44.1</td>
<td>666</td>
<td>4.4</td>
<td>7744</td>
<td>51.4</td>
<td>6648</td>
</tr>
<tr>
<td>Okalongo</td>
<td>22503</td>
<td>11168</td>
<td>49.6</td>
<td>1862</td>
<td>8.4</td>
<td>9441</td>
<td>42.0</td>
<td>11168</td>
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<tr>
<td>Onesí</td>
<td>4139</td>
<td>2264</td>
<td>54.7</td>
<td>268</td>
<td>6.5</td>
<td>1598</td>
<td>36.8</td>
<td>2264</td>
</tr>
<tr>
<td>Tsandi</td>
<td>13715</td>
<td>7987</td>
<td>58.2</td>
<td>556</td>
<td>4.1</td>
<td>6167</td>
<td>37.7</td>
<td>7987</td>
</tr>
<tr>
<td>Uutapi</td>
<td>14534</td>
<td>7010</td>
<td>48.2</td>
<td>968</td>
<td>6.7</td>
<td>6542</td>
<td>45.0</td>
<td>7010</td>
</tr>
<tr>
<td>Oshikuku</td>
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<td>1569</td>
<td>30.3</td>
<td>424</td>
<td>8.2</td>
<td>3181</td>
<td>61.4</td>
<td>1569</td>
</tr>
<tr>
<td>TOTAL</td>
<td>36993</td>
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<td>6081</td>
<td>66.0</td>
<td>44703</td>
<td>45.2</td>
<td>49021</td>
</tr>
</tbody>
</table>

Source: 1991 Population Census

As indicated on Figure 2, the north-eastern part of the highly populated areas inclusive of the Onesí, Uutapi, Anamulenge, Okalongo, Ongono, Oshikuku, Elim and Etayi constituencies are excluded from the study area. The less populated areas which are included in the study area are the Okahao and Ruacana constituencies, as well as the western parts of the Tsandi and Onesí constituencies.

The newly established Etayi constituency, whose figures are not reflected in the 1991 census, is situated in the highly populated north-eastern part of the region and is excluded from the study area.
### 2.4 OSHANA REGION

#### Table 6: Distribution and Age of Population per Constituency in the Oshana Region

<table>
<thead>
<tr>
<th>Constituency</th>
<th>Total</th>
<th>&lt;1</th>
<th>%</th>
<th>1-4</th>
<th>%</th>
<th>5-14</th>
<th>%</th>
<th>15-44</th>
<th>%</th>
<th>45-64</th>
<th>%</th>
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<td>6639</td>
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<td>7.6</td>
<td>1236</td>
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<td>13.7</td>
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<td>33.6</td>
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<td>7169</td>
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<td>927</td>
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<td>5.4</td>
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</tbody>
</table>

Source: 1991 Population Census

### Table 7: Activity Status and Employment Statistics of People 15 Years and Older in the Oshana Region

<table>
<thead>
<tr>
<th>Constituency</th>
<th>Activity Status</th>
<th>Employed by Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Em/ployed</td>
</tr>
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<td>Okatana</td>
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<td>190</td>
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<tr>
<td>Ompundja</td>
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<td>6759</td>
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<tr>
<td>Ongwediva</td>
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<tr>
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<td>9941</td>
</tr>
<tr>
<td>Uukwiyu</td>
<td>1333</td>
<td>580</td>
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<tr>
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<tr>
<td>TOTAL</td>
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<td>29357</td>
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</table>

Source: 1991 Population Census

Although the Oshana Region is the most densely populated region in Namibia with an average of 25.3 people per km², the population density of the grazing land of the Uuvudhiya and Okatjali constituencies is less than 2 people per km². Also included in the study area is a small portion of the Ompundja constituency as indicated on Figure 2.

### 2.5 OHANGWENA REGION

#### Table 8: Distribution and Age of Population per Constituency in the Ohangwena Region

<table>
<thead>
<tr>
<th>Constituency</th>
<th>Total</th>
<th>&lt;1</th>
<th>%</th>
<th>1-4</th>
<th>%</th>
<th>5-14</th>
<th>%</th>
<th>15-44</th>
<th>%</th>
<th>45-64</th>
<th>%</th>
<th>65+</th>
<th>%</th>
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</thead>
<tbody>
<tr>
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<td>1997</td>
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Source: 1991 Population Census
### Table 9: Activity Status and Employment Statistics of People 15 Years and Older in the Ohangwena Region

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<th>CONSTRAINT</th>
<th>ACTIVITY STATUS</th>
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</table>

Source: 1991 Population Census

The average population density of the Ohangwena Region is 17 people per km², while the only area where the population density is less than 2 people per km² is the eastern part of the Okongo constituency as indicated on Figure 2.

### 2.6 OSHIKOTO REGION

### Table 10: Distribution and Age of Population per Constituency in the Oshikoto Region

<table>
<thead>
<tr>
<th>Constituency</th>
<th>Total</th>
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<th>15-44</th>
<th>45-64</th>
<th>65+</th>
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<td>12.7</td>
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</table>

Source: 1991 Population Census
The vegetation over the most of the Great Escarpment of the Kunene Region, as well as the interior could be described as dwarf shrub savanna. It is a semi-desert and savanna transition and the density of vegetation decreases from east to west, according to the rainfall pattern, with the Escarpment and adjacent pro-Namib less vegetated. The savannas consist mainly of grassveld with shrubs in open stands and trees along drainage lines. The central parts of the interior accommodate the Mopaneveld – a dry bush savanna of Mopane shrub and trees with good grass cover. Further to the east lies the Kalkveld – a mixed savanna of Mopane and Acacia species on limestone soils over the areas adjacent to the Etosha Depression. In the extreme eastern parts the periphery of the Thornbush savanna causes a transition to a mixed tree and shrub savanna with an increase of mainly Acacia species.

3.3.2 OMUSATI AND OSHANA REGIONS

The vegetation of the Omusati and the Oshana Regions can broadly be classified according to four physiographic regions, namely the Etaka-Cuvelai Drainage Basin, the Western Sandveld, the Ekuma Grassveld and the Kalkveld.

The Etaka-Cuvelai Drainage Basin is located north-east of Tsandi and the entire northern half of the Oshana Region and is mainly covered by Solonetz Soils. The palm savanna vegetation group is predominant in this area. It is characterised by open grassy drainage depressions lined by Hyphaene petersiana (Makalani palms) with Colophospermum mopane trees and shrubs dominating on higher ground.

The Western Sandveld covers the greater western part of the Omusati Region. Fine to medium textured Aeolian Sands, with a slightly higher clay content than in other areas, give the soil its character. The landscape has a gentle, undulating character with bush savanna as vegetation. Mopane woodland and grassveld over the southern part becomes more composite to the northern part, known as the Ruacana woodland. Mopane species are predominant over the whole area.

The Ekuma Grassveld of the south-eastern part of the Omusati Region, the southern part of the Oshana Region and the south-western part of the Oshikoto Region are predominantly covered by uniformly textured Solonetz soils over the greater part, with black clays present in the drainage depressions in its midst. The landscape is extremely flat, being interrupted by occasional pans and oshanas. The vegetation can be described as seasonally flooded grasslands, with patches of Acacia and Mopane species becoming denser in the south.

The Kalkveld covers the extreme south-eastern and north-western corners of the Omusati Region and the extreme north-western corner of the Oshana Region respectively. Non-Solonetz Soils derived from calcrite or its erosion products, are predominant over these areas. The terrain is gently undulating with suppressed and diffuse drainage. Minor pans, low-lying areas and endoreic, shallow drainage lines are prominent features. The vegetation can be described as open shrub savanna with a good edible grass cover and varied shrubs, mainly Acacia and Mopane species.

3.3.3 OHANGWENA AND OSHIKOTO REGIONS

The vegetation of the Ohangwena Region can broadly be classified according to two physiographic regions, namely the Oshigambo-Niipele Drainage Basin in the west and the Northern Kalahari Sandveld to the east.

The Oshigambo-Niipele Drainage Basin is located over the western half of the Ohangwena Region and the north-western corner of the Oshikoto Region is mainly covered by Solonetz Soils. The palm savanna vegetation group is predominant in this area. It is characterised by open grassy drainage depressions lined by Makalani palms, with trees and shrubs dominating on higher ground.
The vegetation of the Northern Kalahari Sandveld comprises dry medium to tall woodland and savanna associated with the Featureless Plains. Dominant vegetation types are Balikiaea plurijuga, Terminalia spp., Combretum spp., Burkea africana, Pterocarpus anglensis, Lonchocarpus spp. and Guibourtia coleosperma. This vegetation type varies from an Acacia-Dichrostachys-Combretum Bush Savanna to a Tree Savanna of Pterocarpus-Burkea-Combretum-Terminalia over the central areas, an Acacia-Terminalia-Combretum Bush Savanna over the western parts and dry woodland over the eastern parts. The vegetation of the Seif dunes of the south-west could be described as a mixed Acacia-Terminalia-Combretum Bush Savanna.

3.3.4 Desertification

The vegetation of the area has been severely modified by man over the past century, with the rate of change having accelerated over the past two decades as a result of population pressure and consequently the growing numbers of domestic stock. The areas most affected correspond to the areas supporting the highest concentrations of people. Large areas of natural vegetation have been cleared for cultivation, and most of the trees in these areas have been cut for building and fencing material, leading to severe deforestation. Desertification is a definite looming hazard over these parts of the country.

There are five different phases of desertification which overlap each other. Phase one includes a drastic reduction of the original vegetation – mainly the most productive and soil sheltering plants. Phase two is distinguished by an increase in erosion, water run-off and a reduction in rainfall effectiveness. Phase three already begins during the second phase and, because of the loss of top-soil, it is now almost impossible to completely re-establish the original vegetation. Unpalatable intruders, plants not normally utilised by livestock, have appeared in some areas along with some pioneer vegetation. This stage continues and eventually the desirable and productive plants reach such a low level in the fourth stage that the less palatable plants become the main feeding source. In addition, the plants normally utilised for human purposes like firewood and building material disappear. Combined with drought, the last phase of total destruction of vegetation and soil erosion commences.

From observation it is clear that different stages of desertification have already been reached in the area. Invasive alien plants like Datura (Thorn Apple) and Opuntia (Prickly Pear) species, Nicotiana glauca (Wild Tobacco), Argemone and Presopsis species have been recorded. In addition, over large areas the natural vegetation, especially big hardwood trees and edible grass, has simply disappeared. The greatest parts of the five regions under discussion have already degraded to almost the fourth stage of desertification as described above. The parts most seriously affected are the whole of the Kunene Region and the populated areas of the four north-central regions.

3.3.5 Desertification in the study area

The situation with respect to natural vegetation and desertification in the study area, however, shows a different picture. Probably the only factor that has prevented a very serious degradation of the environment in the central part of the four central northern regions which falls within the study area is the waters of the efundja, which regenerate the environment in most years. The water of the Oshanas is essential for the recharging of fresh-water aquifers on which a large number of people and their animals depend. The water rejuvenates the pastures in the multitude of drainage depressions and brings down fish from the permanent swamps in Angola.

The reasons for the reasonable preservation of natural vegetation in the study area, including the south-western part of the Omusati Region and the eastern parts of the Oshikoto and Ohangwena Regions, are mainly due to the following factors:
• Water

The shortage of permanent water in especially the south-western and southern parts of the Omusati Region, the south-eastern and southern parts of the Oshikoto Region and, the eastern part of the Ohangwena Region regulate the utilisation of these areas. However, close to permanent waterpoints and cattle posts the environment is subject to the same degradation as in the more populated areas.

• Seasonal movement of livestock and people

During the rainy season, the availability of surface water in the southern part of the Oshana Region, the south-eastern part of the Omusati Region and the south-western part of the Oshikoto Region results in temporary movement of livestock and people to the so-called grazing area. As soon as the surface water dries up, they move back to their homesteads. The regeneration of the environment due to the waters of the efundja, and the withdrawal of livestock during the dry season somehow balance the preservation of these areas.

In the Kunene Region the same movement of livestock and people occurs amongst the nomadic Himba. However, the situation is much more serious due to the sensitivity of the environment, the number of livestock compared to the grazing available and periodic drought that occurs more frequently in the Kunene Region than in the other regions under discussion.

3.4 SOIL

A very important parameter of the development potential of the study area is the soil types that occur. Together with climate and landform, soil features are an integral part of the classification of agro-ecological zones which can be used for broad planning objectives. These zones can easily be linked to land use or farming system patterns, thereby forming a useful framework to assist agricultural development planning, land use harmonisation and environmental management.

The FAO-Unesco Soil Map of Africa as illustrated on Figure 4 provides a general view of the dominant soil types found in the five northern regions and will be used for the identification of agro-ecological zones. Of course combinations and smaller occurrences of specific soil types are concealed in the regional pattern of distribution. Once identified for a specific purpose, for example a small scale irrigation project, this should be further analysed.

The Kunene Region is dominated by Leptosols, which are generally characterised by a rocky and mountainous landscape with slopes of more than 30%. The soils are very shallow and limited in depth by hard rock or cemented material. Along the border of the Kunene and Omusati Regions, Calciic Zerossols occur. The area is characterised by a fairly level to hilly landscape with slopes of 0% to 30%. These soils are associated with calcretes and often occur as shallow lenses covering layers of limestone. The soil is a typical brown sandy loam, non-saline, non-sodic and inherently fertile.

The greater part of the rest of the area is covered with Haplic Solonetz and Cambic Arenosols. The landscape is level to gently undulating with slopes of 0-8%.

Solonetz Soils are medium textured and cover virtually all alluvial plains and drainage depressions. They are also characterised by a medium but uniform texture and a bleached, sometimes even white surface. The soils can be described as mild to strongly saline sandy loam, overlain by aeolian or fluvial sand. There is also a definite transition between the upper and lower, more compacted, horizon; the former shallow and coarse of texture, the latter fine of texture and less permeable, but
with a high sodium activity. This profile is typical of soils in flat areas with saline parental material and poor drainage.

Aeolian Sands are most common on the Sandveld in the Oshikoto Region. The clay content of aeolian sands is relatively low, varying between 2% and 8%. The colour of the soils varies from grayish (Oakleaf) to red (Hutton) and is generally non-saline. Soils enriched with locally derived material occur in narrow lenses on low-lying areas. Extensive sand mantles of aeolian origin occur over parts east of the Omuramba Omatako in the Kavango Region.

The high percentage of sand particles (above 60%) in the soils of the greater part of the study area, excluding the Kunene Region, determines their texture and accounts for the very low water-retaining capacity of these soils. Organic matter in the topsoils is generally low (1-5%). The nitrogen content is too low for horticulture, while the pH is around neutral. The soils are deficient in most of the major nutrients. In higher-lying areas the calcium content is low, especially in loose sands, while the soils in the drainage depressions are generally rich in calcium. Potassium content is low, especially on the higher-lying areas where crop cultivation can take place, and phosphorus is low throughout the Sandveld. The soils are also deficient in micro-nutrients such as manganese, iron and zinc. The total lack of molybdenum may favour toxicity if the nitrate level becomes high.

3.5 GROUNDWATER

The most important and crucial element in the development process in Namibia is the availability of sustainable water resources. In the absence of surface water, the pressure on underground water resources to satisfy the ever increasing need is tremendous. Throughout the years, boreholes were drilled to open under- and unutilised areas, especially those areas with good vegetation for stock farming.

A common pattern was that areas that were opened up for emergency grazing during periods of drought, either by the extension of pipelines or the drilling of boreholes, eventually became permanently occupied once water was available.

Groundwater occurs in varying quantities over almost the entire study area. However, in a great area comprising the bigger parts of the Omusati and Oshana Regions it is virtually unusable owing to the presence of dissolved solids derived from the rocks in which the underground water is stored. Specific concentrations of fluorides, nitrates and sulphates further affect the usability of the water. Figure 5 gives a general overall view of the quality of the underground water resources in the area expressed in total dissolved solids (TDS) (mg/litre). Using the World Health Organisation's criteria for general human consumption of 200mg/litre concentration of TDS as a guideline, the problems in the Omusati and Oshana Regions can clearly be seen.

3.5.1 GROUNDWATER IN THE KUNENE, OMUSATI AND OSHANA REGIONS

A Groundwater Investigation Study in north-western Namibia was commissioned by the Department of Water Affairs in 1997 to i.e. evaluate the groundwater potential of the area with respect to sustainable use of available resources on an environmentally sound basis. The study area comprised the northern part of the Kunene Region, as well as the Omusati and Oshana Regions. Detailed information on groundwater is very limited for the rest of the area.

3.5.1.1 NORTHERN KUNENE REGION

Groundwater in the Kunene Region occurs in individual and secondary aquifers, as well as in the Kalahari Basin Aquifer. The groundwater quality is generally good, but with slightly elevated sulphate concentrations.
In general, rest-water levels are deeper (more than 20m) in the northern Kunene than in Omusati and Oshana Regions due to the higher topography and the occurrence of groundwater in the deeper aquifers of the Damara Sequence.

A high density of waterpoints, 10-20/100km², lies immediately south of Opuwo. Highest yields are concentrated southwest of Opuwo where the Otavi rocks group crops out.

Groundwater aquifers in the Kunene Region are subject to periodic recharge, and the main area of recharge lies to the south of Opuwo, falling between the Hoarisib, Hoanib and Cuvelai catchments. Secondary aquifers in dolomitic lithologies of the Otavi Group in the central highland area of the Kunene Region also receive significant recharge.

3.5.1.2 OMUSATI-OSHANA

The Omusati and Oshana Regions have widespread groundwater resources, but the water is often highly saline, especially in the Kalahari sediments. Higher quality water also occurs within a few metres of the surface as a discontinuous perched aquifer, with lenses of fresh water overlying the saline water. Loxton, Venn and Associates (1985) recognized two main aquifers in the Kalahari Group beneath the surface aquifer, namely:

- An artesian dolocrete aquifer in the Upper Kalahari, associated with lenses of saline water;
- A conglomeratic artesian aquifer in the Lower Kalahari, associated with more continuous, less saline water.

Yields and salinity of groundwater are variable, with the TDS increasing from 400 mg/l in the northwest to 1,000 mg/l in the south-west and 5,000 mg/l in the central western area. TDS, together with nitrate, sulphate and fluoride increase towards central Oshana. Localised high nitrate concentrations at boreholes probably reflect pollution from animals and humans. The watertable is generally within 10 to 30 m of the surface, but becomes deeper northwards and is 50 m in the Ruacana area, where several dry boreholes were recently drilled in dolomite (GCS, 1994).

3.5.2 OLANGWENA AND OSHIKOTO REGIONS

No detailed investigation has yet been commissioned to assess the groundwater availability and sustainable use for the rest of the area, including the Olangwena and Oshikoto Regions.

However, it is known that groundwater in these areas is found at depths of about 70 m to 90 m. About 85% of drilled boreholes have been successful and yield between 2 and 5 m³/h.

An artesian area is found around Oshivelo and the Andoni Plains. The water is saline, with the salinity increasing towards the north-west of the area. The yield of the artesian boreholes is high, ranging from 20 m³/h to 100 m³/h. A perched aquifer of potable water also occurs in the Oshivelo area at depths of 10 m to 20 m with yields of up to 15 m³/h.

Recharge of aquifers is from annual rainfall, but no monitoring of abstractions takes place and no records are maintained regarding yields, draw-down levels or utilisation, except for wells which are operated by the Department of Water Affairs (DWA) for bulk water supplies to towns.
3.6 GROWING PERIOD ZONES

The climatic data as recorded at the different weather stations in Namibia, of which parts are quoted in paragraph 3.2, has been used to produce growing period zones for practical implementation.

Generally, the growing period is defined as the time during a growing season when both air temperature and soil moisture permit crop growth. The length of the growing period is defined as the number of days during which precipitation exceeds half the potential evapotranspiration, plus the number of days to evaporanspire an assumed 100 mm (or less) of water from excess precipitation. The dependable growing period is the length of the growing period to be equalled or exceeded in three years out of four. The air temperature during the whole period must also exceed 6.5°C.

The growing period zones for the five northern regions are shown on Figure 6. In the Kunene Region, the growing periods vary between zero along the coast, to an average of 41-80 days along the Omuansat border. The greater part of the four north-central regions falls within the growing period zones that vary between 61-90 days in the west, and 61-90 days with a dependable growing period of 60% in the east and north.

3.7 AGRO-ECOLOGICAL ZONES (AEZ’S)

Agro-ecological zones add the climatic information, as described in the growing period zones to landform and soil to identify land entities that are considered to be uniform in these features. The agro-ecological zones are unique by the specific combinations of these land attributes and can easily be linked to land use or farming system patterns. This forms a useful framework to assist agricultural development planning, land use harmonisation and environmental management.

The potential of the 5 regions in terms of agro-ecological zones is summarised in a table from 1-11 where 1 indicates zones with the highest agricultural potential and suitable for short maturing crops, and 11 indicates areas with very low agricultural potential and normally unsuitable for even grazing.

The potential of the specific agro-ecological zones of the area as per Figure 7 is summarised in Table 13.
Table 13: Summary evaluation of potential per agro-ecological zone

<table>
<thead>
<tr>
<th>'New GPZ' and ranking</th>
<th>Suitability</th>
<th>AEZ's</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Short-maturing crops</td>
<td>KAL3-1, KAL6, KAL7</td>
</tr>
<tr>
<td>2</td>
<td>Large stock grazing</td>
<td>CPL16-2, KAL3-2, KAL8, KALK-2</td>
</tr>
<tr>
<td>3</td>
<td>Large stock grazing</td>
<td>CPL16-3, KAL3-3, KAL4, KAL9-3, KAL10, KAL11, KALK-3, KALK-5</td>
</tr>
<tr>
<td>4</td>
<td>Large stock grazing</td>
<td>CPL2, CPL1, CPL3-4, ETO, KAL1, KAL3-4, KAL9-4, KALK-4</td>
</tr>
<tr>
<td>5</td>
<td>Large stock grazing</td>
<td>CPL3-6, CPL5, CPL16-6, ESC4, KAO4, KAL3-8</td>
</tr>
<tr>
<td>6</td>
<td>Mixed large stock &amp; sheep grazing</td>
<td>ESC2</td>
</tr>
<tr>
<td>7</td>
<td>Mixed large stock &amp; sheep grazing</td>
<td>CPL3-7, ESC5, KAL2-7, KAO2</td>
</tr>
<tr>
<td>8</td>
<td>Sheep grazing only</td>
<td>CPL4-8, CPL6, CPL10, KAL2-8, KAO1</td>
</tr>
<tr>
<td>9</td>
<td>Sheep grazing only</td>
<td>CPL3-9, CPL4-9, CPL7, CPL8, CPL9, CPL13, CPL14, ESC3, KAL2-9</td>
</tr>
<tr>
<td>10</td>
<td>Sheep grazing only</td>
<td>CPL11, CPL12, DAM1, DAM2, ESC1, ESC6, KAO3, KAO6</td>
</tr>
<tr>
<td>11</td>
<td>Unsuitable for grazing</td>
<td>DAM3, KAO5, NAM1, NAM2, NAM3, NAM4, NAM5, NAM6, NA M7</td>
</tr>
</tbody>
</table>

According to Table 13 and Figure 7, the western part of the Kunene Region, which falls in the AEZ's Codes of NAM 2, NAM 7 and NAM 6, is unsuitable for grazing. The central part of the Kunene Region, which falls within the AEZ's of codes of KAO 1, KAO 3 and KAO 6, is actually only suitable for small stock grazing, whilst the areas with codes of KAO 2 and KAO 4 are suitable for either large stock grazing or mixed large stock and sheep grazing.

The western and south-western parts of the Omusati Region, which fall within the AEZ codes of KALK 4 and KAL 3-4, are suitable for large stock grazing whilst the south-eastern part of the Omusati Region and the southern part of the Oshana Region that fall within the AEZ code of ETO are ranked 4 and suitable for large stock grazing.

The northern part of the four north-central regions with AEZ codes of KAL 9-3, KAL 9-4, KAL 4 and KAL 3-3 is ranked 3 or 4 with respect to large stock grazing, whilst the eastern part of the Ohangwena Region and the greater part of the Oshikoto Region are ranked 2 with AEZ's codes KAL 3-2 and KAL 8.

The general potential of the five northern regions as ranked on a scale of 1-11 with the suitability of each Agro-Ecological Zone is summarised in Table 14.
<table>
<thead>
<tr>
<th>Region</th>
<th>AEZ's</th>
<th>Suitability</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Kunene</td>
<td>NAM2, NAM 7</td>
<td>Unsuitable for grazing</td>
<td>11</td>
</tr>
<tr>
<td>Central Kunene</td>
<td>KAO 3, KAO 6</td>
<td>Sheep grazing only</td>
<td>10</td>
</tr>
<tr>
<td>Central Kunene</td>
<td>KAO 1</td>
<td>Sheep grazing only</td>
<td>8</td>
</tr>
<tr>
<td>Eastern Kunene</td>
<td>KAO 2, KAO 4</td>
<td>Large stock grazing</td>
<td>5</td>
</tr>
<tr>
<td>Omusati Region</td>
<td>KAL 4, KAL 3-4</td>
<td>Large stock grazing</td>
<td>4</td>
</tr>
<tr>
<td>Southern Oshana</td>
<td>ETO</td>
<td>Large stock grazing</td>
<td>4</td>
</tr>
<tr>
<td>South-western Oshikoto</td>
<td>ETO</td>
<td>Large stock grazing</td>
<td>4</td>
</tr>
<tr>
<td>Eastern Oshikoto</td>
<td>KAL 3-2, KAL 8</td>
<td>Large stock grazing</td>
<td>2</td>
</tr>
<tr>
<td>Eastern Ongwena</td>
<td>KAL 3-2, KAL 8</td>
<td>Large stock grazing</td>
<td>2</td>
</tr>
</tbody>
</table>

From the above table it is clear that the agricultural potential in terms of the AEZ's is the highest in the eastern part of the Oshikoto and Ongwena Regions, which fall within the study area.

The potential in the southern part of the Oshana Region and south-western part of the Omusati Region that fall within the study area is a bit lower and is ranked 4 on a scale of 1-11, whilst the potential in the Kunene Region is very low with rankings of 8 or 10, except for a small part along the border of the Kunene and Omusati Regions where the ranking is 5.

A detailed analysis of the potential of the different Agro-Ecological Zones for crop production appears in paragraph 4.9.
4. AGRICULTURE

4.1 INTRODUCTION

The determination of the agricultural potential of the identified study area is impossible without a holistic view of the agricultural activities of the total area. This chapter will therefore give an overview of agriculture in the five northern regions with references to the study area. Since very little crop production occurs in the study area, it will be discussed briefly and the emphasis will be on livestock production.

Conclusions will then be drawn with respect to agriculture on a regional level, which will have an influence on the study area. Finally the potential of the study area will be evaluated and recommendations made with respect to the utilisation of such areas for agricultural purposes.

4.2 EMPLOYMENT IN THE AGRICULTURAL SECTOR

Agriculture is the most important economic sector in the five northern regions under investigation and on average 64.3% of the economically active people are employed in this sector. The specific figures for the different regions are as per Table 15. It is safe to assume that all rural households are involved in agro-pastoralism and that up to 80% of the people in the study area are dependent on the agricultural sector as a source of livelihood.

Table 15: Percentage of economically active people employed in the agricultural sector

<table>
<thead>
<tr>
<th>REGION</th>
<th>TOTAL</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kunene</td>
<td>20536</td>
<td>55.5</td>
</tr>
<tr>
<td>Omusati</td>
<td>35948</td>
<td>71.5</td>
</tr>
<tr>
<td>Oshana</td>
<td>11835</td>
<td>52.8</td>
</tr>
<tr>
<td>Oshikoto</td>
<td>17381</td>
<td>59.9</td>
</tr>
<tr>
<td>Ohangwena</td>
<td>26684</td>
<td>72.9</td>
</tr>
<tr>
<td></td>
<td>113384</td>
<td>64.3 (Average)</td>
</tr>
</tbody>
</table>

Source: 1991 Census

The agricultural activities comprise mainly two components namely livestock farming and crop production. As the identified study area has very little potential for crop production, but is to a great extent utilised for livestock farming, this report will concentrate on livestock. During the evaluation of the agricultural potential of the study area, potential for crop production will be evaluated.

4.3 LIVESTOCK FARMING

In general, all grazing land in the project area is communal and individual or group grazing rights are generally not recognised. A deviation from this general practice of many years is noticed in certain areas, especially the less populated areas of the southern and eastern parts of the Oshikoto Region, the southern part of the Oshana Region and the south-western part of the Omusati Region.

Seasonal movement of livestock and therefore livestock owners in the area is determined by the availability of water and grazing. In the Kunene Region, the nomadic Himba tend to live near temporary waterpoints in the wet season, and move to permanent water (including boreholes, springs and the Kunene river) in the dry season. In the Omusati, Oshana and parts of the Oshikoto Region, many stockowners move their herds according to the availability of grazing and water. Herds of cattle as far as the Ohangwena and Oshikoto Regions move to the so-called “common grazing area” of mainly the southern part of the Oshana Region during the rainy season. Apart from
the benefit that the livestock is kept away from the mahango fields during the growing period, the main reason is to utilise the grazing available in this area while there is surface water in the oshanas. During the dry season and when the surface water dries up, the herds are driven back to the homesteads.

In other areas, mainly in the Omusati and Oshikoto Regions, cattle owners move their stock to dry season grazing areas (cattle posts) due to the lack of water and grazing in the homestead areas. Livestock from the more densely populated areas where crops are cultivated, tend to be moved to grazing areas with less crop production to keep them away from croplands. During this period they make use of ephemeral water sources, although these are scarce in the sandy areas.

4.3.1 Livestock Population

The latest recorded livestock population as of December 1998 is indicated in Table 16.

Table 16: 1998 Livestock numbers in the six northern regions

<table>
<thead>
<tr>
<th>REGION</th>
<th>CATTLE</th>
<th>SHEEP</th>
<th>GOATS</th>
<th>HORSES</th>
<th>DONKEYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kunene</td>
<td>203 865</td>
<td>84 717</td>
<td>518 735</td>
<td>2 159</td>
<td>10 565</td>
</tr>
<tr>
<td>4 O’s</td>
<td>543 550</td>
<td>0</td>
<td>230 000</td>
<td>13 635</td>
<td>120 000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>746 416</td>
<td>84 717</td>
<td>748 735</td>
<td>15 794</td>
<td>130 565</td>
</tr>
</tbody>
</table>


1 Include the areas of Kaokoland and Sesfontein as per the census, as well as Damaraland North.
2 Include Omusati, Oshana, Ohangwena and the communal part of the Oshikoto Regions

Unfortunately it is not possible to give a breakdown of the numbers of livestock for the study area of the different regions, since it is not available in such a format. However, it can reasonably be assumed that the livestock numbers in the identified study area are controlled by the following factors:
- the absence of permanent water resources;
- the availability of water during the rainy season; and
- the flooding of certain areas during the rainy season.

Almost all livestock in the area are of local breeds, which are hardy and well adapted to the environment. However, occasional traces of especially Afrikaner and Brahman breeds are found amongst the cattle and of Boerboel amongst the goats.

An alarming observation with respect to livestock in the communal areas is the high percentage of unproductive animals, with special reference to the number of donkeys as a percentage of the total livestock population, as well as the composition of herds.

- Donkeys

Donkeys represent ± 15% of the total livestock expressed in large stock units (LSU). Although it is accepted that donkeys are used as draught-animals and pack-donkeys, it is doubtful whether the number of donkeys represents the actual need. The consultants were also informed that in many cases the ownership of donkeys cannot be traced and that in fact some donkeys become wild and roam everywhere, especially in the common grazing area, without any productive use. If it is further taken into account that a donkey consumes ± 75% of the fodder consumed by a Large Stock Unit (LSU), the estimated 120 000 donkeys in the 4 O's therefore represent 90 000 cattle. The question remains whether the already deteriorated rangeland can afford to accommodate such a huge number of unproductive animals.
In a speech at Okahao on 20 May 2000, His Excellency, the President Dr Sam Nujoma also expressed his concern over the quantity of donkeys in the northern communal areas and urged the farmers of these areas to get rid of unproductive donkeys.

- Composition of livestock herds

A second alarming observation is the composition of livestock herds. It can be accepted that the communal farming system, backed by the traditional view of livestock as a form of wealth and the use of oxen as draught-animals, has an influence on the composition of livestock herds. However, once a monetary value is connected to each livestock unit inclusive of draught-animals, it can be expected that unproductive units will be identified and taken out of herds to restructure the composition of livestock herds to be more productive. Fortunately this issue is being addressed in the Northern Regions Livestock Development Project of the Ministry of Agriculture, Water and Rural Development.

4.3.2 Change in Livestock Numbers

Livestock populations change from time to time as a result of the availability of water and feed, droughts and disease. However, there is a general trend of increasing numbers over the years as can be concluded from Table 17.

<table>
<thead>
<tr>
<th>Table 17: Change in Livestock Numbers (000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1994</td>
</tr>
<tr>
<td>1995</td>
</tr>
<tr>
<td>1996</td>
</tr>
<tr>
<td>1997</td>
</tr>
<tr>
<td>1998</td>
</tr>
<tr>
<td>% Change (1994-1998)</td>
</tr>
</tbody>
</table>

Source: Meat Board

The average increase in cattle and goat numbers over the five-year period from 1994 to 1998 was a massive 59%. Although these statistics are correct according to the Meat Board and the Directorate of Veterinary Services within the Ministry of Agriculture, Water and Rural Development, they are questioned by certain members of Regional Councils.

The increase in the two main livestock types, namely cattle and goats, is indicative of the overall deterioration in rangeland conditions, and also has a profound impact on the composition and productivity of the natural vegetation.

Livestock is also in many cases an indication of wealth of the owner and livestock owners are reluctant to market their animals. The pressure which is put on the available water, puts pressure on the authorities to open up new areas by providing water to these areas, either by the extension of pipelines or the drilling of boreholes. The only areas left to extend livestock grazing are those areas identified in this study as under-utilised or unutilised areas.
The comparative figures of cattle and goats in the five (5) northern regions to the total for Namibia are indicated in Table 18.

Table 18: Comparative figures of cattle and goats in the five northern regions to national total.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle (Regions) (000)</th>
<th>Cattle (National) (000)</th>
<th>% of National</th>
<th>Goats (Regions) (000)</th>
<th>Goats (National) (000)</th>
<th>% of National</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>447</td>
<td>2.035</td>
<td>21.9</td>
<td>495</td>
<td>1.639</td>
<td>30.2</td>
</tr>
<tr>
<td>1995</td>
<td>576</td>
<td>2.031</td>
<td>20.3</td>
<td>523</td>
<td>1.616</td>
<td>32.3</td>
</tr>
<tr>
<td>1996</td>
<td>658</td>
<td>1.989</td>
<td>33.1</td>
<td>750</td>
<td>1.786</td>
<td>42.0</td>
</tr>
<tr>
<td>1997</td>
<td>669</td>
<td>2.055</td>
<td>32.5</td>
<td>748</td>
<td>1.821</td>
<td>41.0</td>
</tr>
<tr>
<td>1998</td>
<td>746</td>
<td>2.192</td>
<td>34.0</td>
<td>748</td>
<td>1.710</td>
<td>43.7</td>
</tr>
</tbody>
</table>

Source: Meat Board

On average the five northern regions accommodated 30% of the cattle of Namibia and 37.8% of the goats over the 5-year period.

However, the marketing of livestock from the northern communal areas (inclusive of the Kavango and Caprivi Regions) shows a totally different picture as indicated in Table 19.

Table 19: Marketing comparison of cattle and total take-off.

<table>
<thead>
<tr>
<th>NCA as % of total</th>
<th>Formal Market</th>
<th>Incl. of Informal Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Namibia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total take-off (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>18604</td>
<td>63681</td>
</tr>
<tr>
<td>1995</td>
<td>29690</td>
<td>76636</td>
</tr>
<tr>
<td>1996</td>
<td>19724</td>
<td>85935</td>
</tr>
<tr>
<td>1997</td>
<td>13522</td>
<td>88708</td>
</tr>
<tr>
<td>1998</td>
<td>18488</td>
<td>97358</td>
</tr>
</tbody>
</table>

Source: Meat Board

1) Estimated average of 10% be absorbed by informal market

NCA inclusive of the Kavango and Caprivi Regions.

The comparative figures of Tables 18 and 19 are indicative of probably the single biggest problem of livestock farming in the communal areas. Whereas 30% of the national stock of cattle over the period 1992-1996 is found in the five northern regions (exclusive of Kavango and Caprivi Regions), only 5.5% is being officially marketed from these areas (inclusive of the Kavango and Caprivi Regions).

However, the official marketing figure as recorded does not take into account sales to the informal market and own consumption. According to estimates by the Directorate of Veterinary Services, this market might absorb as much as 85% of all sales of cattle and virtually all sales of goats. As this market is unregulated, there are no reliable statistics on exact numbers. Based on the estimates of the Directorate of Veterinary Services and according to own calculations, a conservative estimate of 10% of the national livestock population in the Northern Communal Areas (NCA's) can be added to the official marketing of livestock from these areas per annum. If the estimate sales to the informal market are taken into account, the estimated sales increase to an average of 25% (exclusive of the 1997 figure) as indicated in Table 19. This represents an estimated average total annual take-off of cattle from the communal land of 12.5%.
Although the authorities, and especially Meatco, put in efforts over the years to increase take-off of livestock from the northern communal areas, the results are of mixed success. However, it is not only the traditional view of cattle as a form of wealth which results in the low marketing figures from these areas, but also limitations like veterinary restrictions which make marketing south of the Veterinary Cordon Fence (Red Line) very difficult. Other restrictions are i.a. poor conditions of access roads, marketing facilities that are far from production areas, lack of transport, low prices at communal auctions, lack of market information, etc.

The poor official marketing of livestock from the communal areas necessitated the authorities to look into the issue seriously. During 1999 a Technical Committee was established by the Meat Board of Namibia to address the issue, which resulted in a Communal Livestock Marketing Strategy to be implemented in the year 2000.

4.4 CARRYING CAPACITY

4.4.1 Overall Situation

The carrying capacity of rangeland in the area (including Kunene and the 4 O's) increases from west to east. Originally the carrying capacity to the west of the Kunene Region was estimated to be more than 24 ha per large stock unit (LSU), with a strip to the west of the Kunene Region and the far east of the Omusati Region where the carrying capacity was between 12 and 15 ha per large stock unit.

The original official estimated carrying capacity for the rest of the Omusati Region, as well as the whole of the Oshana, Ongwediva and Oshikoto Regions, was estimated at between 8 and 10 ha per large stock unit.

However, according to the latest scientific estimations where the figures are based on a large stock unit having 450 kg live weight and requiring about 4 metric tons dry matter per year, the so-called bio-mass principle, the carrying capacity shows a totally different picture. According to these calculations, the estimated carrying capacity to support a sustainable stocking rate of well managed rangeland, is 20-25 ha/LSU in the Kunene Region and 15-20 ha/LSU in the 4 O's. These figures are more within the range as expected by agricultural experts and perceived by the local agricultural authorities.

Table 20 gives an indication of the present stocking of the different areas based on the bio-mass principle, as well as the proposed number of large stock units to secure a sustainable agricultural sector in these regions.
Table 20: Stocking Rates and Carrying Capacities of the Five Northern Regions

<table>
<thead>
<tr>
<th>Productivity</th>
<th>Kunene</th>
<th>4 O’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed stocking rate (ha/LSU)</td>
<td>20-25</td>
<td>15-20</td>
</tr>
<tr>
<td>Area in ha</td>
<td>5 285 000</td>
<td>6 186 143</td>
</tr>
<tr>
<td>Large Stock Units 1)</td>
<td>320 337</td>
<td>723 185</td>
</tr>
<tr>
<td>Present stocking ha/LSU)</td>
<td>16.5</td>
<td>8.55</td>
</tr>
<tr>
<td>Proposed number of</td>
<td>211 000 – 264 000</td>
<td>309 300 – 412 000</td>
</tr>
<tr>
<td>large stock units</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on Livestock Census figures.
1) Five small stock units = 1 large stock unit.
   Inclusive of horses and donkeys.
2) Inclusive of “Northern Damaraland” as per livestock census.
3) Exclude Etosha National Park

In the four north-central regions the existing numbers exceed the proposed number to secure a sustainable agricultural sector by ± 45% and in the Kunene Region by ± 28% as indicated in Table 20. Overall, the stocking rates are far too high to maintain a sustainable resource management level. Palatable perennial sweet grasses therefore have been reduced or have disappeared altogether and been replaced by annual sour grasses and forbs with little feed value after the initial growth period. Bush encroachment is widespread and many of these are thorny and supply little feed.

The negative impact of overstocking is aggravated by the fact that people start bush-fires, often several times a year, in order to obtain young palatable re-growth from unpalatable species. Only a fraction of the potential fodder growth, which soil and rainfall would allow, is obtained at present and it is estimated that under existing conditions of resource management, rangeland productivity could deteriorate by 1% per year.

Also the dynamics of livestock production is a function of the existing feeding and husbandry practices. Stock performance parameters are generally low, with particularly poor reproductive and growth performances. As a result, a large proportion of total feed intake is used for livestock maintenance requirements and only a small fraction of scarce feed is converted into production of milk or meat. Breeding takes place as determined by the influence of the seasons on physiological life-rhythms, and this causes particularly high weight losses when weaning takes place at the end of the vegetation growth period. Overall, weight losses during dry seasons are high and this results in high age at sexual maturity and at full adult weights.

4.4.2 Grazing conditions in the Study Area

4.4.2.1 KUNENE REGION

The Kunene Region, and especially the area west of the 150 mm rainfall isohyet, is environmentally very sensitive. The negative input of overgrazing as discussed above and also highlighted in paragraph 2.3.4 resulted in this area being degraded to the fourth stage of desertification in certain areas. The Kunene Region is subject to periodic droughts and the physiography of the area is also very propitious for erosion, which has a further negative impact on the environment.

According to the Agro-ecological Zoning (AEZ) as indicated in Figure 9.1 (please refer paragraph 3.7), only a small area adjacent to the Omusati border is actually suitable for large and small stock grazing, whereas the bigger part of the region is only suitable for small stock grazing. However, one
will never be able to phase out the tradition of cattle farming to comply with the AEZ's as scientifically determined, and factors should be built in to regulate livestock farming in accordance with the potential of the environment. Such factors might include:
- regulation of livestock numbers
- limitation of water resource development to specific areas
- environmental impact studies as a pre-requisite for water resource development.

In paragraph 9.1 of this report certain criteria are recommended that should be taken into account when new boreholes are drilled for agricultural purposes.

4.2.2.2 THE FOUR NORTH-CENTRAL REGIONS

In the study area of the Ombalantu, Oshikoto and Ohangwena Regions the availability of suitable and sustainable water resources automatically regulates livestock numbers, whereas in the southern part of the Oshana Region they are regulated by the absence of underground water and seasonal flooding. Due to the above mentioned, the overall grazing situation in the study areas of these regions is far better then in the densely populated areas as discussed in paragraph 3.3.4.

This is confirmed by the status of rangeland conditions at the end of each rainy season as monitored over the last seven years by the Remote Rangeland Sensitivity Unit (RRSU) of SADC in Harare. The conditions in the study areas of the four north-central regions is regarded as good to very good, whereas in other areas, including the Kunene Region, it is regarded as poor to satisfactory.

However, continuous pressure is put on authorities to open new areas for grazing purposes, either for permanent settlement or as emergency grazing areas during periods of drought. As soon as an area has been opened by the provision of water, permanent settlement takes place and soon the specific area is subject to the same ecological pressure as the already densely populated areas.

The generally better rangeland conditions of the study area necessitates well planned and controlled development to protect these areas from environmental degradation as in the densely populated areas.

4.5 COMMERCIAL FARMING AND QUARANTINE CAMPS

Within the five communal areas, two areas have been surveyed and developed into individual farms, while one area has been divided into individual farms, but not surveyed and registered as such. These areas are as follows:

4.5.1 Kunene Region

In the Kunene Region approximately 150 surveyed farms in the present Khorixas and Sesfontein constituencies were bought under the Odendaal Plan in the early 1960s and added to the then Damaraland to establish a homeland for the Damara speaking people. These farms were allocated to Damara speaking farmers. Some of them, or their descendants, are still farming on the land. Although the farms are still registered in the office of the Surveyor-General, the concept of a homeland went hand in hand with the concept communal land, with the result that these farms can be regarded as communal land.

A critical assessment of these farms indicated that the infrastructure, including fences, homesteads and water installations were neglected to such an extent that at present very little of the original infrastructure is left. Together with the disappearance of infrastructure like fences, uncontrolled stock quantities and overgrazing resulted in deterioration of vegetation to such an extent that an
advanced stage of desertification has already developed, especially in the more ecologically sensitive areas closer to the Namib desert.

At present, farming activities in the western part of the area are substituted by tourism activities and places like Palmwag, Wêreidsend and Twyelfontein are no longer associated with farming, but with tourism and conservation.

Probably the biggest lesson from this exercise is that livestock farming, whether in commercial or communal areas, should be controlled to secure a sustainable agricultural sector.

4.5.2 Oshikoto Region

4.5.2.1 Amcom Farms

In the Oshikoto Region an area of ± 78 000 ha consisting of 12 farms situated north of the Tsumeb District and south of the surveyed farms as indicated on Figure 9.4 is being commercially utilised by Amalgamated Commercial Holdings (Pty) Ltd, or Amcom as commonly known. The original area has been reduced by ± 13 000 ha for the establishment of a quarantine camp administered by the Directorate of Veterinary Services within the Ministry of Agriculture, Water and Rural Development.

These farms are utilised according to commercial principles and for Amcom's own account. Stock control and pasture rotation ensure sustainable rangeland conditions and prevent deterioration of the natural vegetation. At present, no concrete plans exist to alienate the farms to prospective farmers, although the future of this land would be closely linked to the future of Amcom as a state owned entity.

4.5.2.2 Surveyed Farms

During the late 1970s the previous Government initiated the development of 104 farms in the south-east of the communal part of the Oshikoto Region and north of the Amcom farms. At that stage, the area was uninhabited with only one waterpoint. About 26 boreholes were drilled, providing water with a pipeline from the borehole to the middle of each surveyed unit measuring between 1100 and 1300 ha. The farms were also fenced off.

The Government then invited farmers to apply for farms to be allocated to them. The criteria used were that such a farmer should be in possession of 100 head of cattle, and his/her only obligation was to provide diesel for the engine of the water installation.

A critical assessment of this initiative indicates two major shortcomings namely:

- Uncontrolled stock levels jeopardise what could have been a good idea to secure sustainable livestock farming and
- the absence of a financial contribution by the farmer partly contributed to the lack of commitment to secure long-term sustainable rangeland conditions, or maintenance of infrastructure.

4.5.3 Quarantine Camps

In an attempt to secure marketing of frozen de-boned meat to the rest of Namibia and South Africa (but not to the European Community) from the northern communal areas, the Directorate of Veterinary Services established quarantine camps where cattle are kept before they are marketed to the Oshakati abattoir. These quarantine camps are at Oshivelo, a 13 000 ha camp to the west of the Amcom farms, a 25 000 ha camp at Omatumbo Moawe, adjacent to the north-western corner of the Etosha Pan. Of this, 10 000 ha is used to quarantine animals and 15 000 ha is used for
emergency grazing. Lastly, there is a 5 000 ha area at Khowarib, of which 2 000 ha is used for quarantine purposes and 3 000 ha as holding area.

The construction of a new camp of 30 000 ha approximately 70 km east of Okongo in the Ohangwena Region will be completed during this year (2000), while another camp adjacent to the Kunene River and ± 60 km west of Ruacana is at present not in use.

4.6 FENCING OF CERTAIN AREAS

Apart from these commercial and surveyed farming units, huge portions of land in the communal areas have been fenced off illegally. According to sources, the fencing is mostly done by wealthy or part-time farmers with other sources of income such as senior civil servants, politicians and business people. In the absence of legal entities to allocate land in the communal areas, like the Communal Land Boards as proposed in the Communal Land Reform Bill, the traditional leaders and chiefs were up to now responsible for the allocation of land to individuals for farming purposes. Although the fences, as indicated in Figure 8 are illegal in terms of existing legislation, they can be regarded in a sense as legal since they have been authorised by people who had traditional authority. Most of the fences are erected in the more remote areas like the south-eastern part of the Oshikoto Region, the central south-western part of the Oshana Region, south of the Etaka channel and the south-western part of the Omusati Region (the study area).

Notwithstanding the rules and spirit in which communal land is being utilised, the fencing of certain areas, whether illegal or legal in terms of approval by traditional authorities, clearly indicates a desire by individuals to occupy and control a portion of land.

4.7 THE COMMUNAL LAND REFORM BILL

The Communal Land Reform Bill recognises the tendency and need for individual farming units and the fencing of such units. In terms of Article 21 (a) customary land rights may be allocated in respect of a right to a farming unit, while Article 40 makes provision for the planning and surveying of farming units and Article 18 for the approval to erect fences.

However, provision is also made in the Bill for common grazing areas to be used by lawful residents.

Although the size of land to be allocated to a person in terms of the customary land right is still to be determined, certain areas can be demarcated for the purpose of livestock farming units.

4.8 AGRICULTURAL POTENTIAL

As discussed in paragraph 4.4.2, the rangeland and vegetation conditions in the study area reflect potential for livestock production. However, the potential is still not fully utilised due to limitations such as the availability of permanent water. It is therefore of utmost importance that the potential of these areas be unlocked, subject to good planning and under controlled conditions. The successful implementation of well-developed plans for these areas is further subject to the implementation of strategies on a regional level, such as reduction in livestock numbers, commercialisation of livestock herds, marketing strategies, etc.

The state of agriculture and especially livestock farming in the northern communal areas is not very encouraging at the moment. The reasons for such a statement are:

* the estimated increase of ± 33% in the human population over the next ten years (please refer paragraph 2.7);
• growing shortage of job opportunities in the formal sector and therefore an increase in subsistence farming as a form of livelihood; and
• uncontrolled expansion of livestock farming into areas where rangeland conditions are not as severely affected as in densely populated areas.

The agricultural potential of the under-utilised areas in the communal land of the four north-central regions can best be unlocked in two ways, namely:

• controlled common grazing; and
• introduction of small-scale commercial farming practices within the guidelines as provided by the Communal Land Reform Bill.

However, it must be accepted that the agricultural sector will not be able to provide enough jobs for the growing population. Planning in the agricultural sector should therefore see as an attempt to secure sustainable agricultural production and a conservation mechanism for precious natural resources rather than the creation of jobs. Theoretically, a unit of 5 000 ha which is commonly regarded as an economic unit, can support 3-5 families of say 6 people each, inclusive of the owner and workers. This means that, as a general theoretical guideline, the development of each 1 000 ha will provide a livelihood to 5 people.

4.8.1 Development of Small-scale Commercial Farming Units

The term “commercial farming” is used to indicate the allocation of land to an individual subject to the right of leasehold in terms of the Communal Land Reform Bill. There is thus a distinct difference between common grazing areas, where no fencing is to be allowed, and the areas allocated to farmers in terms of the Communal Land Reform Bill, where the principles of commercial farming are to be practised by individual farmers.

Sets of criteria to demarcate areas for small-scale commercial farming are based on geophysical, socio-economical and economical principles, and include the following:

4.8.1.1 Criteria for Demarcation of Small-scale Commercial Farming Areas

- Agro-ecological Zones

In terms of the General Potential of the five northern regions as per Table 14 and Figure 7, the eastern Ohangwena, eastern and south-western Oshikoto, southern Oshana and the south-western Omusati Regions are suitable for large stock grazing and ranked 2-4 on a scale of 1-11 in terms of agricultural potential. These agro-ecological zones, therefore, form the core of the demarcation of areas for small-scale commercial farming.

- Status of Rangeland Conditions at the end of Rainy Seasons

The above mentioned areas coincide with the areas where an average good to satisfactory vegetative growth at the end of each rainy season has been recorded over a period of seven years by the Regional Remote Sensing Unit of SADC in Harare as indicated in paragraph 4.4.2.

- Population Density and Distribution

The less populated areas with the least negative socio-economic influence on existing communal structures have been used as a socio-economic criterion for the demarcation of areas for small-scale commercial farming.
- **Availability of Infrastructure**

  The provision of infrastructure is a pre-requisite for any development. The co-ordinated development of infrastructure such as water and roads to the least developed areas, which coincide with the areas as indicated in paragraph 4.4.2, can therefore be provided for the orderly and controlled development of the demarcated areas.

- **Existing Farming Practices**

  As a last criterion, the existing farming practices as observed during field trips and confirmed by regional councillors, have been used. For instance, the southern part of the Oshana Region commonly known as the “grazing area” and utilised by livestock owners of all regions during the rainy season is excluded, while areas where fencing occurs and is generally accepted are included.

**4.8.1.2 Demarcated Areas for Small-scale Commercial Farming**

Subject to the above-mentioned criteria, the following areas as indicated in Figures 9.2 to 9.5 are proposed for demarcation for small-scale commercial farming purposes.

- **Omusati Region**

  An area of approximately 4 500 km², stretching from Amarika westwards for a zone of 15 km north of the proposed Ongandjera Community Forest Reserve to the Kamanjab-Ruacana road and northwards along the border of the Ruacana constituency to the proposed Uukwaluudhi Conservancy as indicated in Figure 9.2.

- **Oshana Region**

  The proposed small-scale commercial farming area in the Oshana Region forms a strip 6 km both sides of the Omapale pipeline south of the Etaka channel. The area is ± 435 km² as indicated in Figure 9.3.

- **Oshikoto Region**

  An area of ± 8 200 km² in the eastern and south-eastern part of the Oshikoto Region qualifies in terms of the above mentioned criteria for small-scale commercial farming. The area stretches from the Kavango border to the proposed King Kauluma-Okongo road and south of the proposed Elambo-Poroporo road as indicated in Figure 9.4.

- **Oshango Region**

  The proposed area for the Oshango region is ± 621 km² and lies east of Kambali and south of the Okongo-Rundu road as indicated in Figure 9.5.

**4.8.2 A Simplified Model for Development of Commercial Units**

The Communal Land Reform Bill makes provision for the planning, surveying and fencing of land in the communal areas to be held under customary land rights. The size of this land is to be determined in consultation with the Ministry of Agriculture, Water and Rural Development and is subject to certain specifications as set out in the Bill.
A simplified model for the development of units for small-scale commercial farming has been developed by the consultant in order to estimate the cost of such development. The criteria and assumptions of the model are inter alia based on existing farming practices, carrying capacity and a scenario of growth from small-scale farmers to commercial farmers.

These basic criteria and assumptions for the development of commercial units are as follows:

- Carrying capacity of the demarcated areas in terms of the biomass principle is taken as 15 ha/LSU in the four north-central regions.

- The initial herds do not exceed 60 large stock units, which is 1.5 to twice the existing herds as observed during field trips.

- Water will be supplied by boreholes to four camps of 900 – 1000 ha each. The maximum distance will therefore be 4.5 km from a waterpoint.

- Depending on the number of livestock, one or more camps can be allocated to an individual farmer.

- Constructed access roads are excluded from the calculations and it must be accepted that certain areas will only be accessible with a 4x4 vehicle.

- Generally, development of commercial units will start at the furthest point in each region to minimise disruption of existing practices and allow the concept to be accepted over time.

- Small-scale commercial units of 3 600 – 4 000 ha each will be developed in blocks of six. Six waterpoints will therefore provide water to 6 units of 21 600 ha in total.

- Detailed planning is subject to the availability of water, existing fences, community approval, etc.

Simplified model for development of commercial units.

![Diagram of simplified model]

1 Unit = 4 x 900 ha = 3600 ha
6 Units = 6 x 3600 ha = 21600 ha
4.8.3 Development cost of Commercial Farming Units

4.8.3.1 Scenario I is based on the concept that the Government is responsible for all development cost and that the leaseholder pays the cost back to the Government over a period of 10 years.

The cost for the development of small-scale commercial farming units is based on actual prices of material and equipment. The cost for planning, surveying and groundwater investigation is based on six units totalling 21 600 ha to get the advantage of economics of scale. This cost is then proportionally allocated to a unit of 3 600 – 4 000 ha in order to determine the actual development cost of such a unit.

The quoted price for drilling and equipping of boreholes is based on a success rate of 75% and with a yield of 5 m³ per day, which represents the minimum requirement for a unit of 3 600 – 4 000 ha for livestock and human consumption only.

Hopefully, the restriction on the provision of water will contribute to a restriction of livestock numbers and therefore on overgrazing of the area.

The development cost of a small-scale commercial unit of 3 600 – 4 000 ha is summarised in Table 21, with a detailed breakdown attached as Annexure B.

Table 21: Estimated cost for development of small-scale commercial farming unit of 3600 – 4000 ha

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning and subdivision of land</td>
<td>N$ 6 284.00</td>
</tr>
<tr>
<td>Surveying</td>
<td>N$ 13 000.00</td>
</tr>
<tr>
<td>Opening of fences (Labour intensive) (N$500/km x 36 km)</td>
<td>N$ 18 000.00</td>
</tr>
<tr>
<td>Surveying of existing boreholes (for planning purposes)</td>
<td>N$ 16 500.00</td>
</tr>
<tr>
<td>Groundwater investigation, drilling, testing and equipping of boreholes with diesel machine, mono pump and 5 m³ overhead tank</td>
<td>N$ 75 000.00</td>
</tr>
<tr>
<td>50 m³ Reservoir and 4 x cattle drinking troughs</td>
<td>N$ 25 000.00</td>
</tr>
<tr>
<td>Fences (material and labour)</td>
<td>N$ 201 830.00</td>
</tr>
<tr>
<td>10% Contingency</td>
<td>N$ 35 561.00</td>
</tr>
<tr>
<td>Total estimated cost for unit of 3600 – 4000 ha¹</td>
<td>N$ 391 175.00</td>
</tr>
<tr>
<td>Total estimated cost for unit of 21 600 ha²</td>
<td>N$ 2 273 776.00</td>
</tr>
</tbody>
</table>

Note: ¹ The total estimated cost is based on current prices and may differ from actual tender prices. ² The total estimated cost for a unit of 21 600 ha takes into account infrastructure developed for a single unit.

4.8.3.2 Cost of Leasehold of a Commercial Farming Unit

Article 32 of the Communal Land Reform Bill makes provision and sets guidelines and conditions for the payment of the right of leasehold, as well as for the payment of improvements on the land including surveying and registration cost. The Bill further makes provision that the right of leasehold be granted for a period of ten years by the Communal Land Board and to be approved by the Minister should the period exceed ten years.

Since detail of payment of the right of leasehold is still to be determined, a few assumptions have been made to determine a guideline price for the payment of a small-scale commercial farming unit by an individual leaseholder of such a unit. These basic assumptions are:

- no interest is charged on development expenditure;
- the capital is being repaid over a period of 10 years, which also coincides with the productive life of a cow under commercial circumstances;
- the small-scale commercial farming units are stocked according to the proposed maximum carrying capacity of 15 ha/LSU.

Subject to the above mentioned basic assumptions, the right of leasehold payable by a farmer for a unit of 3,000 – 4,000 ha is N$39,118 per year or N$3,260 per month. The cost per Large Stock Unit is then N$13.60/LSU/m which compares very favourably with prices of N$20/LSU/m for the leasing of grazing presently paid in the commercial area.

Since this will be a fixed payment calculated for a period of ten years, different options can be worked out to allow the farmer to phase in as a commercial farmer. These options can include:

- the lengthening of the period to (say) 20 years subject to the period of right of leasehold in terms of stipulations of the Communal Land Reform Bill;
- the phasing in of the instalments over time.

4.8.3.3 Scenario II

Scenario II is based on the principle that the Government is only responsible for the planning and surveying of small-scale commercial farming units and the provision of water, while the leaseholder will be responsible for the other infrastructure such as fencing. It is assumed that the leaseholder will either pay from his own pocket, or will have access to funds from a financial institution such as the Agribank.

The cost to the government for the development of a small-scale commercial farming unit will then be as follows:

Table 21(a): Estimated cost to the Government for the development of small-scale commercial farming units (Scenario II)

| Planning and subdivision of land               | N$ 6 284.00 |
| Surveying                                     | N$ 13 000.00 |
| Surveying of existing boreholes (for planning purposes) | N$ 16 000.00 |
| Groundwater investigation, drilling, testing and equipping of boreholes with diesel machine, mono pump and 5 m² overhead tank | N$ 75 000.00 |
| 50 m² Reservoir and 4 x cattle drinking troughs | N$ 25 000.00 |
| 10% Contingency                               | N$ 13 500.00 |
| Total estimated cost for unit of 3600 – 4000 ha¹ | N$ 149 364.00 |
| Total estimated cost for unit of 21 600 ha²   | N$ 698 812.00 |

Note: ¹ The total estimated cost is based on current prices and may differ from actual tender prices.
² The total estimated cost for a unit of 21 600 ha takes into account infrastructure developed for a single unit.

Based on the same assumptions as in Scenario I, the cost to the leaseholder will reduce to N$48.50 per head per annum, or N$4.05 per head per month.

Simultaneously, the cost to the Government will reduce by 69% from N$2 273 776 to N$698 812 for the development of six units totalling 21,600 ha, which is calculated at N$32.35 per ha.
4.8.4 Implementation of small-scale commercial farming models

The implementation of a small-scale commercial farming model is subject to various factors of which the following are the most important.

- Promulgation of Communal Land Reform Bill

The Communal Land Reform Bill, once promulgated, will lay down the guidelines within which land is to be allocated and utilised within the communal areas. Issues such as the power to allocate and cancel customary land rights, procedures, limitations on size of land, right of leasehold, surveying of land etc. are all addressed in the Bill.

- Approval of demarcated areas

The demarcated areas for small-scale commercial development as proposed in this report are to be approved by the relevant authorities. Although the areas have been demarcated according to certain criteria, it might happen that smaller parts of these areas are excluded for certain reasons, while other areas not included can be included at a later stage.

- Community involvement and approval

Although the Communal Land Reform Bill includes community and traditional authority involvement in the utilisation of communal land for a specific purpose, the practical implementation of a small-scale commercial farming model should be discussed and approved by communities and their traditional structures before implementation. The success of the implementation of any new model and concept should be subject to the approval and co-operation of the local community within whose area the model is to be implemented.

- Availability of water

Detailed groundwater investigation in an identified area and the success rate of drilling of boreholes will determine where the model can be successfully implemented.

- Detailed planning and surveying

Once an area has been identified and all procedures followed, the successful boreholes will determine the detailed planning and layout to be surveyed for the implementation of a small-scale commercial farming model. The detailed planning will take existing infrastructure, such as fences and access roads, and existing farming practices into account and will determine the size and form of individual commercial units.

- Budgetary provision and co-ordination

The development of small-scale commercial farming units is subject to budgetary allocations to the relevant Ministries. The development cost of a single unit as indicated in paragraph 4.8.3 gives a guideline for budgetary purposes. However, co-ordination between the different responsible Ministries is a pre-requisite.

- Control

The tradition of communal grazing and poor marketing practices have resulted in the building up of livestock numbers, which by far exceed the sustainable fodder production capacity in areas with water availability. Furthermore, pressure is put on authorities to open up new areas and experience
shows that once an area has been opened up, it is subject to the same ecological pressure as the already densely crowded areas. The successful implementation of a small-scale commercial farming model is therefore subject to strict control on livestock numbers to avoid over-exploitation and degradation of the environment.

- **Implementation of commercial farming practices**

The implementation of a small-scale commercial farming model should go hand in hand with the implementation of commercial farming practices, such as composition of livestock herds, marketing, animal health care etc.

4.8.5 **The Red Line**

The Veterinary Cordon Fence as indicated on Figures 14, 15, 17 and 19, or Red Line as it is commonly known, is an inevitable cattle disease control mechanism to secure the marketing of Namibia’s most important agricultural product on the local, southern African and world markets. The construction of the line started in 1961 and the last part north of Gao to the Botswana border was completed in 1992. The fence stretches over a distance of 2 300 km from Palgrave Point on the west coast to Gao at the eastern border with Botswana. The line consists physically of a double fence which is 10 m apart and which is game proof on the northern side and stock proof on the southern side. The purpose of the line is to prevent the spread of notifiable contagious diseases and contagious bovine pleuropneumonia from the northern communal areas to the south. The line completely blocks movement of live cattle and pigs to the south while movement of small stock is only permitted after a period of quarantine in official quarantine stations. Control is enforced through a network of 8 control posts situated along the fence.

However, the Red Line also represents the dualistic nature of the Namibian economy, with well-controlled commercial farming practices south of the line, and communal farming practices north of it. In the process it is also frustrating for some individual farmers north of the line who cannot market their products south of it.

It can be accepted that the maintenance of Namibia’s beef markets be secured by all sorts of control mechanisms, of which the Red Line is one, but there is no reason why more of Namibia’s beef producers should not share in these markets.

A first step towards this ideal should be to progressively start shifting the fence to the north.

It is recommended that the programme to develop small-scale commercial farming units start at selected areas adjacent to the present commercial area and be shifted in stages to the north to eventually include the proposed small-scale commercial farming area in the unrestricted marketing areas.

4.8.6 **Controlled grazing**

The demarcation and implementation of small-scale commercial farming units may take some time and it is expected that this concept will be discussed at length from the highest authority, i.e. the cabinet, to grassroots level. In the meantime, the uncontrolled exploitation of the natural resources of the under-utilized areas may result in the degradation of these areas to the same extent of desertification as in the present populated areas.

The Ministry of Agriculture, Water and Rural Development introduced a donor-funded project, the Northern Regions Livestock Development Project (NOLIDEP), in an attempt to secure sustainable livestock production. The project is being executed through the establishment of physical
infrastructure, Agricultural Development Centres (ADCs), and non-infrastructure efforts such as extension services and animal health care.

However, the control of livestock in demarcated areas may be a step closer to preventing further degradation of rangeland conditions, as well as to introducing the commercialisation of farming activities in these areas.

At present the power to control the quantity of livestock in a specific area is vested in the traditional authorities. It is therefore recommended that the Regional Councils of regions where areas have been demarcated for small-scale commercial farming as indicated in Figures 9.2-9.5 enter into negotiations with the respective traditional authorities to control the quantity of livestock in these demarcated areas to a number not exceeding 15-20 ha per large stock unit. This programme will be additional to the existing livestock development programmes of the Ministry of Agriculture, Water and Rural Development and the communal marketing strategy of the Meat Board of Namibia.

4.9 CROP PRODUCTION

Crop production in the study area is limited to small scattered fields cultivated by some households. Generally, the location of households is to in close proximity to patches of soil suitable for the cultivation of mainly mahango.

Although crop production plays a minor role in the agricultural activities of the study area, it can be assumed that enough mahango is produced on the available patches of better soil to sustain a population density of less than 2 people per square kilometre, which makes the study area self-sustainable with respect to food production.

4.9.1 Cropping Potential for Individual AEZs

4.9.1.1 Kunene Region

According to the Agro-Ecological Zones as discussed in paragraph 3.7, the biggest part of the Kunene Region falls within the AEZ codes of KAO 4 and NAM 7 with agricultural potential rankings of 6th and 11th on a scale of 1-11 respectively. In the KAO 4 zone, the very shallow soil is limited in depth by hard rock or cemented material. The average growing period is only 48 days (compared to the required 90 days for drought-resistant crops) with no dependable growing period. The potential for crop production of the other Agro-Ecological Zones as indicated on Figure 7 is even worse with the highest average growing period of 25 days in the AEZ code of KAO 1. The NAM 7 code even rules out any grazing potential.

However, irrigation possibilities in the Kunene basin might exist on a limited scale. The limited available land suitable for cultivation rules out any large-scale irrigation projects, and the production of vegetables for local consumption and provision to lodges and camps is probably the only option.

4.9.1.2 Omusati Region

Mahango is at present cultivated on a limited scale in the study area of the Omusati Region, but is probably sufficient to supply the demand of the households in the study area. The biggest part of the study area of the Omusati Region falls within Agro-Ecological Zone codes ETO, KAL 3-4 and KALK 4 as indicated in Figure 7. The sandy to loamy topsoil, high lime concentration as indurated form in subsoil associated with very dry moisture regimes of the KALK 4 zone provides the best opportunity for crop production. Although the average growing period of 83 days is close to the
required minimum of 90 days for drought-resistant crops, the dependable growing period of 52 days actually rules out large-scale crop production.

The situation in the ETO and KAL 3-4 zones is worse with growing periods ranging between 63 and 73 days, with a dependable growing period of only 8 days.

4.9.1.3 Oshana Region

The undifferentiated saline soils of the Ekuma Plains and Etosha Pan that fall within the ETO zone are not recommended for crop production.

4.9.1.4 Oshikoto and Ohangwena Regions

Both the Agro-Ecological Zones coded as KAL 8 and KAL 3-2 as indicated in Figure 7 are ranked 2\textsuperscript{nd} on a scale of 1-11 with respect to agricultural potential. This means that these areas are suitable for both short-maturing crops, as well as large stock grazing. In both zones the average growing period is 91-120 days, with a dependable growing period of 86 days.

The soils in the KAL 8 zone vary from red sands on dune crests to fairly heavy soils in drainage lines between dunes and the potential for crop production might even be higher than indicated by the growing period zone, owing to the presence of residual soil moisture in drainage lines.

On the other hand, the mainly deep sandy soils in the KAL 3-2 zone reduce the dependable growing period to marginal, even for drought-resistant crops, owing to the low moisture retention and fertility status of the soils.

Although irrigation is ruled out due to the lack of sufficient water, dryland crop production can be introduced on both the above-mentioned Agro-Ecological Zones to supplement livestock farming. Apart from a drought resistant crop like mahango, crops like beans, groundnuts, sunflowers and cotton can be cultivated.

4.10 CONCLUSIONS

The following conclusions can be made from the abovementioned:

4.10.1 General Conclusions

- The tradition of communal grazing and lack of marketing have resulted in the building up of livestock numbers which by far exceed the sustainable fodder production capacity in areas with water availability.

- Livestock farming is an important parameter of the generation of wealth of communal farmers. Apart from the other constraints with respect to the marketing of livestock, the reluctance of livestock owners to sell animals also contributes to the building up of livestock numbers in the communal areas.

- Most areas within grazing distance of dry- and wet-season waterpoints are over exploited, with the result that palatable grasses and bushes are being replaced by unpalatable, fire-resistant species. It is estimated that actual fodder production per unit of land is now only about 50\% of the sustainable potential.
- Different stages of desertification have already been reached in the different areas and the environment has been degraded to such an extent that livestock farming is seriously threatened, especially in the more populated areas.

- To expand the availability of feed, an elaborate tradition of stock movement to rangeland locations with ephemeral surface water has developed during the wet season. The period of stock movement coincides with the crop-growing season. In some places of lower stock density, animals can still return to their permanent shelters at night, but predominantly, stock is moved over distances of between 20 and 80 km between dry- and wet-season grazing grounds.

- Livestock production is at low-cost and low-performance levels. It satisfies the aspirations of people concerning the generation of wealth, food, cash and farm traction. However, inefficient use is made of scarce feed, as the bulk of nutrients are now needed for stock maintenance, rather than conversion into production.

- Pressure is put authorities to open new areas for grazing purposes by providing water – either by the extension of the existing pipelines, or by drilling new boreholes.

- Once an area has been opened, either for emergency grazing during a period of drought or compensating after people moved into the area, permanent settlement takes place and soon the area is subjected to the same ecological pressure as the already densely crowded areas.

- The authorities recognised that generally the northern communal areas are over-utilised with respect to livestock numbers and that the carrying capacity is generally exceeded. An instrument to change the marketing system and to increase marketing of livestock from these areas has been drafted in terms of a marketing strategy for the communal areas. The results of this strategy will only be available after years of implementation and cannot presently be predicted.

- Any recommendation with respect to livestock farming in the under-utilised or unutilised areas of the northern regions is subject to the simultaneous implementation of strategies to reduce the livestock population of these regions to ensure a sustainable livestock farming sector. Strategies with respect to animal health, extension services and the upgrading of the regional stock are equally important.

- Crop production plays a minor role in the agricultural activities of households in the study area, although sufficient quantities are produced to support the inhabitants.

- Large-scale crop production schemes are ruled out due to the low potential for crop production.

- Livestock farming in certain areas in the Oshikoto and Ohangwena Regions can, however, be supplemented by dryland crop production.

4.10.2 The Study Area

4.10.2.1 Kunene Region

- The ecologically sensitive environment of the Kunene Region has been degraded to such an extent that the fourth stage of desertification has already been reached in areas where water is available.

- The agricultural potential in the Kunene Region lies in the upgrading and commercialisation of the existing livestock population rather than the extension of livestock numbers.
A deliberate attempt should be made to reduce the livestock population in the Kunene Region to an acceptable number based on the carrying capacity of the region.

The expansion of livestock numbers in the Kunene Region should be controlled by only providing water to specific areas indicated to be suitable for stock farming by the Agro-ecological Zoning (AEZ) in Figure 9.1 and subject to an environmental assessment of the area.

4.10.2.2 The Four North-central Regions (4 O'S)

- The rangeland conditions in the study area of the four north-central regions are much better than in the densely populated areas.

- Continuous pressure to open these areas might result in these areas being in the same poor condition as the densely populated areas.

- The opening of areas in the study area took place on the basis of water availability and is not necessarily based on a planned model for development.

- Fencing took place at an alarming rate in especially the study area, which indicates a desire in individuals to occupy a portion of land contrary to communal land use practices.

- The Communal Land Reform Bill recognises the need for individual farming units and provides guidelines for the development of such units, including surveying and fencing.

- Well-planned and controlled development of small-scale commercial farming units might, in the study area of the four north-central regions, prevent degradation of these areas to the same level as in the densely populated areas.

- As a first step towards the commercialisation of farming activities in demarcated areas, a mechanism to control the quantity of livestock to acceptable levels should be introduced.

- The Veterinary Cordon Fence (Red Line) can progressively be shifted to include the demarcated small-scale commercial farming areas in the uncontrolled marketing area of Namibia.

4.11 RECOMMENDATIONS

The success of the implementation of recommendations with respect to agriculture in the study area is subject to the implementation of recommendations on a regional level. The recommendations should also be seen against the background of recommendations made in other chapters such as infrastructure and tourism. The specific recommendations for the agricultural sector are as follows:

4.11.1 North-central Regions (4 O'S)

4.11.1.1 Reduction of livestock numbers

It is recommended that livestock numbers in all the northern communal areas be reduced to the proposed stocking rates in order to secure sustainable livestock production in these areas. Livestock numbers can be reduced by means of the implementation of the Communal Livestock
Marketing Strategy, together with the implementation of plans and strategies which support the reduction of the livestock population in the communal areas.

4.11.1.2 Monetary value of agricultural products

It can be accepted that agricultural extension services concentrate on inter alia the betterment of local breeds, animal health, farming practices etc.. However, the monetary value of livestock should be emphasised in order to change the traditional view of livestock as a parameter of wealth to support other livestock reduction strategies and the implementation of commercial farming principles.

4.11.1.3 Demarcation of small-scale commercial farming areas

It is recommended that the areas as indicated in Figures 9.2 to 9.5 be demarcated for the implementation of small-scale commercial farming models. It is recommended that the small-scale commercial farming model be approved in principle for implementation in demarcated areas, subject to implementation factors as set out in paragraph 4.8.5.

4.11.1.4 Control of livestock numbers and implementation of commercial farming principles

It is recommended that as a first step the implementation of a small-scale commercial farming model be supported by mechanisms to control livestock numbers in order to avoid overgrazing and the degradation of natural vegetation in the demarcated areas. Other commercial farming principles should also be introduced to maximise the production potential of the model.

4.11.1.5 It is recommended that a detailed soil analysis be done in the Oshikoto and Ohangwena Regions within the Agro-Ecological Zones coded as KAL 8 and KAL 3-2 on Figure 7 in order to determine specific areas for crop production as supplement to livestock farming.

4.11.2 Kunene Region

4.11.2.1 Reduction of livestock population

With respect to the Kunene Region, it is recommended that deliberate attempts be implemented to reduce livestock numbers to the proposed quantity in order to secure sustainable livestock production.

These attempts can include:
- the speedy implementation of the Communal Livestock Marketing Strategy;
- limitation on the provision of water for agricultural purposes in areas not suitable for livestock farming;
- provision of water for agricultural purposes subject to criteria that minimise a negative impact on the environment
- informal marketing and trade.

4.11.2.2 Improvement of existing livestock production

To increase the income from the agricultural sector without an increase in livestock numbers in the Kunene Region, it is recommended that strategies be implemented to improve the production capacity of the existing livestock population. These strategies can include the Northern Namibia Livestock Development Project, switching from communal farming practices to commercial farming
practices, increased awareness of the monetary value of livestock and the setting up of a quarantine camp near Ruacana for easy marketing to Oshakati abattoir.

4.11.2.3 Expansion of farming areas

It is recommended that:
- the expansion of the farming area in the Kunene Region be restricted to areas with Agro-ecological Zoning codes KAO 2 and KAO 4 as indicated in Figure 9.1;
- the expansion of agriculture to the above mentioned area be subject to an environmental assessment of the specific area.
5. FORESTRY

5.1 STAKEHOLDERS IN THE INDUSTRY

The strategic importance of forests in Namibia resulted in the Namibia Forestry Strategic Plan, drafted after independence by the Directorate of Forestry within the Ministry of Environment and Tourism with the assistance of all other stakeholders and interested parties. The aim of this strategy is mainly to provide strategic policy guidelines to ensure the sustainable utilisation of the forest reserves in Namibia as expressed in the following mission statement of the Directorate of Forestry:

"To practice and promote the sustainable management of forests and other woody vegetation with the involvement of local communities, in order to supply products and services to enhance socio-economic development of Namibians, while maintaining and enhancing the other environmental and conservation functions of the resources."

Apart from the Directorate of Forestry as guardian of forest reserves in Namibia, other important stakeholders in forestry development are:

- Farmers and local communities as managers of natural forests for the sustainable use of wood products;
- non-governmental organisations to assist in capacity building for the management of forest reserves;
- the private sector to establish processing industries and
- the international community to amplify the financial resources, scope and number of Government Programmes in the short- to medium term.

The expectations of the different stakeholders with respect to the utilisation or management of the forest reserves are summarised in Table 22.
Table 22: Stakeholders in forestry sector development and their expectations

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers (particularly women)</td>
<td>• Firewood as a source of energy for cooking</td>
</tr>
<tr>
<td></td>
<td>• Food collected from forests as a source of nutrition</td>
</tr>
<tr>
<td></td>
<td>• Basketry and wooden tools for domestic chores</td>
</tr>
<tr>
<td>Local communities</td>
<td>• Poles and posts for building and fencing</td>
</tr>
<tr>
<td></td>
<td>• Medicine</td>
</tr>
<tr>
<td></td>
<td>• Fodder for livestock</td>
</tr>
<tr>
<td></td>
<td>• Beverages</td>
</tr>
<tr>
<td>Non-governmental organisations</td>
<td>• Local communities’ participation in forestry management</td>
</tr>
<tr>
<td></td>
<td>• Women empowerment through participation in forestry activities</td>
</tr>
<tr>
<td>Private enterprises</td>
<td>• Raw materials for industry</td>
</tr>
<tr>
<td></td>
<td>• Income generating opportunities from forests environmental services</td>
</tr>
<tr>
<td>Government</td>
<td>• Contribution to rural economic development through job creation and income generating activities</td>
</tr>
<tr>
<td></td>
<td>• Environmental conservation</td>
</tr>
<tr>
<td>International community</td>
<td>• Contribution to rural economic development by complementing Government development programmes</td>
</tr>
<tr>
<td></td>
<td>• Conservation of bio-diversity and restriction of potential climate change</td>
</tr>
</tbody>
</table>

Source: Namibia Forestry Strategic Plan. Directorate of Forestry, 1996

5.2 FORMS OF FORESTRY

There are two forms of forests, namely

• Natural forests and
• Farm forests

Natural forests can be grouped into two functions, namely production forests and environmental forests.

Production forests will be managed by the local community with technical assistance from the Directorate of Forestry.

The harvesting of forest products can constitute a powerful economic incentive for local communities, subject to the management of the resources on a sustainable basis.

Environmental forests constitute national strategic forests and their management and conservation should be the responsibility of the Government.

Farm Forestry entails deliberate tree growing on agricultural land by farmers for the provision of wood products and environmental benefits associated with the presence of trees.

5.3 FOREST PRODUCTS

It can easily be assumed that the only products from forest resources are timber for the building industry and sawn wood for furniture and similar products. However, in the Namibian context, forestry can provide numerous products to individuals, communities and industries. Table 23 gives an indication of forest products, the trend in the utilisation of such products and the driving forces behind the trends.
### Table 23: Forest products and services consumption – end user trends and drivers

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Trends</th>
<th>Driving Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>• Increasing consumption in rural areas</td>
<td>• Subsistence economy</td>
</tr>
<tr>
<td></td>
<td>• Urban consumption to increase at a decreasing rate</td>
<td>• Possibilities of energy substitution due to changes in income</td>
</tr>
<tr>
<td></td>
<td>• Firewood exports to decline</td>
<td>• Government policy aimed at satisfying domestic needs</td>
</tr>
<tr>
<td>Charcoal</td>
<td>• Increasing domestic consumption</td>
<td>• Increased demand for braai in urban areas</td>
</tr>
<tr>
<td></td>
<td>• Indeterminate export trend</td>
<td>• International requirement of forest products certification</td>
</tr>
<tr>
<td>Poles and posts</td>
<td>• No changes in consumption of fencing posts on commercial farms</td>
<td>• Stagnant commercial agricultural production</td>
</tr>
<tr>
<td></td>
<td>• Increasing post consumption on farms in the Northern regions and</td>
<td>• Possibilities of privatisation of communal land and intensive management of</td>
</tr>
<tr>
<td></td>
<td>national parks</td>
<td>national parks</td>
</tr>
<tr>
<td></td>
<td>• Consumption of poles to remain stable or grow in line with</td>
<td>• Telephone company switches to optic fibres</td>
</tr>
<tr>
<td></td>
<td>expansion in the national economy</td>
<td></td>
</tr>
<tr>
<td>Ornamental products</td>
<td>• Increasing demand for carvings</td>
<td>• Expanding tourist industry</td>
</tr>
<tr>
<td></td>
<td>• Increasing demand for mopane roots</td>
<td>• Enhanced product quality and marketing</td>
</tr>
<tr>
<td>Farm implements</td>
<td>• Increasing consumption of farm implements</td>
<td>• Share of the rural economy in gross domestic product</td>
</tr>
<tr>
<td>Sawn wood</td>
<td>• Gently rising consumption</td>
<td>• Changes in national output and income levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Government housing policy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Relative price level of substitute materials</td>
</tr>
<tr>
<td>Boards</td>
<td>• Gently rising future consumption</td>
<td>• Expansion in the construction and housing industry, and relative price level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of substitute materials</td>
</tr>
<tr>
<td>Paper</td>
<td>• Increasing future consumption</td>
<td>• Expansion in national output income levels and education</td>
</tr>
<tr>
<td>Non-wood products</td>
<td>• Increased future consumption</td>
<td>• Policy incentives to encourage small-scale processing activities</td>
</tr>
<tr>
<td>Recreation and eco-tourism</td>
<td>• Increasing future consumption</td>
<td>• Expansion in tourism industry and human recreation</td>
</tr>
<tr>
<td>Environmental services</td>
<td>• Expected increased flows</td>
<td>• Sustainable management of natural forests</td>
</tr>
</tbody>
</table>

Source: Namibia Forestry Strategic Plan. Directorate of Forestry, 1996

As can be expected, the rising need in forest products will put pressure on the resource base. An inventory project of the resource base by the Directorate of Forestry will in future make it possible to undertake a quantitative assessment of the forest resources. This will assist the Directorate of Forestry in the management of the resource base to secure its sustainable utilisation.
5.4 ECONOMIC VALUE OF FOREST RESOURCES

Domestic forest resources in Namibia have an economic value with respect to the utilisation for different purposes such as firewood, construction timber, food, fodder etc. In addition, domestic forest resources contribute indirectly to farming through conservation of soil fertility and water resources.

In 1996, the Directorate of Forestry estimated the total economic value for forest resource exploitation to be N$1058.2 million per annum as per Table 24.

| Table 24: Estimated annual economic value of forest resources exploitation |
|-------------------------------------------------|-------|-----------------|
| Product                                        | Main species | Annual value (million N$) |
| Construction poles                            | Mopane     | 383              |
| Tourism                                       | Ecosystem  | 218              |
| Fences for crop protection                    | Mopane     | 175              |
| Firewood                                      | Mopane, *Acacia* *spp* | 131              |
| Medicine                                      | Various species | 31.5             |
| Kraals                                        | Mopane     | 31               |
| Charcoal                                      | Various bush invaders | 22.4             |
| Crafts and implements                         | Various species | 21               |
| Mahango baskets                               | Mopane     | 12.4             |
| Goat forage                                   | Various species | 9.5              |
| Fencing poles                                 | Mopane     | 6.6              |
| Food                                          | Marcella oil | 4.6              |
| Basketry                                      | *Hyphaene* *spp* | 4                |
| Commercial logging                            | *Pterocarpus*, *Baikiaea* | 2.4             |
| Mortar and pestle                             | Various hardwood | 1.5             |
| Beverages                                     | Various species | 1.5             |
| Ornamental roots                              | Mopane     | 1.1              |
| Carvings                                      | Various species | 1                |
| Mopane worm forage                            | Mopane     | 0.5              |
| Food                                          | Mangetti kernels | 0.2             |
| **Total Economic Value**                      |             | **1058.2**       |

Source: Namibia Forestry Strategic Plan. Directorate of Forestry, 1996

The economic value of domestic forest resources has recently led to an initiative by a local entrepreneur where the oil of the pip of the Marcella fruit is extracted and used in the cosmetic industry. The estimated economic value as indicated in Table 24 could therefore been seen as a source waiting to be exploited by entrepreneurs.

In paragraph 9.4 recommendations are made on a mechanism for the implementation of such small-scale economic projects.

5.5 PROCLAMATION OF FOREST RESERVES

Namibia has no tradition of forest reserves. However, the 1992 Forest Policy Statement has proposed that 10% of the total land area should be proclaimed state forest reserves in order to achieve its goals with respect to the sustainable utilisation of the resource.

The proposed proclamation of reserves as specified in the policy with respect to the five northern regions under review are as per Table 25.
Table 25: Proposed target areas for forest reservation

<table>
<thead>
<tr>
<th>Region</th>
<th>Total area (sq.km)</th>
<th>Proposed reserve areas (sq.km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kavango</td>
<td>45 655</td>
<td>20 544</td>
</tr>
<tr>
<td>Ovambo</td>
<td>51 800</td>
<td>10 000</td>
</tr>
<tr>
<td>Kaokoland</td>
<td>58 190</td>
<td>5 000</td>
</tr>
</tbody>
</table>

During the period covered by the National Development Plan 1 (1995-2000), the Government intends to gazette about 3.3 million ha (2 million ha in Kavango Region, 1 million ha in former Ovambo region and 300 thousand ha in Caprivi region) as state forest reserves. So far, 75 000 ha of forests in Okongo have been gazetted, and the following areas are about to be declared state forest reserves (Ongandjera 128 200 ha, Uukwali 153 000 ha and Uukolonkadhi 111 700 ha).

The proposed forest reserve areas are indicated in Figure 10.

5.6 COMMUNITY INVOLVEMENT IN FOREST MANAGEMENT

Most productive natural forests in Namibia are found in the communal areas. Although the communal land legally belongs to the government, traditional authorities are responsible for the allocation of land use rights to individual household farmers. It is therefore important that strategies be put in place whereby local communities can financially benefit from forest reserves apart from traditional uses such as firewood and poles and posts for construction purposes. These strategies must be understood by the local community, be simple to implement and monitor, and the income generated from this source should be invested to the benefit of the community.

5.7 RECOMMENDATIONS

With respect to the forest resources in the communal areas, it is recommended that:

- The Directorate of Forestry within the Ministry of Environment and Tourism be urged to proceed as a matter of urgency with the proclamation of forest reserves as indicated in the Namibia Forestry Strategic Plan.

- These forest reserves be excluded from other agricultural activities that might damage the objectives of a forest reserve.

- Community-level management of natural forests in communal areas be enhanced to assure sustainable utilisation of forest reserves.

- A strategy be implemented whereby specific small-scale financially viable projects be identified, selected entrepreneurs be trained and technically assisted with respect to basic business principles, drafting of business plans and access to finance.

- Income generated from forest reserves be utilised to the benefit of the local community.
6. GEOLOGY AND MINING

The geology and consequently mining activities are much more prominent in the Kunene Region than in the four other northern regions under review. More emphasis will therefore be put on the potential of geology in the Kunene Region. Figure 11 gives an indication of the geology of the five northern regions.

6.1 KUNENE REGION

The Kunene Region is geologically linked to the major Late Precambrian Damara Mobile belt which follows the west coast of Africa from Gabon through the Congo and Angola. Table 26 gives the names of the various formations found in the Kunene Region, as well as the rock types. The three supergroups are Basement Complex, Damara and Karoo.

Table 26: Geological formation of the Kunene Region

<table>
<thead>
<tr>
<th>Supergroup</th>
<th>Group</th>
<th>Subgroup or Local Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAROO</td>
<td>STORMBERG</td>
<td>Etendeka or Kaoka Volcanics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Etjo Sandstone</td>
</tr>
<tr>
<td></td>
<td>DWYKA</td>
<td>Saelm Granite</td>
</tr>
<tr>
<td>DAMARA</td>
<td>KHOMAS</td>
<td>Upper Otavi</td>
</tr>
<tr>
<td></td>
<td>OTAVI</td>
<td>Tillite</td>
</tr>
<tr>
<td></td>
<td>NOSSIB</td>
<td>Lower Otavi Noeroep Volcanics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Noeroep Volcanic Formation (Southern Kunene)</td>
</tr>
<tr>
<td>BASEMENT COMPLEX</td>
<td>HUAB</td>
<td>Kunene Igneous Complex</td>
</tr>
</tbody>
</table>


The north-eastern and north-central parts of the Kunene Region are underlain by a Basement Complex consisting predominantly of granites and gneisses. Gneissic rocks form part of the base of the Huab Group, a predominantly volcanic cover sequence that is enfolded and partly intruded by the granite rocks of the Basement Complex.

The volcanic rocks consist mainly of acid and intermediate rocks with thick ash flow deposits and pyroclastic rock of similar composition. In the extreme north-eastern part the Basement Complex is intruded by a major anorthosite complex which forms part of the huge Kunene Igneous Complex.

The Basement Complex had been subjected to considerable faulting and eroded to a fairly irregular surface. It was then overlaid by the Damara Supergrup, which consists of the basal Nossib Group, a sequence of volcanic and sedimentary rocks, which are overlaid sub-conformably by the Lower Otavi Subgroup. The Tillite Subgroup overlies the Lower Otavi Subgroup unconformably and is covered more or less conformably by the Upper Otavi Subgroup. The three Subgroups make up the Otavi Group. Most of the Otavi rocks are sedimentary and exhibit faces change from predominantly carbonate rocks in the east to predominantly argillaceous and arenaceous rocks in the west. The overlying sequence within the Damara Group is the Khomas Group, which consists of arenaceous
and quartzite rocks in the east, with an argillaceous-arenaceous facies in the west. Acid to intermediate volcanic rocks and amphibolites occur in the Nossib and Otavi rocks.

After a long period of erosion, tillites, sandstones, and shales of Karoo sedimentary rocks were deposited in valleys and depressions. The rocks of the Dwyka Group were overlain unconformably by sandstones and by basaltic and rhyolitic lavas of the Stormberg Group which were erupted in a major graben structure to the south of the Marienfluss. During the post-Karoo period the inherent instability of the Kaokoland region was demonstrated by major warping and uplift, which occurred along an axis parallel with the Atlantic coastline. As a result, a series of erosion surfaces was developed and partially eroded, and parts of the resulting sequence of river gravel terraces are preserved along many of the major river valleys.

6.1.1 Mineral Resources in the Kunene Region

The mineral resources in the Kunene Region are by far the most promising compared to the four other regions under investigation as indicated in Figure 11. Numerous exclusive prospecting licenses have been issued in the Kunene Region for the exploitation of mainly semi-precious stones, dimension stone, base and rare metals, chalcedony and even precious stones.

A summary of the main mineral resources of the Kunene Region are as follows:

- **Copper**

  Widespread copper occurrences in upper Nossib Group and lower Otavi/Swakop Group sedimentary units have been prospected quite intensively since the 1950s and several exploration campaigns have been launched by major mining groups since independence. At Okahinga some 10 to 5 km north-west of Opuwo, drilling results from extensive exploration in the late 1970s show that copper occurrences are concentrated in quartz-calcite veins. The best values obtained from trenches were 2.41% copper with most mineralisation apparently near the surface. Some 50 copper showings have been located in the Ombombo area south of Opuwo, mainly in basalt dolomite. The tendency of copper mineralisation to diminish considerably below the oxidation zone, with high copper content at most of the shallow prospects, is characteristic of this area. At one of the most promising occurrences, Okagwa, a copper grade of 2.35% over a strike distance of 300 m was obtained. A cupriferous phylite bed 12 km south west of Ombombo averages 2.8% copper over a similar strike length. At Epungwe, copper-silver mineralisation occurs over a 120 x 60 m zone where limestone is intruded by late-stage granite. Sampling of a large quartz-sulphide zone assayed 13.8% copper. At Okohongo, to the southwest, ore outcrops over a 150 km strike length and 10 to 15 m thickness indicate a downdip projection of 500 000 t per 100 m, and samples have returned 10.4% copper.

In the pre-Damaran Epupa Metamorphic Complex, the oldest rock assemblage in the north-west, several occurrences have been reported. North-east of Oruwange, outcrops along 5 km produced assay results as high as 28% copper, 3000 gm/t silver and 2.38 gm/t gold, according to a 1982 survey. Potential environments for volcano-exhalative copper-lead-zinc mineralisation exist in the pre-Damaran Khoabendus Group volcano sedimentary rocks in the Kunene Region.

- **Iron**

  The largest iron deposits are sedimentary with a number concentrated in the northern zone of the Damara Sequence extending into the Kaokoveld area of the Kunene region. The iron content is variable but estimated reserves comprise several hundred million tons with an average grade of 35% iron. The deposits are located south-west of the Ruacana Falls to the north of Opuwo, and in two belts running south-east from Opuwo and Ongaba.
At Ongaba reserves of fine-grained banded ore are estimated at 130 Mt, mineable by open-pit methods. The average metal content amounts to 42.2% (36.8% iron and 5.4% manganese). The outcrop length is 3.7 km with a width of 46 to 85 m in the central portion.

The Owihende ore body located 8 km west of Ongaba is similar but smaller. Reserves are estimated at 26 Mt with a total metal content of 48.2% (iron 41.9%, manganese 6.3%). Another Chuoos Formation deposit 25 km south east of Opuwo contains an estimated 9 Mt of ore with a combined iron and manganese content of 51%.

- **Gold and Silver**

The Nossib Group metasediments and metavolcanics contain precious metals mineralisation. Investigations of the Ouwambo and Otwaan quartz vein occurrences north east of Sesfontein, proved only low gold values, with sporadically better silver values. Assayed peak values of 0.30–2.4 gmt/l gold were obtained in 1982. Gold mineralisation in quartzites grading up to 6 gmt/l was detected 90 km east of Sesfontein in the early 1980s. Near Opuwo copper-silver-gold mineralisation within Otavi Group limestone/Nossib Formation rocks recorded peak values of 0.21-0.58 gmt/l gold in 1985.

- **Lead, Zinc and Ranadium**

Extensive prospecting of known copper, lead and zinc prospects in the south-western Kunene Region is currently underway. These include sulphide deposits at Tsongoari East, Tsongoari West and Omupokko in Swakop Group rocks some 45 km north west of Sesfontein. Indicated reserves of 500 000 tons grading 1.1% lead and 0.3% zinc to a depth of 90 m over a 1200 m strike length at Tsongoari East, and 900 0000 tons at 0.6% lead and 0.2% zinc over a 700 m strike length at Omupokko have been established. At Tsongoari West, drilling has confirmed a 1300 m mineralised strike length with 3.5% lead and 0.55% zinc values obtained. Ongoing exploration is producing encouraging results with proven ore reserves expected to increase considerably as the geological structure of the area is better understood. Potential reserves of 20 Mt of mineable ore grading at around 10% lead are estimated.

- **Semi-precious Stones**

Semi-precious stones occur over a great part of the Kunene Region.

Deep blue sodalite occurs in carbonatite dykes, with the biggest concentration located some 10 km west of Swartbooisdrift and 4 km south of the Kunene River. The sodalite-bearing dykes are hosted by Kunene Complex anorthositic rocks and are irregular in shape with widely varying widths. Ornamental quality sodalite occurs mainly as large crystals requiring large volumes of rock to be mined.

6.1.2 **Investment Opportunities**

Two investment opportunities were identified by license holders in the Kunene Region. They are:

- **Cunene Gem and Dimension Stone**

This opportunity for an estimated investment of N$500 000 for a gem factory and N$4.5m for a dimension stone extraction and processing plant exists 90 km from Opuwo. The area is accessible by gravel road, but there are no telecommunication facilities. Water is obtainable from the nearby
Kunene River. Energy is to be generated. The concession totals 14 claims over 18 ha and is held by Panosa Mining (Pty) Ltd

- Orupembe Marble

The white homogenous marble with a total reserve of 740 000 m³ above base level (and 7.4 million m³, 10 meters below base level), has potential for use as tiles, slabs and certain sculpture work. The deposit occurs 22 km north of Orupembe and 130 km west of Opwo. Access is via gravel road between Opjuva/Otjinungwa. No telecommunication exists, water is apparently available and electricity is to be generated. The project is not operational as yet and requires an investment of N$802 000.

6.2 THE FOUR NORTH-CENTRAL REGIONS

Surface geological exploration is restricted in the north-central regions due to endless level plains covered by sandy to calcareous soil. Little geological mapping has been done and investigations were mainly concerned with soil studies for agricultural purposes. A summary of the stratigraphic succession of the geological formations of the region is as per Table 27.

Table 27: Geological formations of the four north-central regions

<table>
<thead>
<tr>
<th>Supergroup</th>
<th>Group/Formations</th>
<th>Rock Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECENT</td>
<td></td>
<td>Sand, Calcrete</td>
</tr>
<tr>
<td>KALAHARI</td>
<td></td>
<td>Calcrete, Sandstone, Calc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>creaceous Stone, Grit, Marl</td>
</tr>
<tr>
<td>KAROO</td>
<td>STORMBERG DWYKA</td>
<td>Sandstone, Shale, Carbonaceous Shale, Tillite</td>
</tr>
<tr>
<td></td>
<td>ONDANGWA</td>
<td>Sandstone, Shale</td>
</tr>
<tr>
<td></td>
<td>ETOSHA OWAMBO</td>
<td>Limestone</td>
</tr>
<tr>
<td></td>
<td>MUI DÊN</td>
<td>Quartzite, Shale</td>
</tr>
<tr>
<td>DAMARA</td>
<td>TSUMEB OTAVI CHUOS ABENAB</td>
<td>Dolomite, Limestone, Chert Tillite, Sandstone, Shale Dolomite, Chert</td>
</tr>
<tr>
<td>NOSSIB</td>
<td>NOSSIB BASEMENT FORMATION</td>
<td>Conglomerate, Sandstone, Shale Gneiss, Granulite Amphibolite</td>
</tr>
<tr>
<td>EPUPA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


The geological formations of the four north-central regions do not justify detailed descriptions for the purpose of this report. A summary of the mineral resources and potential for mining activities should rather be emphasised.

6.2.1 Mineral Resources of the North-central Regions

In comparison to the rest of Namibia, the four north-central regions are poorly endowed with useful minerals and rocks. With the exception of soda salts there are at present no known deposits that can be exploited.
However, a summary of the mineral resources is as follows:

- **Petroleum**

Drilling for petroleum products were undertaken between 1952 and 1970 (4 boreholes). The geological formation proves to be positive, but no traces of petroleum were found.

- **Coal**

Low-grade coal was found at a depth of more than 300 meters. The depth and the quality rule out any mining possibilities.

- **Calcite**

Calcite is widely distributed over the north-central regions and can be used for building-stone or construction material for roads. Calcite that is pure enough (silica-free) can be used to make burnt lime.

- **Sodalite**

Sodalite occurs in the adjacent Kunene Region not far from the border with the Omusati Region. Deposits might be found in the northwestern area of the Omusati Region.

- **Soda Salts**

The salt pans north-west of Okaukuejo in the Oshana Region, known as the Otjiwalunda and Ongandjera Pans were investigated for deposits of soda salts. The investigations revealed that i.a.:
  - the surface crust consists of 7 cm NaCl;
  - an upper mud layer is on average 20 cm thick and saturated with brine and
  - it is followed by a lower mud layer.

Pans with impermeable clay floors as indicated above are particularly favourable for concentration of salts, if it is borne in mind that evaporation amounts to approximately 2700 mm per annum. The water stagnates and evaporates until the pans and groundwater become briny.

Generally, only a few pans in the north-central regions contain crust salt, and those that might be of economic value have the following surfaces:

- Ongandjera : 60 ha
- Ongandjera East : 30 ha
- Otjiwalunda : 108 ha
- Otjiwalunda West : 400 ha
- Ondangua : 500 ha

However, feasibility studies revealed that the exploration of these pans is not financially viable. The main reasons being:

- cost of infrastructure with respect to roads and power supply;
- shortage of water;
- absence of a railway link for the transportation of a high-volume low-cost product;
- interruption of production during the rainy season;
- strong competition in the industry.
• **Brick Clay**

Brick clay is found at many places throughout the study area in the oshanas in the Kalahari group (sandy clay), as well as the Nossib Formation 4 km east of Ruacana. Clay bricks might be a good alternative for cement bricks, but the feasibility for the manufacturing of clay bricks has not yet been done. However, the production of clay bricks on a small-scale for local use within the area of the deposits may offer an entrepreneur the opportunity to start a small business with very low input cost.

### 6.3 RECOMMENDATIONS

The rich mineral resources of the Kunene Region, as well as the availability of soda salts and brick clay in the Omusati and Oshana Regions, provide investment opportunities to the private sector as well as small-scale commercial operations to the local communities.

It is therefore recommended that:

• The Kunene Regional council, in collaboration with the mining licence holders, develop mechanisms to promote investment opportunities in the mining sector;

• small-scale semi-precious stone operations by local communities be technically and financially assisted in the Kunene Region and organised selling points for these products be established at selected points on the tourism routes;

• small-scale brick clay operations be technically and financially assisted in the 4 O’s for the manufacturing of clay bricks in remote areas as alternative to cement bricks; and

• small-scale commercial salt operations at Ongandjera and Otjiwalunda Salt Pans be technically and financially assisted for the manufacturing of an “exclusive” salt product.
7. TOURISM

7.1 BACKGROUND

Tourism has been the fastest growing economic sector in Namibia since independence. The National Tourism Income increased from N$320m in 1991 to N$1 300m in 1998.

The growth of +15% per annum of the tourism sector is expected to continue, depending on factors such as the provision of a safe and secure environment for the sector, Namibia as a destination for international tourism and the capacity of tourism infrastructure in the country.

The tourist profile visiting Namibia is made up as follows:

- Tourists from African countries represent 77% of all holiday tourist arrivals to Namibia, of which 37% are from Southern Africa. Europeans represent 19%, of which 10% are from Germany.

- The average length of stay in Namibia is 11,8 days, with holiday visitors staying 12.5 days on average.

- More than 70% visit Namibia as a single destination. However, this picture is strongly influenced by South African visitors as 93% of them only stay in Namibia. In general, European tourists can be divided into 50% travelling to Namibia only, and 50% combine Namibia with other destinations in Southern Africa.

- Holiday tourists combining Namibia with other destinations typically also visit:
  - South Africa - 42%
  - Zimbabwe - 25%
  - Botswana - 23%
  - Zambia - 3%
  - Other African countries - 7%

- Only 20% travel on pre-arranged tours, while more than 80% make their own arrangements.

- A high proportion of holiday tourists from South Africa bring their own camping equipment and provisions, or they stay with friends and relatives. Daily average expenditure for this group of visitors is only one third of that for European tourists.

- A high proportion of the European tourists is in the middle professional grouping. Tourists from South Africa have a socio-economic profile more towards the lower - middle grouping. Also, South African tourists more often travel in family groups.

- For travellers to Namibia the focus is on the genuine African experience - wilderness, natural beauty, eco-tourism products, and active holidays. The vast areas, the natural resources, scenery and the wildlife, form the core of the tourism product.

The development of the tourism sector should take policies and guidelines provided by the authorities into consideration. On national level, the National Development Plan 1 (NDP1) and the Draft Tourism Act are such instruments, while on regional level, and specifically the communal areas, "Namibia’s Policy on Wildlife Management, Utilisation and Tourism in Communal Areas (1995)" supported by "Promotion of Community Based Tourism (1995)" are valuable guidelines.
7.2 TOURISM GOVERNING INSTRUMENTS

The following tourism governing instruments are the most important to be taken into account for the development of the tourism sector in the communal areas:

- **Tourism White Paper**

The key guiding words in the tourism policy approach are:

- Low volume, high quality tourism.
- Income and employment creation in general and local involvement and dispersion of benefits in particular.
- Creation of regional tourism images.
- The use of a land use system, defining zones for various uses.

- **National Development Plan 1 (NDP1)**

The NDP1 provides the context for the Tourism Development Plan and drafting of a Tourism Act. The plan states that:

"The central task for the sector is to realise the inter-linked objectives of protecting the bio-physical diversity of Namibia for future generations, and of maximising the economic benefits from tourism, in the form of foreign exchange, income and employment creation, on a sustainable basis. In addition to the resources in the sector being used for national economic development, a vital extra facet is that the resources can also form the basis for involving local communities and thus for the stimulation of local development."

The sectoral objectives and strategies to achieve this goal include:

- Maximising nett foreign exchange earnings from tourism,
- Improving transportation services and infrastructure,
- Promoting and encouraging private investment,
- Promoting regional and international co-operation in tourism development,
- Preserving Namibia's cultural heritage and sustainably utilising wildlife and other natural resources
- Developing a comprehensive human resources development programme for the sector.

- **The Draft Tourism Act**

In accordance with the White Paper on Tourism, the Tourism Bill will be completed and promulgated at some stage in the future.

The Tourism Bill will "make provision for the orderly, co-ordinated and harmonious development of the tourism industry; ensure that benefits accruing from the industry are distributed over a broad
range of beneficiaries; ensure that previously neglected areas of the country receive priority treatment; establish policy guidelines for the tourism industry; spell out the powers of the Minister to provide for the creation of tourism development plans and priority tourism zones and structures to manage them and matters incidental thereto."

It also provides a general Tourism Policy, as well as guidelines, among other issues, for Tourism Development Plans. These plans should be developed on national, as well as regional level and are intended to:

- state the tourism development objective
- identify priorities and potential future tourism operations and tourism developments
- state the measures to be taken to co-ordinate tourism development
- identify measures to promote environmentally sustainable tourism
- state the promotional measures required to meet the identified needs of the tourism industry.

The Regional Tourism Development Plan will:

- be based on an inventory of existing tourism operations, tourism developments, land-use practices and resources in the area

- state the priority to be given by the Ministry of Environment and Tourism to a particular area for a tourism development site through the declaration of Priority Tourism Zones.

The legislation also provides specific guidelines for the declaration and management of Priority Tourism Zones, as well as granting of tourism concessions.

7.3 TOURISM IN COMMUNAL AREAS

7.3.1 Wildlife Management, Utilisation and Tourism in Communal Areas

A document on "Namibia's Policy on Wildlife Management, Utilisation and Tourism in Communal Areas" was outlined in June 1995. This policy document was approved by the Cabinet and gazetted in the form of the Nature Conservation Amendment Act, in June 1996. In brief, the policy covers the following formulations:

- Rights to communal areas in respect of wildlife utilisation.

- Allows rural communities on state land to undertake tourism ventures, and to enter into co-operative agreements with commercial tourism organisations to develop tourism activities on state land.

- Improve the conservation of natural resources by wise and sustainable resource management and the protection of the bio-diversity through the participation of rural communities in an economically based system for the management and utilisation of wildlife and other renewable living resources on communal land.

A key instrument in implementing this policy has been the creation of the opportunity for the development of conservancies. Conservancies have legal status through a representative committee and its constitution. Such legal status is awarded by the Ministry of Environment and Tourism once the duly constituted committee has fulfilled a series of requirements. Conservancies may have a huge influence on the economical utilisation of communal land since its core definition is that "On communal land, a conservancy would be a community or group of communities, within a defined geographical area, who mainly manage, conserve and utilise the wildlife and other natural resources within the defined area."
It is recognised that in the initial stages of development the conservancy will need advice and technical assistance from the state (MET) and NGO's. However, the goal is for these conservancies to become self-sustainable and be in a position to manage wildlife themselves. All conservancies would have a constitution and legal status and would be considered as a corporate body.

The main steps to be followed to establish a conservancy are:

- Obtain an application form from the Ministry of Environment and Tourism;
- Define the membership of the conservancy. (No-one may be excluded on grounds of ethnicity or gender.)
- Elect a Conservancy Committee, which must be representative of the community.
- Develop a constitution which i.a. states the objectives of the conservancy, rules for operation and management, etc.
- Develop a plan for the equitable distribution of income generated by the operations of the conservancy.

However, while the establishment of conservancies is a noble idea and the procedures and objectives very clear, it is in some cases doubtful whether the financial results will meet the expectations of the communities. During interviews with various community leaders and regional councilors, the consultants came to the conclusion that the idea of establishing a conservancy for a specific area is accepted without reservation. It seems as though community leaders are under the impression that, for instance, wildlife will be reintroduced to the conservancy without proper control mechanisms, and that communities will financially benefit without knowing in what way.

It can be reasonably accepted that these new initiatives will take time to be established, and the results will only materialise in the long term. Details on the formation of conservancies with respect to legislation, applications and approval procedures and a model conservancy constitution are available at offices of the Ministry of Environment and Tourism.

7.3.2 Promotion of Community-based Tourism

The above policy document was followed by a second: "Promotion of community-based Tourism:", in June 1995. This document deals with the Ministry’s policy for providing support to communities, and encouragement of the development potential of community-run tourism activities and enterprises on communal land.

The policy document outlines five statements in respect of the MET’s potential role, to:

- Open up opportunities for rural communities, local people and the informal sector to increase their involvement in the tourism industry, particularly in tourism planning and the running of enterprises.
- Ensure that development of tourism on communal land takes place in areas and in forms acceptable to local people.
- Ensure that rural communities, local people and the informal sector have greater access to the benefits from tourism on their land, by creating appropriate legal mechanisms and establishing appropriate incentives.
Encourage the formal tourism sector to co-operate and work with the informal sector, and to recognise that, as well as being in the long-term self-interest of the tourism industry, it is a social responsibility to contribute to Namibia's national development objectives of improved equity, poverty alleviation, and sustainable growth.

Ensure that tourism development within Namibia is environmentally sustainable.

7.4 REGIONAL TOURISM DEVELOPMENT PLANS

Within the above mentioned national and regional framework and guidelines, three Regional development Plans were drafted, namely:

- Tourism Development Planning Framework for the Caprivi Region (Deloitte & Touche Consulting Group, 1997). (This study includes the eastern part of the Kavango Region from Rundu southwards to the border of Bushmanland).

- Tourism Development Plan for the Ohangwena, Omusati, Oshana and Oshikoto Region (Northern Namibian Environmental Project (NNEP), 1999).

- Draft North-west Region Tourism Master Plan (Urban Dynamics Africa, 1999).

These plans provide valuable information and the recommendations of the plans will be taken into account where applicable in this study.

7.5 TOURISM IN THE KUNENE REGION

The north western part of Namibia, inclusive of the whole Kunene Region which falls within the study area, is one of the most attractive areas for tourists in Namibia. Concession areas have been granted to individuals and companies and self-drive routes, mostly for off-road 4x4 vehicles, make this area a most sought after tourist destination. However, the area is environmentally very sensitive and precautions should be taken against over-exploitation.

7.5.1 Tourist Attractions

- Wildlife

The two main wildlife species in the area that attract tourism are elephants and rhinos.

- Elephants

The Kunene Region is known for the "Desert Elephant". These elephants live in arid and semi-arid regions and range over great distances. They are mostly found in riverbeds where fodder and water are available, but range over big parts of the region looking for food. In the late 1960s it was estimated that the population of elephants in "Kaokoland" was between 800-1000. However, the area was subjected to unrestricted hunting by military and professional hunters that reduced the population to an estimated fewer than 50 in 1978.

Considerable conservation efforts by the authorities, assisted by two NGO’s, namely Save the Rhino Trust (SRT) and Integrated Rural Development and Nature Conservation (IRDHC), resulted in elephant numbers recovering to 233 in 1990 and 450 in 1995.
- **Rhinoceros**

Similarly rhinos, classified as an endangered species, have been threatened by extinction, mainly for their horns, which have a value in the Far-Eastern markets as a sex stimulant. With the ongoing conservation efforts by the authorities and the above-mentioned NGO’s, however, the rhino population has recovered from less than 50 in 1978, to an estimated 102 in 1990 and 120 in 1998. Most of these rhinos are found in the western parts of the Kunene Region below the 100 mm isohyet and ranging from the Ugab River in the south to the Hoanib River in the north.

The tourism value of elephants and rhinos is extremely high and when spotted is the highlight of most tourists’ visit to this area. Conflicts between man and animal have been increasing with elephants approaching tourism camps to drink water. The same is applicable between farmers and elephants when elephants in some cases destroy waterpoints regularly used for agricultural purposes.

- **Other Species**

Other wildlife species found in the area are springbok, gemsbok (oryx), Hartmann’s zebra, ostriches, giraffe and kudu. An aerial survey conducted in 1990 indicated 6 species of mammals designated as rare/very rare, 7 species were vulnerable, 11 species were insecure and 2 were protected species.

Regular movements in and between catchments and the rivers are a normal way of life for wildlife in the area.

Numbers of wildlife in the area are unknown. Natural Wildlife is driven from the areas where farming activities are practised, but nevertheless competition for food and water exists between wildlife and domesticated animals. The Kunene Region renders the perfect opportunity for the implementation of conservancies and community-based tourism projects.

- **Scenery**

It is not only the wildlife and scarce species like elephants and rhinos that attract tourists to the area. The Kunene Region is one of the most scenic areas in Namibia with its mountains and contrasting plains. The combinations of these landscapes are well known and are the origin of many works of art.

A valuable, marketable tourism product can therefore be provided to visitors making use of organised coach tours (mainly on the main roads), fly-in safaris to desolate areas and self-driven routes making use of 4x4 vehicles – probably the most popular way to visit the area.

### 7.5.2 Conservancies and Concession Areas

The document “Namibia’s Policy on Wildlife Management, Utilisation and Tourism in Communal Areas” as gazetted in terms of the Nature Conservation Amendment Act, June 1996 as outlined in paragraph 7.3.1, provides guidelines to rural communities on how to reap financial benefit from tourism in communal areas. The Kunene Region, as a prime tourism region in Namibia, provides a golden opportunity for the implementation of policies where communities can benefit from the booming tourism sector. The benefits of the development of conservancies, together with the opportunities provided by the Community-based Tourism Policy, have already resulted in the registration of four conservancies in the Kunene Region, with 9 more in the formative stages (emergency conservancies) as indicated in Figure 10.
The registered conservancies are:
- Torra Conservancy
- #Khoadi Hões
- Uibasen Twyfelfontein
- Doro Nawas

Those conservancies in the formative stages are:
- Marienfluss
- Orupembe
- Omatendeka
- Huab
- Anichab Braunfels
- Sesfontein
- Warmquelle
- Ehirovipuka
- Purros

In the Kunene Region three concession areas have been set aside for private sector entrepreneurs namely the Hobatere -, Palmwag – and Etendeka concessions as indicated on Figure 10.

7.5.3 Tourist Accommodation in Kunene Region

There are no hotels in the Kunene Region and the available accommodation consists of campsites, rest camps, lodges and tented camps.

The accommodation capacity in the Kunene Region is indicated in Table 28.

<table>
<thead>
<tr>
<th>Type of Accommodation</th>
<th>Number of Establishments</th>
<th>Camping Place</th>
<th>Number of Rooms</th>
<th>Number of Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campsites</td>
<td>14</td>
<td>70</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rest Camps</td>
<td>2</td>
<td>0</td>
<td>48</td>
<td>92</td>
</tr>
<tr>
<td>Lodges</td>
<td>6</td>
<td>0</td>
<td>51</td>
<td>100</td>
</tr>
<tr>
<td>Tented Camps</td>
<td>7</td>
<td>0</td>
<td>64</td>
<td>106</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>70</strong></td>
<td><strong>163</strong></td>
<td><strong>298</strong></td>
</tr>
</tbody>
</table>

Source: North-west Region Tourism Master Plan (Draft): Urban Dynamics Africa

7.6 TOURISM DEVELOPMENT POTENTIAL IN THE KUNENE REGION

7.6.1 Sensitivity Zones

In terms of the draft "North-west Tourism Development Plan" the Kunene Region is divided into three sensitivity zones, which are further subdivided into 9 management zones. The sensitivity zones are based on the environmental impact of tourism on the environment and the zones are mainly defined by using rainfall isohyets and local topography as indicated in Figure 12.
Zone I

Environmentally this area is the most sensitive and large parts of the area are not suitable for livestock production. The present infrastructure in this zone is limited with a few access roads, which are mostly in a poor condition. It is recommended that Zone I be developed as a low impact, low tourism volume zone.

Zone II

Zone II is a transition or buffer area between the highly sensitive Zone I and the not so environmentally sensitive Zone III. This zone is more accessible, with several main roads passing through it. The population in this zone is also higher with proportionally larger livestock numbers.

It is recommended that development of moderate volume, low impact tourism should be promoted in this zone. This zone should cater for upmarket, mid-market and budget tourists.

Zone III

The environment of Zone III is much more durable and can cope with a higher intensity of tourists. However, this area has a lower tourist appeal. Population and livestock densities are also higher and the infrastructure is more developed than in the other two zones.

Guidelines for permissible infrastructural development and tourism activities for the different zones with an effect on the environment are as per Tables 29 and 30.

Table 29: Guidelines for allowable tourism infrastructural development with negligible (x) to major (xxxx) environmental impact.

<table>
<thead>
<tr>
<th>Small-scale tourism development</th>
<th>ZONE I</th>
<th>ZONE II</th>
<th>ZONE III</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Community campsites</td>
<td>XXX</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ii) Luxury tented camps</td>
<td>X</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>iii) Mid-market tented camps</td>
<td>XX</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>iv) Luxury lodge</td>
<td>X</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>v) Mid-market lodge</td>
<td>XX</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medium-scale tourism development</th>
<th>ZONE I</th>
<th>ZONE II</th>
<th>ZONE III</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Community campsites</td>
<td>XXXX</td>
<td>XX</td>
<td>X</td>
</tr>
<tr>
<td>ii) Luxury tented camps</td>
<td>XX</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>iii) Mid-market tented camps</td>
<td>XXX</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>iv) Luxury lodge</td>
<td>XX</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>v) Mid-market lodge</td>
<td>XXX</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Source: North-west Tourism Master Plan (Draft): Urban Dynamics Africa
Table 30: Guidelines for allowable tourism activities with negligible effect (x) to major (xxxx) environmental impact

<table>
<thead>
<tr>
<th>Tourism activity in potential tourism areas</th>
<th>ZONE I</th>
<th>ZONE II</th>
<th>ZONE III</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Hunting by vehicle</td>
<td>XXXX</td>
<td>XXX</td>
<td>XX</td>
</tr>
<tr>
<td>ii) Hunting on foot</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>iii) Wildlife monitoring (off-road)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- visual</td>
<td>XX</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>- wilderness</td>
<td>XXXX</td>
<td>XXX</td>
<td>XX</td>
</tr>
<tr>
<td>iv) Flying</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- micro-light</td>
<td>XXX</td>
<td>XX</td>
<td>X</td>
</tr>
<tr>
<td>- light aircraft</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>- helicopters</td>
<td>XXXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>v) Walking trails</td>
<td>XX</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>vi) Horse/donkey/camel safaris</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>vii) Bicycle</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Source: North-west Tourism Master Plan (Draft): Urban Dynamics Africa

7.6.2 Management Zones

Within the three sensitivity zones, management zones were identified as areas of similar tourism use and potential as indicated in Figure 12.

Recommendations have also been made to provide a framework for local tourism planning, of which only the more important aspects are summarised for the purpose of this report (The recommendations must be read together with Figure 12)

- Area A

  Tourism development Potential: Low volume, low impact tourism.

  Infrastructural Development:
  - A small number of luxury tented camps and lodges.
  - Expansion and upgrading of existing tourism infrastructure to mid-market lodges and tented camps.
  - A campsite in the Hartmann’s Valley

  Tourism Activities:
  - All walking activities.
  - Hunting on foot under supervision of professional hunters.
  - 4x4 self drive and guided tours on established roads.
• Area B

Tourism Development Potential: low volume, low impact tourism.

Infrastructural Development:
- A small number of luxury tented camps and lodges.
- A small number of "day fly-camps" to cater for self-drive and guided tours.
- No camping facilities in riverbeds and around wetlands.
- A campsite near the main road at Springbokwasser.

Tourism Activities:
- All walking activities.
- Hunting on foot under supervision of professional hunters.
- 4x4 self-drive and guided tours on established roads.

• Area D

Tourism Development Potential: medium volume, low impact tourism.

Infrastructural Development:
- Luxury tented camps and lodges.
- Mid-market lodges, tented camps and community campsites.
- Upgrading of existing infrastructure to mid-market lodges and tented camps.

Tourism Activities:
- All walking activities.
- Hunting by vehicle or on foot (under supervision of a professional hunter).
- Formal river activities.
- Off-road driving in designated areas and routes.

• Area E

Tourism Development Potential: medium volume, medium impact tourism.

Infrastructural Development:
- Luxury tented camps and lodges.
- Mid-market lodges, tented camps and community campsites.
- Upgrading of existing infrastructure to mid-market lodges and tented camps.

Tourism Activities:
- All walking activities.
- Hunting by vehicle or on foot (under supervision of a professional hunter).
- Formal river activities.
- Off-road driving in designated areas and routes.

• Area F

Tourism Development Potential: medium volume, medium impact tourism.

Infrastructural Development:
- Luxury tented camps and lodges.
- Mid-market lodges, tented camps and community campsites.
- Upgrading of existing infrastructure to mid-market lodges and tented camps.
- Further development should be done once the existing camps are upgraded. Exceptions could be a facility at the entrance to the Hoanib River and a mid-market facility at Khowarib.

Tourism Activities:
- All walking activities.
- Hunting by vehicle or on foot (under supervision of a professional hunter).
- Formal river activities.
- Off-road driving in designated areas and routes.
- Consumptive use of wildlife.

- Area G

Tourism Development Potential: medium volume, low impact tourism.

Infrastructural Development:
- Luxury tented camps and lodges.
- Mid-market lodges, tented camps and community campsites.
- Upgrading of existing infrastructure to mid-market lodges and tented camps.
- Further development should be done once the existing camps are upgraded. Exceptions could be a facility at the entrance to the Hoanib River and a mid-market facility at Khowarib.
- Upmarket lodges.

Tourism Activities:
- All walking activities.
- Hunting by vehicle or on foot (under supervision of a professional hunter).
- Formal river activities.
- Off-road driving in designated areas and routes.
- Consumptive use of wildlife.

Area I

Tourism Development Potential: medium volume, medium impact tourism.

The recommended infrastructural development and tourism activities are centred around the upgrading of facilities in and around Opuwa as the centre from where tourism activities can take place to the other areas.

- Areas J and K

Tourism Development Potential: medium volume, medium impact tourism.

Infrastructural Development:
- Luxury tented camps and lodges.
- Mid-market lodges, tented camps and community campsites.

Tourism Activities:
- Any sustainable tourism activity.
7.7 TOURISM IN THE 4 FOUR NORTH-CENTRAL REGIONS (4 O’s)

7.7.1 Background

According to the report “Tourism Development plan for the Oshangwena, Omusati, Oshana and Oshikoto Regions”, tourism is almost non-existent in these four regions. The communal areas of the four regions have largely been ignored by the broad tourism industry in Namibia and only a few accommodation establishments, located in the larger towns of Ondangwa and Oshakati have been developed. The development was, however, directed to providing accommodation for business people while the needs of the tourism sector were neglected.

The Etosha National Park has recently been incorporated in the Omusati, Oshana and Oshikoto Regions and can provide access to these regions to a source of an estimated 85 000 tourists. The Etosha National Park has been fenced off with no access from the north. It has been administrated in terms of conservation legislation and therefore has no or little economic value to the said regions at present.

As the main tourist attraction in Namibia, the Etosha National Park can provide the spark for tourism development in the four northern regions.

7.7.2 Tourist Attractions

The densely populated areas of these regions in terms of people and livestock limits the tourism potential in these areas to cultural aspects. The “wilderness experience” is limited to selected and less populated areas. These areas are adjacent to the Etosha National Park in the Omusati, Oshana and Oshikoto Regions. Another area identified in the report is the “woodland” of eastern Oshangwena. Coincidentally these areas fall within the study area of these regions and are therefore of importance to this report.

- Wildlife

Wildlife has been almost completely eradicated and only a few antelope species are still to be found close to the Etosha border. Hyenas and wild dogs have posed problems for communities in the Oshikoto Region where elephants from Etosha are also found from time to time trying to follow the old immigration routes. A few solitary elephants occasionally wander into the Ombuca Grassland from the park.

The reintroduction of wildlife into the four north-central regions is one of the aims of the Northern Namibian Environmental Project (NNEP), a donor funded project of the Ministry of Environment and Tourism. It is envisaged to reintroduce common ungulate species that were present in historic times like gemsbok, giraffe, springbok, Burchell’s zebra and ostrich.

- Birdlife

Birdlife is prolific in the rainy season. The Etaka and Cuvelai systems support a diverse avifauna of about 280 species. Included are some 30 Red Data species such as pelicans, Bateleur, flamingos, the Lappet-Faced Vulture, Grey Kestrel, Wattled and Blue Cranes, Kori Bustard and Yellow-Billed Oxpecker.

The areas surrounding the Otushandija Dam, Lake Oponono, the woodland areas of the Oshangwena Region and the Okashana Area of the Ondoni Plains are specific areas where the bird-watching potential for general tourism is high.

- Historical and Cultural Sites

D1055/FnRpt(JUN2000)
A large number of monuments, including the locally well-known Olukonda National Monument and the Ombalantu Baobab, and a large number of historical sites like the well-known Ongulumbashe and graves are found throughout the four regions.

The Nakambale Museum at Olukonda is one of the best museums in Namibia, and is one of very few present focal points for tourism in the four regions. The museum is integrated into the Olukonda National Monument, consisting of an old Finnish Mission church and Mission House. Cultural display and demonstration sites include the Nakambale Museum and the Tsandi Homestead.

7.8 TOURISM DEVELOPMENT POTENTIAL IN THE FOUR NORTH-CENTRAL REGIONS

7.8.1 Ombuga and Lake Oponono (OSHANA REGION)

The vast expanse of flat, treeless grassland known as the Ombuga (Grassland) stretches from about 20 km south of the central Oshakati-Ondangwa area to about ten kilometres north of the Etosha Pan. Some of the main channels of the oshana system, including the Etaka and Cuvelei channels, reach into the Ombuga where they form a series of serpentine, saline lakes, including the Lake Oponono. Although cattle posts have been established along the Ekuma, the harsh emptiness of the grassland creates a unique atmosphere. The proposed tourism areas for the four north-central regions are indicated in Figure 13.

- Accessibility

Access to the area is limited to small tracks to the cattle posts, especially to the northern and eastern areas of the lake which are heavily utilised, whilst the Ombuga west of the Ekuma channel is basically virgin and unutilised land. Preferably 4x4 vehicles are to be used for access to the area.

One main track connects Ondangwa with the eastern fringes of Lake Oponono (35 km), from the Narawandu area (via Onoolongo, 40 km) and the Etosha north road (following the Ekuma channel, 35 km) respectively.

No water, electricity or telecommunication infrastructure exists.

- Development Potential

The lack of specific natural focal points and the low psychological carrying capacity of the area limit major tourism development projects and self-drive visits. The NNEP identified the following tourism potential for the area:
- a fishing camp information centre
- a cattle post information centre
- micro-flights

The fishing camp information centre can include a picnic site at the lake and should focus on the livelihood activities around Lake Oponono. The centre should create awareness within the community regarding hunting and fishing in relation to the utilisation and management of natural resources.

The cattle post information centre should give an insight into the historical utilisation of the grassland and all related issues.
The extremely flat topography of the area makes it very attractive for micro-flights. Low-level aerial views can give interesting insight into the complexity of the oshana system, especially during the rainy season. The proximity of the Ondangwa and Oshakati airports makes this a logical venture to be investigated.

7.8.2 Narawandu Tourism Area

The Narawandu Tourism Area is situated on the central northern border of the Etosha Pan, where the border makes a sharp corner towards the south, north-west of Okakuejo. Topographically, the area is flat to slightly undulating, and is characterised by monotonous low mopane scrub and a number of salt pans of various sizes. Towards the north-west there are areas of more open vegetation dominated by low acacia. Some wildlife occurs in the area.

- Accessibility and infrastructure

A gravel road links Okakuejo and the Narawandu Gate, situated ±95 km north of Okakuejo on the northern border of the Etosha National Park. The road infrastructure inside the park in the Narawandu area is reasonable, but outside the park it is very poor, consisting of single tracks requiring 4x4 vehicles. No other infrastructure exists, but there are several cattle posts in the area with large sections of fencing.

- Development Potential

According to the Tourism Development plan for the Ohangwena, Omusati, Oshana and Oshikoto Regions, the main opportunity in the Narawandu area is the development of a bush camp north of the Narawandu Gate, probably at one of the salt pans. The suggested camp should be of very high standard with respect to style and facilities in order to meet international standards and should comprise eight units en suite. Such a development could create an identity that focuses on Etosha, while the wilderness experience north of Etosha could also reflect elements of the local culture, especially with respect to fishing and cattle farming in the Ombaga area, including Lake Oponono.

- Infrastructure Development

The development of a bush camp outside the borders of Etosha National Park in the Narawandu area would only be possible if this camp were accessible from Okakuejo, as well as from the north. The existing gravel road in Etosha will have to be improved, and a linkage road with the Oshakati road be built to make the area accessible for 2x4 vehicles from the north.

The opening of the Narawandu Gate should be investigated to allow free access to Etosha National Park from the north. Alternatively, and as an interim arrangement, the control of movement in and out of Etosha could be delegated to a concessionaire who will hold the concession in Narawandu. Such an entrepreneur could develop the bush camp and exploit the opportunity of the wilderness area outside Etosha, while at the same time have limited access to the National Park. In either case infrastructure will have to be developed with respect to the gate and supporting facilities.

- Limiting Factors

Limiting factors for any development in the Narawandu area might be finding a usable and sustainable source of underground water and an agreement for cross-border utilisation of resources between conservation authorities and communal communities. Although the Etosha National Park is included in the Omusati, Oshana and Oshikoto Regions, present conservation legislation will prohibit the utilisation of wildlife resources within the Etosha National Park should a Narawandu tourist area be established as a conservancy.
7.8.3 Andoni Area

The Andoni area is bordered on the north by the Oshivel-Ondangwa road. The area is characterised by the extremely flat and treeless Andoni plain, which stretches into the Etosha National Park. Settlement is concentrated along the road, with the Andoni plain being unsettled. The Andoni plain forms part of the communal grazing area and only some wildlife, mainly springbok, occurs towards the border of Etosha. Inside the Park, large herds of springbok, gemsbok, blue wildebeest and Burchell's zebra congregate on the plains around the Andoni waterhole.

The Andoni plain and small wetland areas create a serene natural setting.

- Accessibility

The Andoni plain is easily accessible from the Oshivel-Ondangwa tar road bordering the area on the eastern side. Roads within the Etosha National Park connect Namutoni with a small track, known as the North Etosha Road, along the northern border of the Park. This track connects the Andoni area with the Narawandu area and eventually links up with the Kamanjab-Ruacana road.

- Infrastructure Development

Within the area itself no infrastructure exists apart from the all-weather road from Okashana to the proposed King Nehale Gate. However, the Oshivel-Ondangwa development axis with water, electricity and telecommunication available can provide infrastructure to the area, or at least the eastern border of the area at a relative low cost. These infrastructures are also available at the Okashana Training Centre for extension to service site developments in the Andoni Area.

- Development Potential

Of the three tourism areas in the study area bordering the Etosha National Park, the Andoni area provides the highest potential for tourism development. The accessibility of the area and the closeness of Namutoni in the Etosha National Park automatically contribute to a movement of people and potential tourists to the area. The proposed opening of the "King Nehale Gate" on the northern border of the Etosha National Park will provide a direct link between Namutoni and the north and will allow a large existing market to be tapped as visitors to the Andoni area. Furthermore, existing lodges in the Tsumeb area can also provide tourists to the area. Recommendations made for the development of the Andoni area can be divided into two main components, namely:

- a joint venture development between the community and a private investor for an upmarket resort with a minimum of 20 rooms, and
- a community-owned development of a traditional homestead, campsite and picnic site.

The specific sites for these developments are still to be determined.

7.8.4 Uukwaluudhi Conservancy (OMUSATI REGION)

The (proposed) conservancy area is located close to the Ruacana-Kamanjab road as indicated on Figure 13. The core conservation area is located in the extreme south-western corner of the conservancy and consists of an expansion grassland pan system with isolated tree islands in a surrounding woodland setting. A few small hills and the different mountains of the Kunene Region add to the scenic value of the area.

- Accessibility and Infrastructure
The area is accessible from the Ruacana-Kamanjab road, as well as from the Ruacana-Oshakati Road. Various unmarked 4x4-tracks lead to the scenic core of the conservation area.

- Development Potential

The development potential of the area lies in the general benefits applicable to conservancy areas. A campsite at a selected site could provide accommodation for transit traffic from the Kunene Region to destinations in the north-central regions.

The surrounding attractions are:

- **Cultural**
  - Ombalantu Baobab and former Military Base
  - Ongulumbashe Monument
  - Tsandi Homestead

- **Natural**
  - Olushandja Dam
  - Ruacana Falls
  - Kaokoland

7.8.5 Homestead Lodge

The Eunda-Onesi area, where a Homestead Lodge can be established, is located in the north-west of the Omusati Region and lies 10-20 km south of the Oshakati-Ruacana road and can be reached via the D3616 from both Epalela and Tsandi.

The Eunda-Onesi area is one of the most scenically interesting areas of the four north-central regions. The western-most oshanas flow through the area creating a typical oshana atmosphere. The vegetation, however, is more diverse and intact than in the central oshana area, and is dominated by a great number of baobabs, as well as makalani palms. Scenic stands of mixed woodland to the west of Eunda and Onesi consist of baobab, camelthorn, shepherd's tree, bird plum, mopane, silver-leaved Terminalia, bushwillow, mangetti and other tree species and create a beautiful parkland atmosphere. It is this area that provides the most ideal settings for the development of a small, exclusive lodge. The various attractions in the north-west part of Omusati justify an accommodation facility. Numerous day excursions could originate here. In addition, transit traffic will be offered more than just accommodation with the development of a theme-based facility. However, the specific site for the development of such a lodge needs to be selected.

- Available Infrastructure

Road, water, electricity and telecommunication infrastructure exists in Eunda and Onesi.

The surrounding attractions include the following:

- **Cultural**
  - Ombalantu Baobab and former Military Base
  - Ongulumbashe Monument
  - Tsandi Homestead
  - Tsandi Baobabs

- **Natural**
  - Olushandja Dam
  - Ruacana Falls
  - Uukwaliudhi Conservancy
7.8.6 Otjipahuriro Campsite (Ruacana)

The Ruacana area is located in north-west Omusati Region, on the border with Angola. The Otjipahuriro Campsite is located on the banks of the Kunene River, just downstream of the Ruacana Falls. Access via the C46 tar road from the Ruacana township turn-off (20 km) is good. The entrance gate to the campsite is along the road. A single track accessible to 4x4 vehicles only connects the Ruacana area with Swartbooisdrift in Kaokoland.

The Otjipahuriro Campsite is a large camping ground and Mr Ndumbu holds Permission to Occupy (PTO), a previous Ruacana Councillor now living in Keetmanshoop. Three reed-screen ablution blocks, each with one flush toilet and a cold water shower, are spread out in the grounds. Although the reed-screen ablution block concept suits the campsite setting, the quality of the facilities is inadequate and needs to be upgraded. The number of ablution blocks should be increased to create at least five sites with adjoining ablution facilities.

Plans exist to develop fixed accommodation on a small island in the Kunene River, directly opposite the campsite. This development is likely to cater for Namibian and South African visitors travelling to Kaokoland, rather than overseas tourists visiting Namibia.

Available Infrastructure

Road, water, electricity and telecommunications infrastructure exists in the area. The campsite has road and water infrastructure, but lacks electricity and telephone connections.

The surrounding attractions include the following:

Cultural - Ombalantu Baobab and former Military Base
           - Tsandi Homestead
           - Himba Culture, Kaokoland

Natural - Olushandja Dam
          - Uukwaliwushi Conservancy
          - Ruacana Falls
          - Ruacana Hydro-electric Power Station
          - Kaokoland

7.8.7 Ohangwena Woodland (Ohangwena Region)

The eastern half of the Ohangwena Region is characterised by largely unaltered areas of Kalahari woodland, dominated by species such as Rhodesian teak, kiaat, mangetti, silver-leafed Terminalia, Combretum and acacia species. Beautiful stands of large trees present a scenic atmosphere.

The area of interest is located in the central and western Ohangwena Region. The C45 road (gravel) passing through this area links the central area of the four regions to Rundu in the Kavango Region via Eenhana, Okongo and Mpungu and thus also provides an important direct link to Caprivi. Access to the area along this road is good.

Specific sites for the development of a transit facility need to be selected through co-operation between the community and an investor. Ideally, the setting should provide a scenic woodland atmosphere. Many sites exist that fulfil this criterion.
Available Infrastructure

The road infrastructure is more limited than in other areas of the four regions. Water and electricity infrastructure exists along the western section of the C45.

The surrounding attractions include:

Cultural - Nakambale Museum and Olukonda National Monument

Natural - Kavango River (Rundu area) and Caprivi Region

7.9 RECOMMENDATIONS

Proposals on tourism development are based on a holistic view of the potential for tourism in the whole of the Kunene Region, which is included in the study area, as well as the demarcated study area of the four north-central regions. It is also generally accepted that tourism development be exploited by the private sector and that the Government, through its various Ministries as the guardian of communal land, provides guidelines and an enabling environment within which the private sector can operate. Specific suggestions may therefore trigger private sector initiative which in turn may motivate the public sector to make certain investments in, for example, infrastructure. Any tourism development is thus subject to a good understanding and co-ordination between the private and public sectors.

7.9.1 KUNENE REGION

As mentioned, the Kunene Region provides the opportunity for the implementation of policies where the local community can benefit from the financial results of tourism development in Namibia. The four registered and nine formative conservancies in the region are indicative of this assumption. Conservancies can, however be extended to can include other areas with a high tourism potential, and more community-based tourism enterprises be established to provide an income for local communities.

7.9.1.1 Tourism Development as Policy

The development of the tourism sector in the whole of the Kunene Region, but more specifically in Sensitivity Zones I and II, should officially be accepted as priority by local and regional authorities. Once accepted as a policy on local and regional level, all infrastructural development should be directed to, first of all, meet the needs and requirements of the tourism sector.

This might include the following:

- access to scenic areas,

- improvement of the more important routes to be accessible by 2x4 vehicles,

- improvement of alternative routes to substandard routes such as van Zyl's Pass to accommodate 4x4 vehicles without jeopardising off-road expectations,

- provision of water and ice on tourism routes for exclusive use of tourists.
7.9.1.2 Implementation of Recommendations of North-west Region Tourism Master Plan

The "Draft North-west Region Tourism Master Plan" makes detailed recommendations as summarised in paragraph 7.6. The report supports the above-mentioned recommendations in principle and recommends that they be implemented once approved by the Ministry of Environment and Tourism as client Ministry.

7.9.1.3 Formation of additional conservancies

With respect to the formation of additional conservancies, it is recommended that the communities in the Management Zone A and D in the Sensitivity Zone II as indicated in Figure 12 be mobilised to establish conservancies in these areas.

7.9.1.4 Small-scale and community-based operations

(i) Community-based tourism enterprises

The community-based tourism camps at Purros and Orupembe are good examples of the implementation of the policy on community-based tourism enterprises. It is therefore recommended that small- and medium-scale tourism facilities be established at Marlenfluss, Swartbooisdrift, Etanda (near Van Zyl's Pass), Hoanib River (Amspoort area), northern part of Hartmann's Valley and Okangwali area.

(ii) Entrance gates to conservancy areas

Although the concept of paying a fee to enter a specific conservation area apart from a proclaimed national park may be new in Namibia, it is not uncommon elsewhere. It is therefore recommended that entrance gates be erected at the entrances of conservancies where a permit is obtained at a fee to enter the specific conservancy. As a small-scale enterprise, the local community will manage the gates and the funds raised partly utilised for the improvement of the facilities within the conservancy.

(iii) Tourist information centres

The entrance gate to a conservancy should be combined with a Tourist Information Centre. This Tourist Information Centre will provide information on the specific conservancy, as well as sell maps and other basic necessities to tourists. The tourist Information Centre will also serve as a market for locally produced curios and handicrafts.

7.9.2 FOUR NORTH-CENTRAL REGIONS (4 O'S)

The study area of especially the Omusati and Oshana Regions provide the best opportunity and potential for tourism development in the four north-central regions. The inclusion of the nearby Etosha National Park in the Omusati-, Oshana- and Oshikoto Regions provides a golden opportunity for the expansion of tourism into the study areas of these regions. Wildlife can also relatively easily be introduced in especially the Narawandu and Andoni areas due to the resources available in the Etosha National Park. In fact, a first initiative has been taken with the establishment of the Efaotelaka Holding camp.
7.9.2.1 Establishment of conservancies

In the light of existing conservation legislation it is recommended that:
- the areas of the Narawandu and Andoni tourist areas that fall within the communal land, as well as the Ombuga tourist area, be upgraded to conservancies.
- agreements be entered into and between Regional authorities and conservation authorities for the utilisation of wildlife and other resources available in the Etosha National Park to also benefit neighbouring communities.

7.9.2.2 Specific development proposals

With respect to specific recommendations in the north-central regions, it is recommended that:
- the Narawandu, Ombuga and Andoni tourist areas be developed in accordance with recommendations made in the Tourism Development Plan for the Ohangwena, Omusati, Oshana and Oshikoto Regions.
- Regional authorities be supported to source for suitable private investors to develop a Homestead Lodge in the Eunda-Onezi area and a transit camp in the Ohangwena Woodland.
- Mr Ndumbu, who holds the PTO for the Otjipahurirro Campsite near Ruacana, be urged to upgrade the camp to an acceptable standard for tourists, or alternatively to relinquish his PTO so that a well-managed community camp can be established.

7.9.2.3 Small-scale and community based operations

(i) Entrance gates to conservancy areas

As soon as the proposed Narawandu, Ombuga and Andoni tourist areas have been upgraded to conservancy areas, it is recommended that entrance gates be established where permits can be obtained to enter the conservancy. This can be a private small-scale commercial operation.

(ii) Tourist Information Centres

As described in paragraph 7.9.1.4 (iii), the entrance gate can be combined with a Tourist Information Centre.

7.9.3 Technical and financial assistance to small-scale entrepreneurs

The services of any small-scale enterprise are subject to the successful implementation of such a project. It is therefore recommended that the above-mentioned small- and medium-scale commercial project be implemented in terms of the proposed mechanism as described in Chapter 9.
8. INFRASTRUCTURE

A direct correlation exists between infrastructural development and population density and distribution. Generally, the development of infrastructure is a direct result of people and communities moving into and occupying under-utilised and unutilised areas. Such developments occur mostly on an ad hoc basis, which emphasises the need for proper regional and land-use plans. Although this report is restricted to unutilised and under-utilised parts of the communal land of the five regions under review, note should be taken of infrastructure development on a regional level, as well as existing and proposed regional development plans, land-use plans and extensions of existing infrastructure into the un- and under-utilised areas.

8.1 ROADS

The provision of an adequate road infrastructure of an acceptable standard and at the right time is a prerequisite for sustained economic growth and an impetus for enhanced development in a region. Overall, the five regions under review have been neglected for a long time with respect to the provision of a proper road infrastructure. However, after independence the Department of Transport within the Ministry of Works, Transport and Communications commissioned two major studies to advise on the development of a proper road system in these regions. They are:

- the Owanbo Roads Master Plan (1992) as reviewed and renamed the Oshikoto, Oshana Omusati and Ohangwena Roads Master Plan Revision (May 1999); and

- Kavango Roads Master Plan (September 1998).

A third Master Plan, i.e. for the Kunene Region, has been commissioned and is in the process of drafting.

8.1.1 Road Development and Construction Cost

8.1.1.1 Road Development and Environmental Issues

Apart from the primary objective of roads, any road development should take the environmental impact of such development into account. For the north-central regions, the environmental impact could be very serious, since the drainage system of the Cuvelai Delta can easily be changed by artificial structures such as roads and canals. The Oshikoto, Oshana, Omusati and Ohangwena Roads Master Plan therefore took the environmental impact of road development into account and planned roads according to these categories, namely:

- those that run across the Cuvelai Delta in an east-west direction;

- those that run approximately north-south within the Cuvelai, parallel to the general direction of flow, and

- those outside the Cuvelai system.

A secondary effect that was taken into account by improving existing tracks or of building new roads is the accelerated settlement of people along these routes. Roads Master Plans therefore concentrate on already populated areas to serve existing communities and social infrastructure rather than to open new areas for settlement. According to documentation, the governor of the Ohangwena Region, for example, expressed his concern regarding the opening up of the still pristine eastern woodlands and recommended that any link between the eastern part of the Ohangwena Region and Oshivelvo should be shifted to areas already settled.
In general, numerous tracks give access to the more remote areas and communities in the study area. These tracks are in most cases only accessible to a 4x4 vehicle and in some areas, like the southern part of the Oshana Region, not accessible at all during certain times of the year due to flooding.

8.1.1.2 Types of road Construction and Cost

The improvement or construction of roads in the study area can be classified into three categories namely:
- construction of gravel roads;
- construction of earth roads;
- construction of cleared tracks.

The general criteria mentioned below and cost estimates are based on the Kavango Roads Master Plan and give an indication of the cost of construction on the different types of roads for that Region. Aspects that were taken into account are:
- design standard;
- number of drainage structures;
- soil condition and in-situ material;
- topography.

As the greater part of the study areas of the Oshikoto-, Ohangwena- and Omusati Regions are similar to the Kavango Region, the cost as indicated in the Kavango Roads Master Plan can be used as a guideline for construction of roads in these areas. The cost of construction of roads in the Kunene Region is not applicable at this stage, whilst the cost of construction of roads in the flood area of the Oshana Region should be determined in feasibility studies as and when roads are constructed. However, for the purpose of this report the cost of construction of a gravel road is used as a very rough estimation.

- **Gravel Roads**

  Gravel roads are generally constructed with a 7.5m wide carriageway, on a 10m wide formation. Suitable in-situ material is used for the formation with a gravel wearing course imported from borrow. The construction cost is greatly influenced by the number of drainage structures required and is estimated to be:

  Roads in Omarambas  
  NS380 000/km

  Other roads  
  NS300 000/km

- **Earth Roads**

  Upgrading of natural tracks to earth roads is done by clearing the road reserve and creating a formation by raising and compacting in-situ material. No imported material is used.

  Earth roads are appropriate for construction using labour-based techniques which can provide employment for communities alongside the road. They are also appropriate where financial constraints preclude upgrading to gravel road standard.
The construction cost of earth roads is estimated to be N$100 000/km.

- **Construction of cleared tracks (betterment)**

Upgrading natural tracks to cleared tracks, referred to as "Betterment", is done by grading existing tracks and clearing adjacent bush. In-situ material is used exclusively and no imported material is utilised. Betterment activities are well suited to labour intensive techniques for the clearing and minor smoothing tasks. From discussions with relevant officials the financial cost of constructing cleared tracks was estimated to be N$20 000/km.

Betterment is an appropriate option as the first phase of a systematic upgrading programme. Its advantages include the provision of employment, a reduction in the proliferation of tracks and improved access.

- ** Provision of roads in the study area**

Access to the more remote and under-utilised areas, together with the provision of water is the two main shortcomings identified for the economic utilisation of these areas.

It can be assumed with reasonable surety that the government will, as a first priority, concentrate on the development of roads as indicated in the different roads master plans to service existing communities and social infrastructure.

The development of roads as indicated in this study may therefore be delayed for an indefinite period, which makes cost, estimates irrelevant.

If budgetary provision for a certain amount could be made on a yearly basis for the opening up of under – and unutilised areas, access roads to these areas could be prioritised and a programme implemented over a period of time.

The allocation of funds for this purpose will then determine ...at access roads should be developed, as well as the distances, taking into account inflation.

As a first phase of development, only a single lane earth road (4 meters) with gravel at the more sandy places can be developed to improve access to the more remote areas.

Subject to the quantity of gravel needed and distances, the cost of this type of road might be between N$150 000 and N$200 000/km.

8.1.2 **KUNENE REGION**

A consultancy for the drafting of a Roads Master Plan for the Kunene Region has been commissioned by the Ministry of Works, Transport and Communications (Department of Transport). The Roads Master Plan will be completed towards the end of 2000.

The Kunene Region is connected with a good gravel district road, the DR 67, to the south where it links up with the bitumen road at Kamanjab. To the north the DR 67 is connected with main road MR92 that has a bitumen surface as far as Ruacana.

The most important places in the Kunene Region are accessible by a network of district roads. However, the harsh and hostile environment of the region resulted in these roads not being in a good condition compared to similar roads in the rest of Namibia, which is a serious threat to any economic development in the region.
The Kunene Region is becoming more and more popular for 4x4 self-drive tourism. Mostly South African and Namibian tourists have a passion for testing their vehicles on the roads of the Kunene Region. Alternative 4x4-routes are being utilised more frequently, but a good knowledge of the area or of a Global Positioning System (GPS) is necessary to avoid becoming lost.

Two factors should be taken into account when roads are planned and designed in the Kunene Region namely tourism and the nomadic lifestyle of the local communities.

- **Tourism**

As discussed in Chapter 7, the Kunene Region is at present one of the more important regions in Namibia with respect to tourism potential, and more specifically 4x4 and off-road driving. A network of good surface roads might jeopardise this potential on the one hand, while on the other hand it may open the region for more tourists with 2x4 and sedan cars. However, all indications are that an overcrowding of tourists in the region should be avoided and that the region be developed as a low traffic volume tourism region.

- **Nomadic Culture of Inhabitants**

The nomadic culture of the local people means that communities in the remote areas are always on the move, subject to the availability of water and grazing for livestock. This implies that only the more permanent settlements need be serviced with proper access roads.

- **Needs Assessment**

According to the needs assessment as indicated in paragraph 2.1 of Annexure A, it seems as though the regional representatives are more concerned about the upgrading of the main road to Opuwo, which is at present in an excellent condition.

The only other aspect mentioned, is the construction of bridges over the main rivers in the area.

**8.1.3 THE FOUR NORTH-CENTRAL REGIONS**

**8.1.3.1 General Overview**

The primary road network of Namibia of approximately 42 000 km is divided into Trunk Roads (9%), Main Roads (22%) and District Roads (69%). It does not include farm roads, estimated at 23 295 km. Paved roads make up 13% of the primary road network, with gravel roads representing the major portion, namely 56%. The remainder can either be classified as earth, salt or sand roads/tracks. Table 31 compares the primary road network of Namibia to that of the four north-central regions.
Table 3.1: Proclaimed Primary Road Network

<table>
<thead>
<tr>
<th>Type</th>
<th>Namibia (km)</th>
<th>Oshikoto, Omusati, Oshana &amp; Ohangwena Regions (km)</th>
<th>Percentage of Namibia's total Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUNK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Paved</td>
<td>3874</td>
<td>215</td>
<td>5.5</td>
</tr>
<tr>
<td>- Gravel</td>
<td>63</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>- Earth</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Sub-total</td>
<td>3937</td>
<td>215</td>
<td>5.5</td>
</tr>
<tr>
<td>MAIN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Paved</td>
<td>1407</td>
<td>(a)353</td>
<td>25.1</td>
</tr>
<tr>
<td>- Gravel</td>
<td>7716</td>
<td>308</td>
<td>4.0</td>
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<tr>
<td>- Earth</td>
<td>(b)227</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Sub-total</td>
<td>9400</td>
<td>661</td>
<td>7.0</td>
</tr>
<tr>
<td>DISTRICT</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>- Paved</td>
<td>145</td>
<td>46</td>
<td>31.6</td>
</tr>
<tr>
<td>- Gravel</td>
<td>16277</td>
<td>(c)719</td>
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<td>- Earth</td>
<td>(d)13208</td>
<td>(e)606</td>
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</tr>
<tr>
<td>Sub-total</td>
<td>29630</td>
<td>1371</td>
<td>4.6</td>
</tr>
<tr>
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</tr>
<tr>
<td>- Paved</td>
<td>5426</td>
<td>614</td>
<td>11.3</td>
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<td>4.2</td>
</tr>
<tr>
<td>- Earth</td>
<td>3485</td>
<td>613</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Source: Stewart Scorr & Bicon, 1998
(a) includes MR 110, Onuno to Elundu
(b) includes salt roads from the coastal region
(c) includes sand tracks
(d) includes all gravel roads currently under construction or that are programmed to be gravelled
(e) excludes Etosha National Park and roads south of Oshiwalo.

In 1990, the paved roads in the four north-central regions made up 10% of the country's network and gravel roads 3%. By 1999 its share of paved roads had risen to 11.3%. Presently gravel roads in the four north-central regions contribute 3.8% to the country's total network, but this figure will increase to 4.2% if the upgrading of the roads that are on programme to be gravelled is realised. There is 16.8 km of improved roads per 1000 population in the whole country, whereas in the four north-central regions there are only 2.1 km of improved roads per 1000 population. The proposed roads as per the Roads Master Plan, as well as proposed rural access roads, are indicated in Figures 9.2 – 9.5 and 15 to 18.

8.1.4 OMUSATI REGION

Within the study area of the Omusati Region five roads are either in the process of being upgraded, or are proposed for the future. They are:
- DR 3614 from Okahao to MR 67 (Opwo-Ruacana main road). It is recommended that this route start from Okahao and pass by the Okatutwa, Ankonga, Okatele and (Omaand) schools west of Okahao, continue to Okatsidechi School and clinic and pass the Uukwalaudhi wildlife sanctuary to join the MR 67.
- RT 18 from Ongulumbashe to DR 67.
- RT 21 from Amwaanda to Omatalmo-Mawe Quarantine camp via lilapu, Okeeholongo and Uutsathima Junior Primary Schools.

- RT 24 from Onkani to Otjivalunda salt pans and the proposed Narawanda Gate on the northern border of the Etosha National Park, ± 95 km north of Okaukuejo.

- DR 3605 to link the Omatalmo-Mawe quarantine camp to the west with DR 87 and eventually to the east with Ondangwa via Uukwiyu, Ekuma and Oponono. (This road is presently under construction up to Uukwiyu). This road is to cross the numerous pans at Oponono.

Additional to proposed roads as per the roads master plan as described in paragraph 8.1.3.1, the upgrading of the road from Okahao via Amwaanda and Amalika to the Ongandjera salt pans as indicated as a need. However, there is a tract of which the first part, about 10 km, has already been cleared in the “Food for Work Programme”, but not yet been constructed.

8.1.4.1 RECOMMENDATIONS

It is recommended that with respect to road infrastructure in the Omusati Region:
- the proposed roads as per the roads master plan be developed, and
- a betterment programme to improve access to the Ongandjera salt pans from Okahao via Amwaanda and Amalika be implemented.

The distance is ± 55 km and the cost ± N$110 000.

8.1.5 OSHANA REGION

Of interest to the study area of the Oshana Region are the following proposed roads in terms of the roads master plan:
- DR 3605: As described above.

- RT 23 and RT 24 from the Oshakati-Okahao main road to Onkani in the Omusati Region via Ekamba school and clinic, Nakele, Ombuga, Okaku, Ekuwa and Uuvudhiya schools, Onkani to Salt Pan No. 1 and the proposed Narawandu Gate at the Etosha National Park.

The first part (RT 23) to Onkani is included in the proposed 1999-2003 programme for graveling.

The needs assessment with respect to roads for the three constituencies partly included in the study area is as per paragraph 4 of Annexure A.

Notice should be taken of the needs of the Okatjali and Ompundja constituencies, but priority should be given to the Uuvudhiya constituency since the biggest part of this constituency falls within the study area. Due to the flat topography and oshanas, earth roads will have to be constructed at an estimated cost of N$100 000/km.

8.1.5.1 RECOMMENDATIONS

It is recommended that with respect to road infrastructure in the Oshana Region:
- the proposed roads as per the roads master plan be developed;
- the following tracks be upgraded to earth roads:
  - From Onaanda to Onkani
  - From Onkani to Oponono
  - From Oponono to Ompundja
- From Narawandu Gate (in Omusati Region) via Salt Pan no. 1, Amupini, Onaholongo to lipopo in the Oshikoto Region (Second priority).
- From Onaholongo to Onanke in the Oshikoto Region (Second priority)
- From Oponono southwards to Road D3605 near saltpans (Third priority).

The total distance of these proposed rural access roads that fall within the Oshana Region is 190 km. At a construction price of N$100 000/km, the total cost would be N$19 million.

The first priority access roads are 100 km at a cost of N$10 million.

8.1.6 OSHIKOTO REGION

The proposed roads that stretch into the study area of the Oshikoto Region as per the roads master plan are as follows:
- RT 30 to link lipopo with Onathinge via Onathinge-South, ihongo and Eseshete schools.
- RT 29 to link the constituency centre Omuntele to the south with Onanke and back via RT 33 to the Oshivelova-Ondangwa road.
- RT 43 from Oshivelova to the Mangetti east and west quarantine camps via a Veterinary Rural Extention Centre at Okaya.
- RT 35 from the Oshivelova-Ondangwa road near Okashana to Andoni on the Etosha National Park northern boundary.
- RT 37 from the Oshivelova-Ondangwa road near Okashana to join D3630 at Elambo via Okashana, Kandume, Oomanya, Onamishu and Elambo schools.
- DR 3603 from Okankolo to Onkumbula school and clinic and eventually to Okongo in the Ohangwena Region.
- RT 38 from main road 110 (Enhana-Okongo road in the Ohangwena Region) to Onkumbula in the Oshikoto Region via Oupili, Oshifu and Omutwewomhedi schools.

The need for rural access roads for the Oshikoto Region, apart from the roads as proposed in the roads master plan, is prioritised in paragraph 5 of Annexure A and indicated on Figure 17.

Due to the topography and soil in the region, it would be difficult to recommend only one type of construction method. The existing tracks, which in most cases follow the lining of the proposed roads, are in some places very sandy and only accessible with a 4x4 vehicle, while in other places the surface is hard and good enough for a betterment programme. A mix between a betterment programme and earth roads might therefore be implemented, which will influence the cost.

The needs assessment for access roads in the Oshikoto Region is as per paragraph 5 of Annexure A. However, the proposed rural roads as indicated in Figure 17 do not necessarily follow the routes as indicated in the needs assessment. The proposed roads also take into account access to existing district and national roads, as well as links with adjacent regions and the needs assessment of these regions.

The recommendations, therefore differ slightly from those as indicated in the needs assessment for the Oshikoto Region, but will provide a skeleton network for access to this very remote area in the region.
8.1.6.1 RECOMMENDATIONS

It is recommended that with respect to the development of rural access roads in the Oshikoto Region:
- the roads as indicated in the roads master plan be developed.
- Rural access roads be developed according to the following priorities:
  - First Priority
    - The King Kauluma road from King Kauluma to the Mangetti Quarantine Camp (50 km).
    - From the quarantine camp directly northwards (Poroporo road) to Olukula in the Ongwena Region (55 km in Oshikoto Region)
    - From the quarantine camp westwards to the border of the Kavango Region, with an off-take to the south to Tsinisabis (120 km).
    - From Elemba westwards to the Poroporo road (70 km)
    - From Okankolo to Olukapa via Onkumbula
    - From Olukapa to Ekonhola (70 km).
  - Second and Third Priorities
    The second priority is a road from Okongo in the Ongwena, as well as the second and third priorities as per the needs assessment, taking into account the proposed access roads as indicated in the first priority above.

The total length of the proposed rural access roads to the remote areas of the Oshikoto Region is ± 365 km. At a cost of N$200 000 per km the total cost would be N$73 million.

8.1.7 OHANGWENA REGION

The greater part of the Ongwena Region east of Okongo falls within the study area. This study will therefore concentrate on this area, but notice should be taken of the needs for rural access roads in the other constituencies as per paragraph 8 of Annexure A.

East of Okongo, only two roads are proposed according to the roads master plan, namely:
- RT 41 from the main road (MR 110) to Eekoka clinic via Oidiva School.
- RT 42 from MR 110 to Olukula School via Enyana, Olukeno and Oshikuni schools.

In the Okongo constituency most of the rural access roads as indicated in the needs assessment have already been cleared in the "Work for Food Programme". However, since the roads are not constructed or even mechanically cleared, re-growth already has started in the cleared areas and unless some sort of construction is started, the whole exercise will be fruitless. Due to the sandy terrain, it is doubted whether the construction of earth roads, without importing material, will be a solution. As in the case of the other regions, a 4 m gravel road can be constructed at an initial phase as an estimated cost of N$200 000/km.
8.1.7.1 RECOMMENDATIONS

With respect to rural access roads in the Ohangwena Region, it is recommended that:
- the roads as indicated in the roads master plan be constructed;
- rural access roads with a gravel surface of 4 m be constructed on the already cleared routes and prioritised as indicated in paragraph 6 of Annexure A.

The total distance east of Okongo, the priority area, is ± 85 km and at a construction cost of ± N$200 000/km will cost N$17,0 million.

8.2 WATER

The most important factor in the opening of virgin, unutilised of under-utilised land in the communal areas is the availability and quality of water. Two major programmes have been initiated by the Government to provide water to existing developed and underdeveloped areas namely bulk water supply by Namwater and rural water supply by the Directorate of Rural Water Supply within the Ministry of Agriculture, Water and Rural Development. Whereas bulk water is supplied to mainly bulk water consumers, the emphasis of rural water supply is on the provision of water to households and livestock in the more remote areas.

For the purpose of this study, notice will be taken of bulk water supply schemes like the network of canals and pipelines in the north-central regions, but the emphasis will be on rural water supply schemes and proposed plans.

8.2.1 KUNENE REGION

Water in the Kunene Region is directly linked to the availability of underground water and comprises mainly boreholes, springs and wells, with a few earthdams. In total, there are approximately 243 boreholes, 94 springs and 47 wells providing water to an area of ±49 000 km². This means that a single waterpoint in the northern Kunene Region provides water to roughly 127 km² or 12 700 ha.

Boreholes are dependent on regular, local recharge of the specific aquifer dependent on the geological formation within which the aquifer is situated. Ideally, boreholes should be sited at the intersections of geological structures with major watercourses to provide recharge. For example, promising sites may occur along the Purros lineament where it diverts the Khurib and Hoarosib rivers, whereas the recharge of the northern extension of the Sesfontein thrust is limited due to the minor watercourses.

Glaciated, sediment-filled valleys have also proved to be promising sites for boreholes in the eastern part of northern Kunene Region.

North-west of Opuwo, reasonable yields were obtained from boreholes in a calcrite-floored valley, filled with over 150m of Karoo sediments.

8.2.1.1 Approach to Groundwater Resource Development in the Kunene Region

A sustainable approach to the development of groundwater resources in the Kunene Region cannot ignore factors which include considerations of land surface conditions. An ad hoc approach to water resource development may contribute to the process of accelerated land degradation and even to desertification in places where these processes have been allowed to advance.
Criteria that should be taken into account when new boreholes are drilled include the following:

- **Land evaluation**

A prerequisite for any water development in the Kunene Region is to establish full knowledge of existing land conditions in the area. Since the general condition of the soil and vegetation in the Kunene Region has already degraded to such an extent that desertification is a reality, the opening up of new areas should take into account the potential negative impact, for example the encouragement of localised overgrazing, on the land. A short environmental impact study should therefore be done for all future water development.

- **Conservation measures**

Hand in hand with land evaluation, the future water development should be planned with the aim of utilising the land resources in a sustainable manner. Conservation and betterment of the environment should therefore play an important role not only to protect the currently potential productive and conserved land, but also to enhance the tourism potential of the area.

- **Stock control practices**

The development of water resources should be implemented alongside conservation management and stock control practices with the full participation and understanding of the farming community.

The implementation of policies and strategies like the Communal Livestock Marketing Strategy and the Northern Regions Livestock Development Project will therefore be essential to secure sustainable utilisation of the resources of the Kunene Region.

- **Resource limitations**

Taking into account the above-mentioned, the development of new boreholes and the amount of water provided per borehole are determinants of the intensity of use of land surrounding the borehole.

The provision of water should therefore only be made after evaluating the resilience of land resources to potential change in land use and/or intensity.

- **Tourism Potential of the Kunene Region**

As discussed in paragraph 7.6 of this report, the whole of the Kunene Region is one of the most important tourism areas in Namibia. Taking into account the current stock numbers which led to overgrazing and degradation of the region with respect to vegetation and erosion, any further water development should be strictly controlled according to above mentioned factors. However, certain areas in Tourism Zone III (Figure 12) and according to agro-ecological zones KAO2 and KAO 4 (Figure 9.1), could still be investigated for the development of water resources subject to the criteria as mentioned. The development of water resources to satisfy the need of the tourism sector and to enhance tourism development should therefore be the priority in the Kunene Region.
8.2.1.2 RECOMMENDATIONS

With respect to water resource development in the Kunene Region, it is recommended that:

- Water resource development to satisfy the needs of the tourism sector be a priority.
- Water resource development for livestock be restricted to areas indicated by the agro-ecological zoning as suitable for small- and large stock grazing as indicated in Figure 9.1.
- The development of water resources for livestock be strictly subject to the criteria as set out above.

8.2.2 THE FOUR NORTH-CENTRAL REGIONS

Limited water availability and poor water quality are among the main factors limiting development in the study area of the 4 O’s. The canal and pipeline system provides water to the more densely populated areas and only one pipeline stretches into the study area of the Oshana Region. The greatest part of the study area is dependent on groundwater, which can be classified into four broad areas namely the Western Area, the Central Brine Lake Area, the Eastern Area and the Artesian Area.

The Western Area, covering the Omusati Region, has somewhat variable groundwater occurrence, with only some boreholes providing a good yield. At depths between 10 and 50 m the watertable is quite shallow, but the water quality is poor, being saline in most cases.

The deep regional aquifer of the Brine Lake covers the eastern part of the Omusati Region, the whole of the Oshana Region and the south-western part of the Oshikoto Region. The quality of the water is highly saline and unsuitable for human consumption. A shallower aquifer in the central area, at depths between 5 and 20 m, is potable and is being utilised through open pits and hand-dug wells.

Groundwater in the Eastern Area covering the Oshikoto and Ohangwena Regions, is found at 70 to 90 m and about 85% of drilled boreholes have been successful. Yields are around 2 and 5m³/day.

The Artesian Area is found around Oshivelco and the Andoni plains. The yields of the artesian boreholes are high, but saline. A perched aquifer of potable water also occurs in the Oshivelco area at depths of 10 to 20 m with yields of up to 15m³/day.

8.2.2.1 NEEDS ASSESSMENT

The needs assessment as indicated in Annexure A for the different constituencies range from earth dams, extension of pipelines, new boreholes and the renovation of existing boreholes.

- Earth dams

Due to the saline underground water, earth dams are a possible solution for providing water to certain areas. However, the success of earth dams as a permanent source of water is subject to the topography for the refilling of the dams during the rainy season, the soil and clay content in the soil to hold water and rain. The only areas where earth dams might bring relief to the water situation are in the Ruacana and Okahao constituencies in the Omusati Region, the Uuvudhiya and Ompundja constituencies in the Oshana Region and the south-western part of the Oshikoto Region. The soil over the greatest parts of the Oshikoto, Ohangwena and Kavango Regions will not hold water for a
long period. However, certain pans might be used although the catchment area of these pans is very limited.

The construction of earth dams may also influence the ecology when such dams are fed from the Etako and Ekuma channels. However, the amount of water taken out of these channels should not severely affect the flow to the Etosha Pan, especially in good rainy seasons when the Efundja are fed with good rains in Angola.

In terms of the needs assessment, 47 earth dams are recommended in the four north-central regions (please refer Annexure A).

The excavation cost of an earth dam ranges between N\$20/m³ and N\$25/m³. Depending on the size of the dam, the location and condition of the soil, the construction of an earth dam can range between N\$25 000 to N\$50 000 for sizes ranging between 20 x 20 m and 40 x 40 m with a depth of 3 m.

- **Renovation of existing boreholes**

It can be expected that the renovation of existing boreholes including the cleaning of the boreholes and replacement of equipment and machines in all the regions, is an ongoing process and should be budgeted for on the maintenance programme instead of the capital programme. According to the needs assessment, the renovation of existing boreholes has been identified in different constituencies.

The cost for the renovation of existing boreholes is subject to the state of the boreholes. However, the cleaning of the borehole, the replacement of five pipes and the provision of a standard machine is ± N\$10 000 per borehole.

- **Boreholes**

For the greatest part of the study area the extension of existing pipelines is too costly given the amount of people and livestock. The best alternative is boreholes in areas where the availability and quality of underground water allow this source of water development.

Although the quality of the water in the western and south-western parts of the Omusati Region is poor, the present occupation of the area indicates that one can live with it. In the southern and eastern parts of the Oshikoto Region and the eastern part of the Ohangwena Region the water is deep and therefore expensive to develop. However, the availability and quality of underground water in these areas justify an organised drilling programme to provide water to well-defined and demarcated plots in demarcated areas.

The needs assessment as summarised in Annexure A indicates the different places where boreholes are needed in the different regions. It is assumed that these areas are where people already live, whether temporarily or permanently, and that the provision of water to these areas is a priority.

The estimated cost of a borehole with yields of 5m³/day to 10m³/day ranges between N\$75 000 to N\$95 000 per borehole. This cost includes groundwater investigation, siting, drilling, testing and equipping with a diesel engine, mono pump, 1 m overhead tank and fittings (please refer paragraph 4.8.3).
Extension of pipelines

The channel and pipeline network in the four north-central regions provides a reliable source of water to people and livestock in the most populated areas. The system is divided into two administrative components, namely bulk water supply provided by Namwater and rural water supply provided by the Directorate of Rural Water Supply within the Ministry of Agriculture, Water and Rural Development. Obviously, the planning and extensions of pipelines for rural water supply is dependent on the amount of water available at a certain point as provided by the bulk water supplier.

At present, four projects for rural water supply are in the planning and/or construction phases to extend water supply to the rural areas. They are the Endola East Project, the Tsandi South Project, the Oshivelo-Okankolo Project and the Ruacana South Project. Of these four projects, only small parts will provide water to the study area. This includes water supply to the Okalseidi community in the Omusati Region from the Tsandi South Project, and a few communities in the Oshikoto Region from the Oshivelo-Okankolo Project. Since the extension of pipelines for rural water supply is based on existing communities, it can be expected that the greater part of the study area will not be serviced with pipelines as a source of water simply because it is not cost-effective.

Many pipelines come to an end in the area bordering the land area of this study. This aspect might, therefore, create the impression that the extension of a pipeline (as suggested in the needs assessment) could be a solution.

In reality, the solution is not so simple. Although the design of a pipeline takes into account the amount of people and livestock, as well as an expected increase due to the permanent supply of water, the demand normally exceeds the supply within a very short period.

This normally results in a shortage of water, especially at the end of a pipeline. A very good example of this situation is the Omapi pipeline in the Oshana Region. The pipeline was designed to supply water to a certain amount of people and livestock, as well as to the Uuvudhiya and Onkani schools, but the demand exceeds the supply to such an extent that water has to be transported to the Uuvudhiya and Onkani schools with tankers.

Due to the above-mentioned situation, separate feasibility studies should be done for the extension of pipelines into the study area, and can therefore not be recommended within the scope of this study.

8.2.2.2 RECOMMENDATIONS

With respect to the development of water resources in the four north-central regions, it is recommended that:

- new boreholes be drilled according to the implementation of a well planned programme of a small-scale commercial farming model as recommended in Chapter 4.

- Budgetary provision be made for:
  - the excavation of earth dams at a cost of N$50 000 per unit on the capital budget;
  - renovation of existing boreholes at a cost of N$20 000 per borehole on the current budget;
  - purchasing of new diesel engines at a cost of N$ 6 400 per unit on the current budget.
• Subject to the allocation of funds on the budget:
  - earth dams be constructed according to the needs assessment as set out in Annexure A;
  - boreholes be renovated and new engines be installed according to Annexure A;
  - construction of earth dams, renovation of boreholes and installation of new engines be
    prioritised by field personnel of the Ministry of Lands, Resettlement and Rehabilitation.

8.3 ELECTRICITY

Electrification is becoming more and more of a priority for rural communities, as emphasised in the
Needs Assessment. This need necessitated the Ministry of Mines and Energy to address the issue
on a national level. A consultancy has been commissioned to draft a Master Plan for rural
electrification for the whole Namibia. At the time of writing this report, the Master Plan has been
finalised for the southern regions, but not yet for the northern regions inclusive of the Omusati,
Oshana, Oshikoto and Ohangwena Regions. However, a Final Draft will be presented by the

The Master Plan is based on acceptable criteria for the distribution of an initial amount of
N$30 m between all thirteen regions. In terms of a score sheet where points are allocated to
prospective electricity consumers in rural areas, electricity will be provided according to a
predetermined programme to rural communities over a period of time.

Since this detailed programme will regulate the provision of electricity, the consultants are of the
opinion that it is worth waiting for the Master Plan to see which communities in the study area are
included in the programme.

8.3.1 RECOMMENDATIONS

It is recommended that:

• the provision of electricity to rural communities in the study area be subject to the Master Plan
  for Rural Electrification;

8.4 BUDGETARY PROVISION FOR INFRASTRUCTURAL DEVELOPMENT

The specific line ministry in terms of the priorities of such a ministry normally does budgetary
provision for infrastructural development. Due to the low population density of the study area and
subsequent low consumer use of infrastructure, it may happen that budgetary provision for
infrastructural development in the study area does not get the necessary attention. Therefore, the
motivations submitted to the National Planning Commission for inclusion of projects in the national
budget is of utmost importance.

It would thus be necessary to prioritise the development proposals of each sector within each
region, as well as within the broader perspective of all the regions under discussion, after which well
motivated submissions must be submitted to the National Planning Commission. To be successful
in developing infrastructure in the remote areas, it might be necessary to acquire the services of an
independent competent professional to assist the regional councils in determining priorities and the
drafting of project proposals.
8.4.1 RECOMMENDATIONS

It is recommended that:

- The Ministry appoint a competent professional to assist the regional councillors to prioritise infrastructure project proposals and to draft project motivations for submission to the National Planning Commission on an annual basis.
9. SMALL-SCALE ECONOMIC PROJECTS

9.1 INTRODUCTION

After the submission of a first draft report the consultant was requested by the client to expand the report to also include small-scale economic projects which can create jobs for people and communities in the less developed areas. The needs assessments as contained in Annexure A concentrate mainly on socio-economic and infrastructure projects which have been addressed in the main report. Some economic projects as highlighted in the annexure have however been identified. This chapter will concentrate on the identification and implementation of possible economic projects.

9.2 AGRICULTURE AND FORESTRY

The following is a list of possible projects that can be developed by small-scale entrepreneurs:

Agricultural projects

- Fish farming at Oponono Lake.
- Small-scale vegetable gardening projects

Small-scale gardening projects can be established where water is available and where local markets are in close proximity e.g. tourist camps/lodges and settlements.

These places inter alia include:

<table>
<thead>
<tr>
<th>Ruacana</th>
<th>Marienfluss along the Kunene River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swartbooisdrift</td>
<td>Okongwali</td>
</tr>
<tr>
<td>Epupa</td>
<td>Ephembe</td>
</tr>
<tr>
<td>Purros</td>
<td>Lake Oponono Area</td>
</tr>
<tr>
<td></td>
<td>Expansion of existing gardening at Sesfontein/Khowarib Area</td>
</tr>
</tbody>
</table>

- Non-perishable products

These products are considered important because the proximity to a market is not as vital as for the above category. These products include different types of nuts, dates, cotton, granadillas and jojoba for which a feasibility study is currently being done by the consultant for the NDC. These products can be produced anywhere where water is available and where climatic and soil conditions are suitable.

Agro-agricultural projects

Agro-agricultural projects can be developed where raw materials are available. These projects include mahango/maize milling, small-scale processing of animal hides and skins and cutting of poles and ratters where suitable material is available and under strict environmental guidelines and control. Other projects can include:

- The collection and processing of mopane roots for the tourist trade.
- The collection and processing of makalani nuts for the tourist trade.
- The cultivation of Jojoba.
- Chicken farming.
9.3 TOURISM

For the tourist industry the following projects can be developed:

- The manufacturing of handicrafts like baskets, clay pots, wood carving, beads, exotic and camping furniture.
- Supply of ice, firewood and bottled water.

- Infrastructure
  - Maintenance and improvement of certain sections of 4x4 routes.
  - The development of new alternative 4x4 routes.

- Manufacturing

Various types of small-scale manufacturing projects can be considered e.g.
- brick making,
- clothing and shoes,
- bakeries,
- cooking utensils,
- wire mesh,
- processing of semi-precious stones,
- salt from the Okandjera and Ojivalunda salt pans.

- The establishment of small bio-gas plants using cow dung as raw material to supply gas for cooking and lighting to remote communities where electricity and fire wood are not available.

The above list is by no means exhaustive and should only be used to trigger private initiative. The success of any economic project is subject to a well-developed mechanism for identification of projects, the identification entrepreneurs, the training of identified entrepreneurs in basic business principles, the drafting of a business plan, sourcing of financing, the establishment of business ventures and the provision of after care services.

9.4 MECHANISM FOR THE IMPLEMENTATION OF ECONOMIC PROJECTS

It is recommended that the following mechanism be implemented for the establishment of small-scale projects.

- Identification of projects

The communities in the remote areas should be activated to identify small-scale development projects within the specific area.

The identification of projects could best be done by a facilitator who should work in close collaboration with regional councillors, community leaders, traditional leaders and experienced business people.

- Identification of possible entrepreneurs

As a second step the facilitator should identify possible entrepreneurs to develop small-scale economic projects. This could be done by the drafting of basic criteria like:
- educational requirements,
- previous business experience,
- own financial contribution,
- own available infrastructure e.g. building, electricity, equipment etc.

The identification of the possible entrepreneurs will go hand in hand with the identification of projects.

- Training

Once projects and suitable entrepreneurs have been identified, group training in basic business skills should be provided by means of a suitably developed training course. This course culminates in the development of a business plan for a specific business. Business plans will be evaluated and used as the qualifying criterion for the selection of successful candidates.

- Financing

The successful business plans will be submitted to a suitable financial institution/s for possible financing. It must be borne in mind that the non-income generating activities such as identification of projects and entrepreneurs, training and after care will have to be financed by a donor or a Government institution (in this case possibly the Ministry of Lands, Resettlement and Rehabilitation). The financing of the business venture itself could be done by the different financial institutions available in the market.

- Implementing Agent

A suitable implementing agent should be identified for the successful implementation of the mechanism described above. The responsibilities of this implementing agent will include inter alia:
- the identification of projects and possible entrepreneurs,
- the training,
- the evaluation business plans,
- the sourcing of finance, and
- the provision of an after care service.

A similar mechanism was developed by IDC for the Job Creation Fund of the Government of Namibia in 1994. The project worth about N$5 m was successfully implemented with the assistance of IMLT, who was responsible for training and after care and the commercial banks in Namibia as administrators of the finances.

Annexure C describes the philosophy behind a rural development training program.

- Recommendation

It is recommended that
- The Ministry of Lands, Resettlement and Rehabilitation take the initiative for the implementation of small-scale economic projects in the remote and under-developed areas in the five regions covered in this report;
- implementation of this small-scale business development project be done in terms of the mechanism described above;
- a project facilitator be identified and appointed;
- budgetary provision be made by the Ministry in collaboration with the facilitator;
- a fund called the Rural Assistance Fund be established within the Ministry of Lands, Resettlement and Rehabilitation to provide technical and financial assistance to small economic development projects in remote rural areas of the five regions covered by this report. An initial
amount of N$500 000 per region could be appropriated for this purpose. A proposed agreement between the Ministry and commercial banks is attached as Annexure D.

This Fund could at a later stage be extended to include the other regions.
10. SUMMARY

This chapter serves to summarise the proposed sectoral development in each of the five regions under investigation, as well as to summarise the recommendations made with respect to small-scale economic projects. The sectoral recommendations as visually presented in Figures 14-18 are a summary of the recommendations made for the five regions under investigation.

10.1 AGRICULTURE

10.1.1 Agricultural Practices

On average, 64.3% of the population in the five regions under investigation are directly or indirectly involved in the agricultural sector. It can further be assumed that up to 80% of the population in the study areas of these regions is directly dependent on the agricultural sector as a source of livelihood. The agricultural activities in the study area comprise of mainly livestock farming with small patches of crop production on suitable soil. In general, the soil in the study area is not very suitable for crop production and the unavailability of sufficient underground or surface water recourse rules out any irrigation projects.

10.1.2 Carrying Capacity

The scientific accepted carrying capacity for sustainable rangeland utilisation of the regions is exceeded by 55% in the Kunene Region and is as high as 100% in the four north-central regions. The figures include an estimated 120 000 donkeys in the 4 O’s. Although the local livestock breeds are hardy and well adapted to the environment, the productivity of the agricultural sector is negatively influenced by uneconomical and outdated practices such as composition of herds and reluctance to sell unproductive animals.

10.1.3 Grazing Conditions in the Study Area

Compared to the general grazing conditions in the five regions which in some cases deteriorated to the fourth stage of desertification, the conditions in the study area are far better than in the densely populated areas. The main reasons for this are mainly the unavailability of suitable of sustainable water resources, as well as the flooding of certain areas during the rainy season.

10.1.4 Fencing of Certain Areas

Huge portions of land, especially in the 4 O’s are “illegally” fenced off. The fencing off of certain areas, whether illegal or legal in terms of existing practices indicates a desire by individuals to occupy and manage land in terms of economical farming practices. This desire should be acknowledged and properly controlled by the Communal Land Reform Bill once it is generally accepted and promulgated.

10.1.5 Demarcation of small-scale commercial farming Areas

In order to avoid uncontrolled development of communal land, as well as to prevent degradation of the relative conserved rangeland conditions in the study area, certain portions of land in the 4 O’s should be demarcated and reserved for small-scale commercial farming purposes. The areas as indicated in Figures 15-18 are selected according to specific criteria, while the rest of the land is still available as common grazing areas.
10.1.6 Development of Small-scale Commercial Farming Units

A model for the development of small-scale commercial farming units is proposed. Subject to the availability of funds, the government can implement the model in phases and take the responsibility for all development cost to be paid back over time by the leaseholders. Alternatively, the Government can take the responsibility for the planning, surveying and provision of water while the leaseholder will be responsible for the other infrastructure.

10.1.7 Implementation of Small-scale Commercial Farming Units

The implementation of the small-scale commercial farming model is subject to the promulgation of the Communal Land Reform Bill, the approval of demarcated areas by the local communities and different levels of authority, proper planning and surveying, the implementation of commercial farming practices and strict control by the relevant authorities.

10.1.8 Implementation of Commercial Farming Practices

The contribution of the agricultural sector to the income of rural households in the study area can be dramatically increased by the introduction of commercial farming practices. Such practices may include the restructuring of livestock herds and the doing away of non-productive units and the implementation of plans and strategies on livestock development and marketing.

10.2 GENERAL RECOMMENDATIONS: AGRICULTURE

10.2.1 Reduction of Livestock Numbers

It is recommended that livestock numbers in all the northern communal areas be reduced to the proposed stocking rates in order to secure sustainable livestock production in these areas. Livestock numbers can be reduced by means of the implementation of the Communal Livestock Marketing Strategy, together with the implementation of plans and strategies which support the reduction of the livestock population in the communal areas.

10.2.2 Monetary Value of Agricultural Products

It can be accepted that agricultural extension services concentrate on inter alia the betterment of local breeds, animal health, farming practices etc. However, the monetary value of livestock should be emphasised in order to change the traditional view of livestock as a parameter of wealth and to support other livestock reduction strategies and the implementation of commercial farming principles.

10.2.3 Approval of a Model for Small-scale Commercial Farming

It is recommended that the proposed model for small-scale commercial farming in principle be approved.

10.2.4 Demarcation of Small-scale Commercial Farming Areas

It is recommended that the areas as indicated in Figures 9.2 to 9.5 be demarcated for the implementation of a small-scale commercial farming model.
10.2.5 Control of Livestock Numbers and Implementation of Commercial Farming Principles

It is recommended that the implementation of a small-scale commercial farming model be supported by mechanisms to control livestock numbers in order to avoid overgrazing and the degradation of natural vegetation as well as the implementation of other commercial farming principles to maximise the production potential of the model.

10.3 REGIONAL RECOMMENDATIONS: AGRICULTURE

10.3.1 Kunene Region

- It is recommended that the provision of water for agricultural purposes be limited to areas suitable for livestock farming as indicated in Figure 14.
- The provision of water for livestock purposes in each area be subject to criteria that minimise a negative impact on the environment.

10.3.2 Omusati Region

It is recommended that the small-scale commercial farming model be implemented in the south-western part of the Omusati Region stretching from Amarika westwards for a zone of 15 km north of the proposed Ongandjera Community Forest Reserve to the Kamanjab-Ruacana road, and northwards along the border of the Ruacana constituency to the proposed Uukwaluudhi conservancy as indicated in Figure 15.

10.3.3 Oshana Region

It is recommended that the small-scale commercial farming model be implemented in the area south of the Etaka channel and 6 km both sides of the Omapala pipeline as indicated in Figure 16.

10.3.4 Oshikoto Region

It is recommended that the small-scale commercial farming model be implemented in the south-eastern part of the Oshikoto Region north of the border of the present commercial farming area of the Tsumeb district and from the proposed King Kauluma-Okongo road to the Okavango border as indicated in Figure 17.

10.3.5 Ohangwena Region

It is recommended that the small-scale commercial farming model be implemented in the south-eastern part of the Ohangwena Region south of the Okongo-Rundu road as indicated in Figure 18.

10.4 FORESTRY

10.4.1 Economic value of Forest Reserves

The economic value of Namibia’s forest resources has as yet not been acknowledged and fully utilised as a source of income for rural communities. Various products from forest reserves such as construction poles, firewood, charcoal, crafts and implements, baskets etc. can be manufactured by small-scale entrepreneurs to contribute an estimated N$1000 m per annum to the income of rural households and communities. However, a well-developed strategy for the commercial utilisation of forest resources should be developed whereby specific small-scale projects and entrepreneurs be
identified, training in basic business principles be provided and access to finance be secured. This could be done within the model as recommended in Chapter 9.

10.4.2 Recommendations

It is recommended that:

- the proposed Community Forest Reserves as indicated in Figures 15 and 18 be proclaimed as a matter of urgency;
- the commercial value of forest reserves be recognised and propagated as a source of income for rural households and communities;
- a strategy be implemented whereby specific small-scale financial viable projects be identified, selected entrepreneurs be trained and technically assisted with respect to training in basic business principles, drafting of business plans and access to finance.

10.5 GEOLOGY AND MINING

10.5.1 General Overview

The mineral resources in the Kunene Region are by far the most promising compared to the four other regions under review as indicated in Figure 11. Numerous exclusive prospecting licences have been issued in the Kunene Region for the exploitation of mainly semi-precious stones, dimension stone, base and rare metals, chalcedony and even precious stones. At present, two investment opportunities are available for private investors namely at Cunene Gem and Dimension Stone (N$500 000) 90 km from Opuwo, and at Orupembe Marble (+ N$500 000) 130 km west of Opuwo.

Although the 4 O's are not as richly blessed with mineral resources, the appearances of brick clay at different places and soda salt at the Ongandjera and Otjiwalunda pans provide opportunities for small-scale business ventures.

10.5.2 Recommendations

It is recommended that:

- the Kunene Regional Council in collaboration with mining licence holders develop a mechanism to promote investment opportunities in the mining sector;
- small-scale semi-precious stone operations by local communities in the Kunene Region be technically and financially assisted and organised selling points of these products be established at selected sites on the tourism routes;
- small-scale brick clay operations be technically an financially assisted in the 4 O’s for the manufacturing of clay bricks in remote areas as an alternative to cement bricks; and
- small-scale commercial salt operations at Ongandjera and Otjiwalunda be technically and financially assisted for the manufacturing of an “exclusive” salt product.

10.6 TOURISM

10.6.1 Tourism Governing Instruments

Tourism has been the fastest growing economic sector in Namibia since independence. On national and regional level, various instruments govern tourism and at least three regional tourism development plans have been drafted.
The Government, through the Ministry of Environment and Tourism, acknowledged the importance of tourism and tourism-related activities as a source of income for rural communities in the communal areas which resulted in two policy documents namely "Wildlife Management, Utilisation and Tourism in Communal Areas" and "Promotion of Community-based Tourism".

Within these two policies, instruments and guidelines are provided to communities in communal areas for the establishment of conservancy areas and community-based tourism enterprises for the benefit of local communities and entrepreneurs.

10.6.2 Tourism in the Kunene Region

The Kunene Region is at present being regarded as one of the prime tourism areas in Namibia. Various conservancies as indicated in Figure 10 have been established or are in the process of being established and local communities can benefit from the rich and unique wildlife and scenery resources of the region.

However, due to the environmental sensitivity of the region it is of utmost importance that tourism be controlled and infrastructure be provided according to the tourism carrying capacity of the region. For this reason, the communal part of the Kunene Region is divided into three tourism zones and nine management zones as indicated in Figures 12 and 14. Based on an environment assessment, recommendations for each zone are been made in Chapter 7.

Ample scope and numerous opportunities exist in the Kunene Region for small-scale tourism ventures. However, selected entrepreneurs and communities should be technically and financially assisted to exploit these opportunities.

10.6.3 Tourism in the 4 O's

At present tourism is almost non-existent in the four north-central regions. However, the reintroduction of wildlife in mainly the Oshana Region and the rich birdlife provide an opportunity for the establishment of at least three tourism areas. This opportunity is enhanced by the incorporation of the Etosha National Park in the Omusati, Oshana and Oshikoto Regions. Figures 13 and 15-17 give indications of the locations of the Ombuga, Narawandu and Andoni Tourism Areas.

10.6.4 Recommendations

It is recommended that:

- The Kunene Regional Council acknowledges and accepts the tourism sector as a priority in the region, and more specific in Tourism Zones I and II, as indicated in Figure 14.
- Tourism development in the Kunene Region be within the guidelines as provided for the different Tourism and Management Zones.
- Additional Conservancies be established in the Kunene Region and the status of the Ombuga, Narawandu and Andoni Tourism Areas in the Omusati, Oshana and Oshikoto Regions be upgraded to conservancies.
- Small-scale and community-based tourism operations such as community-based camps, information centres and entrance gates to conservancies be identified; and selected entrepreneurs and communities be technically and financially assisted with respect to training in basic business principles, drafting of business plans and access to finance to exploit the identified small-scale business opportunities in the tourism sector.
10.7 INFRASTRUCTURE

10.7.1 General

A direct correlation exists between infrastructural development and population density and distribution. Generally, the development of infrastructure is a direct result of people and communities moving into and occupying under-utilised and unutilised areas. Such developments occur mostly on an ad hoc basis, which emphasises the need for proper regional and land use plans. Although this report is restricted to unutilised and under-utilised parts of the communal land of the five regions under review, note should be taken of infrastructure development on a regional level, as well as existing and proposed regional development plans, land use plans and extensions of existing infrastructure into the unutilised and under-utilised areas.

10.7.2 Budgetary Provision for Infrastructural Development

The specific line ministry in terms of the priorities of such a ministry normally does budgetary provision for infrastructural development. Due to the low population density of the study area and subsequent low consumer use of infrastructure, it may happen that budgetary provision for infrastructural development in the study area does not get the necessary attention. Therefore, the motivations submitted to the National Planning Commission for inclusion of projects in the national budget is of utmost importance.

It would thus be necessary to prioritise the development proposals of each sector within each region as well as within the broader perspective of all the regions under discussion after which well motivated submissions must be submitted to the National Planning Commission.

10.7.3 Needs Assessment

A comprehensive Needs Assessment has been done for each region and is attached to the report as Annexure A. The Needs Assessment expressed the needs of the different Regional Councils and communities and is not necessarily included as a priority as determined by the specific line ministry. It would therefore be necessary for the Regional Councils to take these needs in terms of infrastructural development into account and prioritise each infrastructural project. To be successful in the process to develop infrastructure in the remote areas it might be necessary to acquire the services of an independent competent professional to assist the Regional Councils in determining priorities and the drafting of project proposals.

10.7.4 Roads

The provision of an adequate road infrastructure of an acceptable standard and at the right time is a prerequisite for sustained economic growth and an impetus for enhanced development in a region. Overall, the five regions under review have been neglected for a long time with respect to the provision of a proper road infrastructure. However, after independence the Department of Transport within the Ministry of Works, Transport and Communications commissioned two major studies to advise on the development of a proper road system in these regions. They are:

- the Ovambo Roads Master Plan (1992) as reviewed and renamed the Oshikoto, Oshana Omusati and Ohangwena Roads Master Plan Revision (May 1999); and
- Kavango Roads Master Plan (September 1998).

A third Master Plan, i.e. for the Kunene Region has been commissioned and is in the process of drafting.
Apart from the recommendations as made in the different Regional Master Plans, the Needs Assessments as expressed by the different Regional Councils were taken into account in the recommendations of this report.

10.7.4.1 Recommendations

It is recommended that the recommendations of this report with respect to each region as indicated in Chapter 8 be taken into account for the development of roads.

10.7.5 Water

The most important factor in the opening of virgin, unutilised land in the communal areas is the availability and quality of water. Two major programmes have been initiated by the government to provide water to existing developed and underdeveloped areas namely bulk water supply by Namwater and rural water supply by the Directorate of Water within the Ministry of Agriculture, Water and Rural Development. Whereas bulk water is supplied to mainly bulk water consumers, the emphasis of rural water supply is on the provision of water to households and livestock in the more remote areas.

10.7.6 Kunene Region

Water in the Kunene Region is directly linked to the availability of underground water and comprises mainly of boreholes, springs and wells with a few earthdams.

Boreholes are dependent on regular, local recharge of the specific aquifer dependent on the geological formation within which the aquifer is situated. Ideally, boreholes should be sited at the intersections of geological structures with major watercourses to provide recharge.

A sustainable approach to the development of groundwater resources in the Kunene Region cannot ignore factors, which include considerations of land surface conditions. An ad hoc approach to water resource development may contribute to the process of accelerated land degradation and even to desertification in places where these processes have been allowed to advance.

Criteria that should be taken into account when new boreholes are drilled in the Kunene Region include the following:

- Land evaluation;
- conservation measures;
- stock control practices;
- resources limitations; and
- tourism potential

10.7.7 Recommendations

With respect to water resource development in the Kunene Region, it is recommended that:

- Water resource development to satisfy the needs of the tourism sector be a priority.
- Water resource development for livestock be restricted to areas indicated by the agro-ecological zoning as suitable for small- and large-stock grazing as indicated in Figure 14.
- The development of water resources for livestock be subject to the criteria as set out above.
10.7.8 The Four North-central Regions (4 O’s)

Limited water availability and poor water quality are amongst the main limiting factors on development in the study area of the 4 O’s. The canal and pipeline system provides water to the higher populated areas and only one pipeline stretches into the study area of the Oshana Region. The greatest part of the study area is therefore dependent on groundwater which can be classified into four broad areas namely the Western Area, the Central Brine Lake Area, the Eastern Area and the Artesian Area.

The Western Area covering the Omusati Region has a somewhat variable groundwater occurrence, with only some boreholes providing a good yield. At depths between 10 and 50 m the water table is quite shallow, but the water quality is poor being saline in most cases.

The deep regional aquifer of the Brine Lake covers the eastern part of the Omusati Region, the whole of the Oshana Region and the south-western part of the Oshikoto Region. The quality of the water is highly saline and unsuitable for human consumption. A more shallow aquifer in the central area, at depths between 5 and 20 m is potable and is being utilised through open pits and hand-dug wells.

Groundwater in the Eastern Area covering the Oshikoto and Ohangwena Regions is found at 70 to 90 m and about 85% of drilled boreholes have been successful. Yields are around 2 to 5m³/hour.

The Artesian Area is found around Oshivelo and the Andoni plains. The yields of the artesian boreholes are high, but saline.

The Needs Assessment as indicated in Annexure A for the different constituencies range from earth dams, extension of pipelines, new boreholes and the renovation of existing boreholes.

10.7.9 Recommendations

With respect to the development of water resources in the four north-central regions, it is recommended that:

- new boreholes be drilled according to the implementation of a well planned programme of a small-scale commercial farming model as recommended in Chapter 4.

- Budgetary provision be made for:
  - the excavation of earth dams at a cost of N$50 000 per unit on the capital budget;
  - renovation of existing boreholes at a cost of N$20 000 per borehole on the current budget;
  - purchasing of new diesel engines at a cost of N$ 6 400 per unit on the current budget.

- Subject to the allocation of funds on the budget:
  - earth dams be constructed according to the needs assessment as set out in Annexure A;
  - boreholes be renovated and new machines be installed according to Annexure A;
  - construction of earth dams, renovation of boreholes and instalment of new machines be prioritised by field personnel of the Ministry of Lands, Resettlement and Rehabilitation.
10.8 ELECTRICITY

Electrification becomes more and more a priority of rural communities as also emphasised in the Needs Assessment. This need necessitated the Ministry of Mines and Energy to address the issue on a national level. A consultancy has been commissioned to draft a Master Plan for rural electrification for the whole of Namibia. At the time of writing this report, the Master Plan has been finalised for the southern regions, but not yet for the northern regions inclusive of the Omusati, Oshana, Oshikoto and Ohangwena Regions. However, the consultants will present a Final Draft at the end of June 2000 with a Final Report at the end of July 2000.

The Master Plan is based on acceptable criteria for the distribution of an initial amount of N$30 m between all thirteen regions. In terms of a score sheet where points are allocated to prospective electricity consumers in rural areas, electricity will be provided according to a predetermined programme to rural communities over a period of time.

Since this detailed programme will regulate the provision of electricity, the consultants are of the opinion that it is worth waiting for the Master Plan to see which communities in the study area are included in the programme.

10.8.1 Recommendations

It is recommended that:

- the provision of electricity to rural communities in the study area be subject to the Master Plan for Rural Electrification.

10.9 SMALL-SCALE ECONOMIC PROJECTS

10.9.1 Identification of Small-scale Economic Projects

The identification and implementation of small-scale economic projects can greatly enhance the development of under-utilised communal areas. Although some of these small-scale economic projects have been identified in each relevant chapter, a summary of possible economic projects is provided in Chapter 9.

However, the list of identified projects is in no way exhaustive and should only be seen as an instrument to raise interest and to stimulate initiatives of entrepreneurs.

10.9.2 Mechanism for Implementation of Small-scale Economic Projects.

The implementation of small-scale economic projects as part of the process to develop the under-utilised communal areas is subject to a well-structured mechanism. A mechanism comprising of the identification of financially viable projects, identification and training of prospective entrepreneurs and technical assistance with respect to financing and aftercare is proposed. Although there are different financing products available in the market, it is doubtful whether prospective entrepreneurs in the remote under-utilised communal areas will qualify for financing in terms of the criteria with respect to collateral, own contributions, interest rates etc. It is therefore proposed that a separate fund be established to specifically cater for entrepreneurs in these areas.
10.9.3 Recommendations

It is recommended that:

- the Ministry of Lands, Resettlement and Rehabilitation take the initiative for the implementation of small-scale economic projects in the remote and under-developed areas in the five regions covered in this report.
- Implementation of this small-scale business development project be done in terms of the mechanism as described in Chapter 9.
- A project facilitator be identified and appointed to assist the Ministry.
- Budgetary provision be made by the ministry in collaboration with the facilitator.
- A fund, called the Rural Assistance Fund be established within the Ministry of Lands, Resettlement and Rehabilitation to provide technical and financial assistance to small economic development projects in the remote rural areas of the five regions covered by this report.
- If proved successful, the fund be extended to include other identified neglected communal areas.
ANNEXURE A

NEEDS ASSESSMENT
NEEDS ASSESSMENT

1. INTRODUCTION

During the field visits, meetings were held with all Regional Councils, and especially those councillors of the specific constituencies that fall within the study area of each region. The meetings were also attended by Regional Officials, traditional leaders, NGO's and civil servants of the relevant Ministries represented in the regions.

During these meetings, which took the form of a workshop, a needs assessment was done for each constituency of part of it that falls within the study area.

These needs assessments were compared to the requests for capital projects that form part of the yearly budgetary planning presented to the National Planning Commission.

A third needs assessment that was taken into account, represented extracts from discussions that were held between constituency representatives and consultants (Namibia Development Consultants) appointed by the National Planning Commission and the Ministry of Regional and Local government and Housing to draft regional development plans for each region.

It can therefore be assumed that the needs assessment as presented in this report is comprehensive, and that all stakeholders, but especially the local communities through the regional councillors and headmen, had the opportunity to contribute to the needs assessment.

Although this assignment emphasises the economic utilisation of the study area, cognisance should be taken of the needs of the communities with respect to social infrastructure. For the sake of completeness, all the needs as identified are listed for each constituency within the study area. Items that normally are the function of a line-ministry and where finance is provided on the recurrent budget such as renovation and upgrading of schools and clinics etc., are excluded.
2. KUNENE REGION

The Kunene Regional Council identified five major sectors in which development should take place. They are:

- agriculture
- tourism
- infrastructure
- mining
- industry (especially SME-development)

All these sectors as identified by the Regional Council will be attended to in this report, exclusive of industrial development which is to be established in the main centra.

The needs assessment per constituency are as follows:

2.1 Opuwo Constituency

1. Upgrading of main road to Opuwo.
2. Expansion of the existing livestock production and economic development and establishment of tannery and abattoir.
3. Establishment of additional sport facilities.
4. Expansion of business centre for example banking facilities.
5. Establishment of SME industrial units.
7. Provision of a tourist information centre, the creation of a traditional village exhibition centre.
8. Production of charcoal.
9. Establishment of Möwe Bay Harbour and possible Export Processing Zones.
10. Establishment of Coastal Zone Management Project.
11. Establishment of irrigation agricultural project.
12. Establishment of a cement factory.

2.2 Epupa Constituency

1. Establishment of community tourist camping sites.
2. Provision of water and electricity infrastructure.
3. Establishment of agricultural gardens.

2.3 Sesfontein Constituency

1. Construction of earth dams and the subsequent expansion of community gardens and a possible cotton production project.
2. Expansion of the existing water supply network and provision of additional boreholes.
3. Upgrading and expansion of the Hoanib-Sesfontein Scheme.
4. Establishment of public works programmes.
5. Establishment of small scale semi-precious stone mining.
7. Establishment of Conservancies.
8. Construction of bridges over main rivers.
9. Establishment of poultry project.
10. Establishment of SME industrial units.
11. Construction of a tannery in particular due to controlled hunting in the conservancies.

2.4 Khorixas Constituency

1. Establishment of Conservancies.
2. Establishment of small scale mining projects.
3. Establishment of livestock production projects.
4. Establishment of cultivation of dates and other crops.
5. Establishment of community gardens.
6. Restoration of historic building and the subsequent expansion of the tourism sector.
7. Establishment of SME industrial units.
8. Provision of community camping sites.
9. Harvesting of traditional medicines and the processing and export thereof.
3. **OMUSATI REGION**

The Omusati Regional Council identified the following main areas for development:

- Roads
- Water (boreholes and pipelines)
- Schools
- Mobile Post Offices
- Clinics
- Rural electrification/Solar systems
- Telecommunication

The specific needs per constituency are as follows:

### 3.1 **Ruacana Constituency**

#### 3.1.1 Water

**Earth dams**

Due to the saline underground water, earth dams as a source of water supply should be constructed at the following places:

- Okaulukwa
- Omunduwahawanga
- Otjolute
- Omakange
- Omuhama
- Concord (one east and one south)
- Otjovanatje
- Otjekwa
- Ombombo Fontein
- Onamatanga
- Otjiljekwa

**Pipelines**

Extension of the Otjimangombe and Otjovanatje pipelines.

**Boreholes**

A borehole at Onamatanga J.P. School.

**Machines**

Twenty (20) machines are needed for existing boreholes.

#### 3.1.2 Electricity (Solar systems or Rural electrification)

The following schools and clinics are in need of some form of electricity:

- Otjekwa J.P. School
- Omakange P.S
- Omuhana J.P.S.
- Otjolute J.P. School
- Onamatanga J.P.S and clinic
- Otjovanatje J.P.S.
3.2 Onesí Constituency

3.2.1 Roads

Apart from the roads as recommended by the Road Master Plan for the 4 O’s, the following roads are recommended:

- Onesí via Okaulukwa to join the Kamanjab-Ruacana road
- From the Onesí-Tsandi road via Elondo-west, Okasheshete via Okapundja to join the Kamanjab-Ruacana road.

3.2.2 Water

Pipelines

Water through pipelines is recommended at:

- Oshikondailongo
- Oshithashembungu
- Onandjaudjaudja

Boreholes

Otjobwiti borehole to be renovated.

3.2.3 Electrification

The following places need some sort of electrification:

- Onandjandja
- Eendjokwe
- Okasheshete
- Oharnakiya

3.2.4 Health Clinics

Health facilities are needed at:

- Onandjandja
- Oshikondalongo
- Okasheshete
3.3 Okahao Constituency

The greatest part of the Okahao constituency falls within the study area.

3.3.1 Water

Water is the biggest problem in this area and is needed at the following places where grazing is of a good standard:

- Okakombe
- Onegonga
- Okasakala
- Oshikango
- Oshimbunjila
- Iitapa
- Omandu
- Uuthaye
- Amalika
- Uuthima
- Onkolahka
- Okakewa
- Omahama Gambalala
- Iitamanzi
- Okutsimati Onambonge
- Namanene
- Onkwina
- Okalolongo
- Okuzimba
- Omako
- Ongendjo
- Onambiga
- Uuku
- Onkunlumba
- Onkaankaa
- Ilimanya

As a priority, a pipeline from Okahao to Uutsathama and Nkulumba is recommended, as well as from Okahao to Onamatanga.

As a second priority, a pipeline from Likango via Otamanzi to Ukulumba is recommended.

Earth dams

Earth dams are recommended at the following places:

- Okashana
- Olutha Lyalumpelengwa
- Okadhiyakaanayampingana
- Otbimbulingili
- Olutha Iyanambiga
- Onkolankola
- Eethadhangulumbu
- Oluthaloonkwnwi
- Ekango Lyakanyaganye
- Onandjamka
- Odlingadhinga
- Nakashugilwa
- Omathagangawa
- Uuku Eethadhumku
- Mbulwa Eethadhaakaatu

3.3.2 Health Clinics

Clinics are recommended at

- Okeeholonga
- Akutsima
- Onambandje
- Okakewa

Veterinary clinics
- Amalika
- Osalindi

3.3.3 Education
- Okakewa

- Onkaanka
- Otjovasaandu
- Namatanga
- Onkaanka
4. OSHANA REGION

The Oshana Regional Council identified access to remote areas, together with the provision of water as the most important issues in terms of infrastructure development. **With respect to economic development projects, tourism is high on the priority list together with salt from the saltpans at Otjiwakunda and fish farming at the Oponono Lake. Subject to the availability of water, mixed crops (gardens) is also been seen as a source of income for the communities.**

The needs assessment per constituency are as follows:

### 4.1 Uuvudhiya Constituency

Almost the total area of the Uuvudhiya constituency falls within the study area. Whereas the greater part of this constituency is been utilised for grazing, water and access roads are been emphasised as priorities.

#### 4.1.1 Roads

- Construct newly road from Uukwangula via Onkani to Oshivalunda Salt Pan no. 1.
- Extension Onaanda gravel road to Onkani Combined School.
- Establish newly gravel road from Eendjati to Uuvudhiya Combined School.
- Establish an off-take from Onaanda to Omapopo School.
- Establish road from Onkani to Onkaanka.
- Establish road from Oponono to Salt Pan No. 1.

#### 4.1.2 Water

With respect to rural water supply, the following projects are recommended:

**Excavation of earth dams**

- Oneheke
- Lihamu
- Mwetuyela
- Okashiya
- Okuafomongo
- Onoolongo
- Uukanga
- Oshiwurunda
- Otshakalo
- Ondombe-yemanja

- Eendjati
- Onilwegendje
- Onkonkdo
- Between litota and Kuma
- Katumbulwa (Elamba)
- Windhoek (Eti-ekukutu)
- Oluthalwenkono
- Onkurumba
- Omupopo
4.1.3 Health Clinics
- Onaushe Clinic
- Omapopo Clinic
- Onkani Clinic
- Endjati Clinic

4.1.4 Electricity
- Supply electricity to all schools including would-be clinics and business places.

4.1.5 Education
- Teacher's houses
- Turn Onkani Combined School Secondary School – additional 6 rooms
- Establish a building at Uuvudhiya Combined School consisting of six rooms
- Establish four classrooms at Ondjungulume
- Establish building consisting of eight rooms at Omapopo School
- Establish building of (3 rooms) at Endombo Kindergarten
- Establish new Primary School at Engombe Kindergarten building (3 rooms)
- Establish building of (3 rooms) at Onkaanka
- Establish building of (3 rooms) at Oponono
- Establish four rooms at Endjati

4.1.6 Telecommunication
- Supply all schools, would-be clinics and would-be GRN buildings, business buildings in Uuvudhiya constituency.

4.2 Okatjali Constituency
For the Okatjali constituency, the following projects have been identified that fall within the study area:

4.2.1 Roads
- Okashandja to Okatjali
- Okatjali to Onekandu
- Okatjali to Onezizi
- Onezizi to Oshitenga
- Okatjali to Okadhiya
- Okatjali to Uukwiyu
- (Okatjali is to become the constituency centre).

4.2.2 Water
An off-take from the Ondangwa-Omutele pipeline to the grazing area of Okadhiya via litota and Oohonga.
4.3 Ompundja Constituency

4.3.1 Roads

- From Ompundja to Oponono Lake
- From Ompundja via Oshipumpa to Ehafo clinic and school and back to Ondangwa
- From Ehafo to Onakamwandi
- From Ompundja to Okungue centre in the Oshakati-west constituency

4.3.2 Water

Earth dams

- Oshipumba
- Onangolo

4.3.3 Health Clinics

- At Ombonde (where there is a school)
- At Ondjongolume

4.3.4 Education

- Extension of school at Oshipumba with four classrooms.
- Extension of school at Enguwantale with three classrooms.
- Three classrooms at Uueke P.S.

4.3.5 Electricity

Electricity at:

- Oshipumba
- Enguwantale
- Ompundja
5. OSHIKOTO REGION

Although the Road Master Plan for the Oshikoto, Oshana, Omusati and Ohangwena Regions proposed certain roads as per Chapter 8 of this report, the Regional Council also prioritise the following access roads:

First Priority

- The King Kauluma road from Oshivelo to the Oshikoto/Kavango Border.
- Okangolo to Olukupa via Onkumbula to Ekonkola
- Omuthiya to Onkumbula
- Onyaanya to Onanke via Omuntele

Second Priority

- Popoporo road from Tsinsabis to Olukala in the Ohangwena Region
- Olifantspad from King Kauluma via Okapy to Poroporo road
- Omuthiya to Onanke via Amilema
- From Ontana to Onkumbula

Third Priority

- From King Kauluma to Okongo in Ohangwen Region
- Onalunike to Amilema
- Okankali to Ambembe
- Okankolo to Okakodhi via Onyuulaye
- Uuhana to Onyuulaye via Ontunda
- Okatope to Okankolo
- Okatope to Omuntele
- Epebene (in Ohangwena Region) to Onayena

The needs assessment per constituency are as follows:

5.1 Eengodi Constituency

5.1.1 Water

Pipeline

From the Oshivelo pipeline:

- King Kaulume to Okoloti Hedimbi School
- Onamishu Clinic
- Onanguo
- Omutowda
- Evale
- Ehangano
- Onyati
- Omboto
From the Okankolo pipeline:

- Elambo
- Ohahati
- Omushiloli
- Oshana-Shetemba
- Onamishu Leemani
- Onkumbulo
- Okengele
- Ohainghete
- Otjolo

Boreholes

- Omushiloli
- Ohamaye
- Ohainghete
- Omufonda

5.1.2 Health Clinics

- Onanguo
- Ofilu
- Ohahati
- Okoloti
- Omboto
- Omutonda
- Otjolo

5.1.3 Education

- Ehangano
- Omutonda
- Ojulu
- Oshangwe
- Elombo upgrading grade 1-12
- Onanguo
- Omboto
- Ohahati
- Onamakulikwa

5.1.4 Electricity

Electricity from:

- Onyati Onyuulaye to Elambo, Onamishu and Evale
- King Kaulumo to Okoloti Hedimbi School

5.2 Okangolo Constituency

The eastern part of the Okankolo constituency falls within the study area. The following infrastructure have been identified as a need in the constituency:
5.2.1 Roads

First Priority

- Okankolo to Ekonkola via Onkumbula and Olukupa
- Ontana to Onkumbula

Second Priority

- Okankolo to Onyanya (Okatope) via Omutse School

5.2.2 Water

Pipelines

Pipeline from Okankolo to Onkumbula

Boreholes

- Elavi
- Olukupa
- Omeyaomatalala

- Ohaimbanda School
- Othimbika
- Ongombe-hupa

5.2.3 Electricity

From Onyulaye to Utala School and the communities must be supplied with power.

5.2.4 Education

Primary Schools

- Elavi
- Omeyaomatalala

- Emany
- Amikoka

Second Priority

- Othimbika
- Eengodi

- Haimbanda
- Uutha

Third Priority

- Omahembe
5.2.5. Health Clinics

**First Priority**
- Olukupa
- Emanya
  - Engodi
  - Ekonkola

**Second Priority**
- Elavi
- Haimbanda
  - Okashana Kritembu

**Third Priority**
- Ontana
  - Omeyaantalala

5.3 Omuthiyagwiipundi Constituency

The southern part of the Omuthiyagwiipundi constituency north of the Etosha National park border is included in the study area. Apart from access roads and water as in most of the other constituencies, electricity and a telephone service have been identified as shortcomings.

The needs assessment are therefore as follows:

5.3.1 Roads

Assess roads are needed from:
- Onnlumke to Amilema
- Omuthiya via Amilema to Onanke
- Omuthiya to Onkombula

5.3.2 Water

The finalisation of the Oshivelo-Omutsegonime-Okankolo has been emphasised.

A community waterpoint between the Okamgororose Combined School and Omboto School.

5.3.3 Electrification

Rural electrification network must be extended to provide electricity at the following schools:
- Omutsegonime
- Amilema
- Olupale
  - Okangororose
  - Epandulo
  - Oshifukwa
- Omboto
- Othemayefanu
- Alweendo
- Kandjeka
- King kauluma
- Tsinsabis

- Onamutele
- Ameelo
- Kaudume
- Omutsegonime
- Uukumive

5.3.4 Telecommunication

In the absence of telephone services, people have to go at great cost to the closest telephone along the main road to make telephone calls. The places identified in need of a telephone service are:

- Omutsegonime
- Amilema
- Okapuku
- Okangororose

- Eham-Eham
- Oshifukava
- Onalunike
6. OHANGWENA REGION

The whole of the Okongo constituency falls within the study area, with smaller parts of the Epeembe and Omundaungilu constituencies. Priority should be given to the Okongo constituency, while notice taken of the needs in the other constituencies.

6.1 Okongo Constituency

6.1.1 Roads

New roads are needed as follows:

- Ohenghonon JPS to Onhunda
- Okahenge CS to Ouryenyelle JPS
- Oshidute via Okadidiya JPS to Onambaladi JPS
- Etakaya to Onambaladi JPS
- Omulonga via Efuta CS to Odila
- Okambuwa via Onamafila JPS to Onulushe Shete
- Ohameya via Oluwaya CS to Omboloka JPS
- Oluwaya CS to Efinde
- Omupembe to Ondema CS
- Okongo to Oshiti
- Okongo to Ongudi
- Okongo via Ongalangobe to Oshishogolo
- Oluhapa to Ombudiya
- Main road to Oshushu
- Omauni via Oshilimanarnwene to Oshikome

6.1.2 Water

Boreholes

Renovation of boreholes at following places:

- Emanya
- Oshamukueni
- Okanyadi
- Omunghete
- Odiya
- Oupili
- Omutuenomunhu
- Onamata
- Efinde
- Onguvyu
- Omufemba
- Oshalumbu
- Oluhapa
- Omunda
- Oshitayi
- Eendombe

New boreholes are needed at the following places:

- Ondombeyelao
- Oshulisahapete
- Ongalangobe
- Okafaludila
- Eshowa
- Enghombo
- Odimuenena (small Oshikuni)
- Oneamadila
- Omushiydo School
- Oshishogolo
- Okongo town

Boreholes already drilled but not yet equipped:

- Oshalumbu
- Olhapa
- Omhuda
- Oshitayi
- Eemdome
- Oshakati
- Onigmadila
- Onhuli
- Oshatotua
- Oshamabo
- Omhitooyavalyange
- Okalupalona
- Ondyamba

6.1.3 Education

Upgrading of schools needed at the following places:

- Efinde
- Ehafo
- Ohameva
- Oidiva
- Oupili
- Omutuewomubu
- Onamata
- Omehanga
- Ekokofi
- New Om-3halulu

6.2 Epeembe Constituency

6.2.1 Roads

- Omuhongo to Epeembe
- Etakaya to Epumba Londjaba
- Oshidute to Onambaladi
- Epeembe via Oshamono to Onambaladi
- Epeembe to Oshaango

6.2.2 Water

Pipelines

- Omambutu/Epeembe
- Epeembe/Okankolo
- Eenhana/Okongo
Boreholes
- Oshamono
- Ohamikoka
- Onduludiya
- Etsapa
- Egongo
- Ombwa

6.2.3 Electricity
- Oondunda to village
- Etsapa to school
- Amwiimbi to school and village
- Onambaladi to school and shops
- Ohakafiyi to school and shops
- Epumba Londjaba
- Onghuwiyu
- Omuhongo to village and school, paypoint
- Limbadungila to school
- Oshamono to school and shops
- Okadidiya to school
- Ohenghono to school
- Ondobemufiya
- Etakaya

6.2.4 Education
- Omahahi
- Onduludiya
- Omwii
- Ondjaba yonghalu
- Ombwa
- Oluno
- Onamagogani
- Amukulungundju
- Ekuma
- Egongo
- Oondunda

6.2.5 Health Clinics
- Onduludiya
- Ohakafiyi
- Amwiimbi
- Epembe Health Centre
- Oshamono
- Omuhongo
- Onambaladi
- Oshikunde Health Centre
7. OHANGWENA REGION

7.1 Omundaungilo Constituency

7.1.1 Roads
- Odimba to Onangolo
- Onakalunga to Epinga
- Extension of Omundaungilo road to Ohauwanga
- Extension of Okankholo road to the Boarder

7.1.2 Water

Water are needed at the following villages:
- Epinga
- Ooimba
- Eexa
- Omutwewondjaba
- Onakalunga
- Onangolo
- Ohehonge
- Omundaungilo

7.1.3 Electricity
- Epinga
- Otdimba
- Onakalunga
- Onangolo

- school and clinic
- school and shops
- school, church and shopping centre
- school, clinic and shopping centre

7.1.4 Education

New schools at the following places:
- Omadano
- Omutwewondjaba
ANNEXURE B

COST ESTIMATES
COST ESTIMATE OF INFRASTRUCTURAL DEVELOPMENT

SMALL-SCALE COMMERCIAL FARMING UNITS

The detail breakdown of the development of a small-scale commercial farming unit as proposed in paragraph 4.8.3 is divided in:

- Planning and surveying
- Groundwater investigation, siting, drilling, testing and equipping of boreholes
- Fencing
- Dams and troughs
- Project Management

To save on cost, planning, surveying and groundwater investigation will be done for 6 units totalling 21 600 ha. This cost is then pro rata allocated to a unit of 3 600-4 000 ha.

A  Planning and surveying of six units

- Planning (including discussions with communities)
  5 Man days @ N$2 500/man day  N$12 500.00
  Travelling: 2 500 KM @ N$4.50/km  N$ 9 000.00
  Accommodation: 4 days @ N$400/day  N$ 1 600.00
  Total  N$23 100.00

  Plus: GST
  N$ 1 250.00
  N$24 350.00

  Plus: Subdivision and registration
  Total  N$37 700.00
  ÷ 6  N$ 6 284.00

- Surveying
  Survey of position of water point and corners
  of four camps (9 beacons)  N$13 000.00
  Total  N$13 000.00

NOTE: Additional survey of existing fences and structures as well as setting out of line beacons for fencing purposes if required will be done at an hourly rate of N$380/hr and travelling at N$3.90/km plus N$270.00/hr, as well as accommodation fees of N$390.00/bed-night for the team.
B  Fencing and opening of fences

The cost of fencing per 1000 m is as follows:

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<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 x 1250150 mm tar poles</td>
<td>1</td>
<td>N$22.70</td>
<td>N$1 135.00</td>
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<tr>
<td>250 x 1,2 m tar ratters</td>
<td>1</td>
<td>N$2.71</td>
<td>N$677.00</td>
</tr>
<tr>
<td>4 x 1 500 m oval steel wire</td>
<td>1</td>
<td>N$289.52/</td>
<td>N$1 158.08</td>
</tr>
<tr>
<td>1 x No 14 wire (2 mm)</td>
<td>1</td>
<td>N$265.62/</td>
<td>N$265.62</td>
</tr>
<tr>
<td>1 x No 8 wire (4 mm)</td>
<td>1</td>
<td>N$248.03/</td>
<td>N$248.03</td>
</tr>
<tr>
<td>1 x 3 m medium gate</td>
<td>1</td>
<td>N$188.49/</td>
<td>N$188.49</td>
</tr>
</tbody>
</table>

Labour

N$ 1 000.00

N$ 4 672.00

Plus: 20% transport cost

N$ 934.40

N$ 5 606.00

Plus: Opening of fences @ N$500/km

N$ 500.00

N$ 6 106.00 x 36 km

Sub-total per kilometre

N$ 219 816.00

Sub-total per unit

C  Dam and troughs

1 x 50 m² dam plus erection cost

N$20 000.00

4 x 5 m Rocla troughs @ N$1 200/unit

N$ 800.00

N$ 200.00

N$ 25 000.00
**Groundwater investigation, siting, drilling, testing and equipping boreholes**

Based on success a rate of 75%, the quoted price of a reliable firm to provide an equipped borehole is N$75 000.00 for a borehole with a yield of 5 m³/day and N$95,000 for a borehole with a yield of 10 m³/day calculated as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determination of existing boreholes</td>
<td></td>
</tr>
<tr>
<td>5 man days @ N$1 950/day</td>
<td>N$ 9 750.00</td>
</tr>
<tr>
<td>Accommodation: 5 days @ N$250.00/day</td>
<td>N$ 1 250.00</td>
</tr>
<tr>
<td>Travelling: 2000 km @ N$ 2.75/km</td>
<td>N$ 5 500.00</td>
</tr>
<tr>
<td>Siting of a new borehole</td>
<td>N$ 11 250.00</td>
</tr>
<tr>
<td>Drilling N$120/m x 120 m</td>
<td>N$ 14 400.00</td>
</tr>
<tr>
<td>Casing N$120/m x 40 m</td>
<td>N$ 4 800.00</td>
</tr>
<tr>
<td>40 x 50 mm galvanised pipes @ N$132.39/unit</td>
<td>N$ 5 295.60</td>
</tr>
<tr>
<td>40 x 16 mm rods @ N$39.00/ unit</td>
<td>N$ 1 550.00</td>
</tr>
<tr>
<td>1 x BP8MH Monopump</td>
<td>N$ 1 900.00</td>
</tr>
<tr>
<td>1 x 8HP Batley Boy Diesel Engine</td>
<td>N$ 6 395.00</td>
</tr>
<tr>
<td>1 x 5 000L overhead tank plus fittings</td>
<td>N$ 2 500.00</td>
</tr>
<tr>
<td>1 x 3 m stand</td>
<td>N$ 800.00</td>
</tr>
<tr>
<td><strong>Plus: 15% contingency</strong></td>
<td>N$ 9 810.00</td>
</tr>
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**TOTAL**                                                                  N$ 75 210.00
ANNEXURE C

TERMS OF REFERENCE
REFERENCES
REFERENCES

Bicon Namibia Inc (1999) – The Oshikoto, Oshana, Omusati and Oshangwena Road Master Plan Revision
Bicon-LCE Joint Venture Partnership (1992) Owambo Roads Master Plan
Burmeister and Partners (1999) - Planning Report on Rural Water Supply to the Tsandi South Area in the Omusati Region
Burmeister, Van Niekerk Partners (1993) – Northern Regions Development Programme (NRDP)
IDC (1995) – Towards Development in the Kunene Region
IDC (1995) – Towards Development in the Ohangwena Region
IDC (1995) – Towards Development in the Omusati Region
IDC (1995) – Towards Development in the Oshana Region
IDC (1995) – Towards Development in the Oshikoto Region
Lambrechts JNN (1997) – Verslag oor ‘n Grondoppname vir Besproeiing in die Weste van Omusati
Lund Consulting Engineers (Aug 1999) – Feasibility Study on Water Supply to the Oshivelo-Omutsegwonime–Okankolo Area
Meat Board of Namibia (1999) - Communal Livestock Marketing Strategy
Ministry of Environment & Tourism (1999) – Source of Tourists to Namibia
Ministry of Environment and Tourism (1999) – Namibia Forestry Strategic Plan
Ministry of Environment and Tourism: Communal Area Conservancies in Namibia – A Simple Guide
Ministry of Environment and Tourism: Namibia’s Community-based Tourism Enterprises – A Simple Guide
Ministry of Environmental & Tourism (1999) - Travel News Namibia
Ministry of Lands, Resettlement and Rehabilitation (1999) – Kunene Integrated Regional Land Use Plan
Ministry of Mines and Energy (1999) - List of Prospecting Licences in the Kunene Region
NNEP (1999) – Tourism Development Plan for the Oshangwena, Omusati, Oshana and Oshikoto Regions
Stewart Scott Namibia (March 1999) – Kavango Road Master Plan. Volume 1
Urban Dynamics Africa (1999) – Draft North-west Region Tourism Master Plan
Venture Publications (Sept 1999): Travel News Namibia
Windhoek Consulting Engineers (1999) – Analysis of Present and Future Water Demand in Namibia
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<td>Proposed Development of Oshana Region</td>
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<td>Figure 17</td>
<td>Proposed Development of Oshikoto Region</td>
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<td>Proposed Development of Ohangwena Region</td>
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<tr>
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<td>Combined Summary of Figures 15-18</td>
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FIGURE 2.0
STUDY AREA
KUNENE, OMUSATI, OHANGWENA, OSHANA, OSHIKOTO

LEGEND
(Tiles per square km)

- 0-2
- 2-20,000

Regional Boundary
Title Deed Farms
Town

Tar Road
Main Road
District Road
Scrubland
Constitutional Border

DEVELOPMENT OF UNDERUTILISED AREA:
KUNENE, OMUSATI, OSHANA, OSHIKOTO & OHANGWENA REGIONS

Figure 2.0
STUDY AREA:
NORTHERN REGIONS

0-2 (Study Area)
2-20,000 (Excluded from study)
FIGURE 7.0
(PRELIMINARY) AGRO-ECOLOGICAL ZONES
KUNENE, OMUSATI, OHANGWENA, OSHANA, OSHIKOTO
FIGURE 9.2
PROPOSED SMALL SCALE FARMING AREA AND ROADS
OMUSATI REGION

LEGEND: INFRASTRUCTURE
- 0 - 2 p per km
- 2 - 20000 p per km
- Proposed Small Scale Farming Area
- Tar Road
- Main Road
- District Road
- Track
- Prop. Road (Master Plan)
- Prop. Rural Access Road
- Boreholes & Wells
- Pipe Line
- Etosha Park
- Constitutional Border
- Farms & Quarantine Camps
- Illegal Fences
- Household
- Town

DEVELOPMENT OF UNDERUTILISED AREA:
KUNENE, OMUSATI, OSHANA, OSHIKOTO
& OHANGWENA REGIONS

Map compiled by IDC,
Data Supplied by
Northern Namibia Environmental Project (NNEP)
and Spatial Data Engineering (SDE)
MARCH 2000
FIGURE 11
GEOLOGY & MINING
KUNENE, OMUSATI, OHANGWENA, OSHANA, OSHIKOTO

LEGEND
- Towns
- Trunk Road
- Main Road
- District Road
- Mining Licences
- Geology
- Granite
- Lauvas and sandstones
- Limestones and dolomites
- Limestones and sandstones
- Rhyolites and sandstones
- Sands and calcarenites
- Sandstones and shales
- Schists and dolomites

DEVELOPMENT OF UNDERUTILISED AREA:
KUNENE, OMUSATI, OSHANA, OSHIKOTO
& OHANGWENA REGIONS

Map compiled by IDC,
Data Supplied by Northern Namibia Environmental Project (NNEP)
Ministry of Agriculture, Water & Rural Development
and Professional IT Services
March 2006
FIGURE 12
TOURISM POTENTIAL OF KUNENE REGION
FIGURE 13.0
TOURISM POTENTIAL OF OMUSATI, OSHANA, OSHIKOTO & OHANGWENA REGIONS

LEGEND
- Regional Boundary
- Ombuga Tourist Area
- Narawandu Tourist Area
- Andoni Tourist Area
- Uukwaluudhi Core Area
- Uukwaluudhi Conservancy Area
- Etosha Pan
- Etosha Nature Reserve
- Salt Pans
- Main Town
- Minor Town/Village
- Tar Road
- Main Road
- District Road
- Track
- Lake

Figure 13.0
TOURISM POTENTIAL
OMUSATI, OSHANA, OSHIKOTO & OHANGWENA REGIONS

DEVELOPMENT OF UNDERUTILISED AREA:
KUNENE, OMUSATI, OSHANA, OSHIKOTO & OHANGWENA REGIONS
Map compiled by ICD,
Data Supplied by
Namibia National Environmental Project (NNEP)
and Spatial Data Management (SDM)
04/04/00
FIGURE 4.0
SOIL TYPES
KUNENE, OMUSATI, OHANGWENA, OSHANA, OSHIKOTO

LEGEND: INFRASTRUCTURE
- Regional Boundary
- Tar Road
- Main Road
- District Road
- Escalo Park
- Town

LEGEND: SOIL TYPES
- Y6f: Coarse- to very coarse-textured, inclusions of Calico Varnish, Haplic and Typic, 0-10% slope,
- Y6: Coarse- to very coarse-textured, inclusions of Calico Varnish, Haplic and Typic, 0-10% slope,
- Y6c: Coarse- to very coarse-textured, inclusions of Calico Varnish, Haplic and Typic, 0-10% slope, strongly
- Y6f: Coarse- to very coarse-textured, inclusions of Calico Varnish, Haplic and Typic, 0-10% slope, strongly
- Y6c: Coarse- to very coarse-textured, inclusions of Calico Varnish, Haplic and Typic, 0-10% slope, strongly
- Y6: Coarse- to very coarse-textured, inclusions of Calico Varnish, Haplic and Typic, 0-10% slope, strongly
- Y6f: Coarse- to very coarse-textured, inclusions of Calico Varnish, Haplic and Typic, 0-10% slope, strongly
- Y6c: Coarse- to very coarse-textured, inclusions of Calico Varnish, Haplic and Typic, 0-10% slope, strongly
- Y6: Coarse- to very coarse-textured, inclusions of Calico Varnish, Haplic and Typic, 0-10% slope, strongly

DEVELOPMENT OF UNDERUTILISED AREA:
KUNENE, OMUSATI, OSHANA, OSHIKOTO & OHANGWENA REGIONS

Map created by GIS.
Data supplied by Namibia International Development Programme (NIDP) and Professional GIS Services.
March 2000.
FIGURE 5.0
GROUND WATER QUALITY
KUNENE, OMUSATI, OHANGWEWA, OSHANA, OSHIKOTO

LEGEND: INFRASTRUCTURE
- Regional Boundary
- Tar Road
- Main Road
- District Road
- Etosha Park
- Town

LEGEND: GROUND WATER QUALITY
Total dissolved solids (mg/litre)
- < 1,000
- 1,000 - 2,000
- 2,000 - 3,000
- 3,000 - 4,000
- > 4,000

DEVELOPMENT OF UNDERUTILISED AREA:
KUNENE, OMUSATI, OSHANA, OSHIKOTO & OHANGWEWA REGIONS

Map compiled by ROC
Data Supplied by Northern Kunene Environmental Project (NKEP)
and Provincial IT Service
March 2000
FIGURE 9.3
PROPOSED SMALL SCALE FARMING AREA AND ROADS
OSHANA REGION

LEGEND

- Towns
- District Road
- Main Road
- Trunk Road
- Proposed Rural Access Road
- Proposed Road
- Pip Line
- Pans/Lakes
- Unsurveyed Farms
- Ethoza Park
- Proposed Small Scale Farms
- 2 - 200,000 persons/sq km
- 0 - 2 persons/sq km

MAP COMPILED BY IDL
DATA SUPPLIED BY NORTHERN MAIZEAN ENVIRONMENTAL PROJECT (NHAE)
AND SPATIAL DATA ENGINEERING (SDE)
MARCH 2000
FIGURE 9.5
PROPOSED SMALL SCALE FARMING AREA AND ROADS
OHANGWENA REGION

LEGEND: INFRASTRUCTURE

- 0 - 2 p per km² - Common Grazing Area
- 2 - 200000 p per km² - Proposed Small Scale Farming Area
- Tar Road
- Main Road
- District Road
- Track
- Prop. Road (Master Plan)
- Prop. Rural Access Road

DEVELOPMENT OF UNDERUTILISED AREA:
KUNENE, OMUSATI, OSHANA, OSHIKOTO
& OHANGWENA REGIONS

Map compiled by IDC,
Data Supplied by
Northern Namibia Environmental Project (NNEP)
and Spatial Data Engineering (SDE)
MARCH 2000
FIGURE 12
TOURISM POTENTIAL OF KUNENE REGION