REPUBLIC OF BOTSWANA

THE CHOBE ENCLAVE

Summary report

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CHAPTER 1 INTRODUCTION

This summary report is the last in a serie of reports on the research programme conducted in the Communal First Development Area (CFDA) of the Chobe District, an area commonly known as the Chobe Enclave. This final report highlights the major findings of the study, summarizes the results of the land evaluation exercise (Chapter 2) and discusses options for rural development in the Chobe Enclave (Chapter 3). These options or recommendations logically reflect the results of the studies in the area. In this sense they provide a starting-point for the implementation of a rural development programme in the Chobe Enclave. It should be noted that the views presented in Chapter 3 are those of the research team of the University of Utrecht, and not necessarily those of the Government of Botswana.

The present report has been preceded by the Chobe Enclave Development Profile and Land Evaluation report, published in January 1990. It outlined the study area in terms of natural environment, population and land tenure, social services and local institutions, and discussed the major rural development constraints. The part on land evaluation dealt with the suitability ratings of land in the Chobe Enclave for the production of a variety of crops.

Furthermore, in 1988 and 1989 two comprehensive Technical Reports were produced covering the field surveys of two Applied Research Teams which operated in the South and North Enclave areas. The reports covered a range of topics and were intended as inventories of the major data collected.

With the present report the Chobe CFDA study has come to an end. The study was started as part of a research programme conducted by the Geographical Institute of the University of Utrecht in the Netherlands in close cooperation with the Applied Research Unit, Ministry of Local Government and Lands and the Rural Development Unit, Ministry of Finance and Development Planning in Botswana.

The programme, funded by the Dutch Ministry of Development Cooperation and the University of Utrecht, aims to provide districts with information on various components of rural development in CFDAs so that development plans can be drafted.

We would like to thank all the people who contributed to the implementation of this study. Special thanks go to Mr M. Setimela, head of the Applied Research Unit and liaison officer of the project, for administrative, logistical and academic support at central government level. We are further grateful for the comments on earlier reports by members of the CFDA Applied Research Reference Group and for the data provided by consultants of Sir MacDonald & Partners engaged in the prefeasibility study of the Chobe Enclave.

Many thanks are due to the Chobe District officials for their support and cooperation. We are indebted to the District Commissioner and her staff, and to the officials of the North West District Council and the Chobe Land Board for their encouraging assistance throughout the years.

We are also grateful to the people of the Chobe Enclave for providing us with information and for their hospitality. We express the hope that this study will ultimately be for their benefit.

Utrecht, the Netherlands
May, 1990

CHAPTER 2 EXECUTIVE SUMMARY

This chapter aims to provide an executive summary of the major findings of the study.
The first part of this chapter discusses a range of issues, varying from the characteristics of the Enclave's natural environment, the population distribution and settlement pattern to the various production activities of which arable agriculture takes a dominant position. The final part of the chapter summarizes the results of the land evaluation and grazing studies.
The chapter only highlights the main results and may serve as a quick reference guide. For a detailed description of the state of affairs in the Chobe CFDA the reader is referred to the Chobe Enclave Development Profile and Land Evaluation report.

The Chobe Enclave is situated in the extreme north of Botswana, bounded in the north by the Namibian border and in the east, south and west by the Chobe National Park.
The Enclave area totals 306,000 hectares of which nearly half is taken by the Chobe Forest Reserve. The remaining communal area (169,000 ha) is made up of a dryland area (87,000 ha) and an area liable to flooding, which covers 91,000 ha. The whole Enclave is designated as the Communal First Development Area (CFDA) of Chobe District.

2.1 Natural environment

Climatologically, the Chobe Enclave is characterized by a semi-arid to sub-humid climate, with a mean annual temperature of 30 C and an evaporation of 2,300 mm. Most of the mean annual 664 mm of rain falls in the months of October to April. Rainfall exceeds evaporation in general only in January.

A striking feature of the Enclave's natural environment is the periodic occurrence of floods. The Enclave may receive water from the Chobe river and occasionally from the Linyanti river and the Bukalo molapo. Through a complex system of channels, which intersect the Caprivi swamps, water from the Zambezi river flows back through the Chobe river towards the Enclave. In normal years a relatively reliable flood occurs between Ngoma Bridge and Kavimba. This is the area where so-called real molapo farming can be practised. (Molapo farming is an arable farming system in which stored soil moisture is used for crop water requirements after receding of a flood.)
The Linyanti river flows from Angola southwards to the Linyanti swamps, southwest of the Enclave. The outflow of the Linyanti is very small because the low gradient of the river and the abundant swamp vegetation cause an enormous loss of water through evaporation. Water from the Bukalo molapo, which cuts across Caprivi into the presently dry Lake Liambezi, only reaches the lake in years of exceptional high water tables in the Zambezi river.

Apart from the annual flood between Ngoma Bridge and Kavimba, there is a remarkable variation in high water levels in the Enclave. Local people indicate a ten year cycle of high floods, but no reliable data is available on the extent of these floods.
A widespread flood occurred in 1958 when depths of up to 3 meters were reported and a large number of people had to evacuate their homes. However, this flooding coincided with very heavy rainfall; an amount of twice the annual average fell over a three months period.
Recently in 1989, large parts of the eastern Enclave were inundated, this time caused by an exceptional backflow of the Zambezi and the Chobe rivers. The other river systems did not contribute to the flooding and Lake Liambezi stayed dry.

The surveys have shown that groundwater levels are fairly high, between 1 and 4.5 meter below surface. In case of high groundwater levels, flooding can also be caused by heavy rainfall during the rainy season. Present development of groundwater within the Enclave is limited to a small number of boreholes to supply the five villages. Smaller

settlements drain water from shallow handdug wells, used for domestic purposes and for watering cattle. The wells are poorly constructed and often relocated after collapse.

In terms of natural environment the Chobe Enclave can be divided into five major units, with strongly correlated geomorphology, soil types and vegetation. The five units are: the sandveld, the colluvium area, the Chobe floodplain, the Linyanti floodplain and the Chobe flats.

The sandveld

The sandveld, bordered by the southwest - northeast escarpment, forms an undulating flat with layers of aeolian Kalahari sands from Tertiary to Quaternary age. The sands are underlain by Karroo basalts. At various locations along the escarpment calcrete banks occur being the result of weathering of basalt.
The soils developed on basalts are medium-textured and contain gravel. They are moderately fertile but have a limited depth. The soils on the Kalahari sands are deep, sandy and have low natural fertility. (soil unit R)
Geomorphological features of the sandveld consist of small river valleys and aeolian forms which are fossil. The sandveld is covered by a tree and shrub savanna. Dominant tree species are *Baikiaea plurijuga* (Rhodesian teak), *Pterocarpus angolensis* (Mukwa), *Burkea africana* and *Erytrophleum africanum*. Grass species are *Panicum maximum*, *Hyperthellia dissoluta* (thatching grass) and *Digitara*.

The colluvium

The colluvium northeast of Kavimba consists of a layer of accumulated material with gravel and stones in a loamy matrix. The material originates from metamorphous rocks on the escarpment. The permeability of the soil is low, causing run-off and consequently gully formation. The soils here have, in general, the same characteristics as on the

escarpment but are deeper and more compact. However, the presence of calcrete layers restricts the rooting depth. (soil units R and C)
A number of alluvial fans have been formed where small rivers of the sandveld drain into the floodplain. Some settlements like Kavimba, Seriba and Kataba are located on these higher sandy fans.
The slopes of the colluvium are covered by shrubs of *Acacia* and of the *Combretum hereroense* type and by trees like *Terminalia sericea* and *Andansonia digitata* (Baobab). Grasses show a wide variety of favourable species: *Dactyloctenium giganteum*, *Digitaria milanjiana*, *Cynodon dactylon* and *Urochloa trichopus*.

The Chobe floodplain

The Chobe floodplain is situated between a serie of faults which run in a southwest - northeast direction: in the south the above mentioned Kachikau escarpment and in the north the Shaile - Linyanti fault. This area in between the faults consists of layers of Tertiary and Quaternary aged lacustrine and alluvial sediments, which are underlain, most likely, by the same Karroo basalts. The lacustrine origin, followed by aeolian and alluvial reworking of sediments, caused a complicated pattern of different geomorphological forms.
The most distinct features are the higher sandy ridges, with a north-south orientation and a concave curve to the east, covered by a tree and bush vegetation. These are the assumed beach ridges of a late Pleistocene lake. The ridges have been cut through in several places by west - east running channels or molapos (soil unit Fm and FM). East of these channels delta-like fans are present at relatively higher levels than the rest of the floodplain (soil unit F2 and F3). The intersecting molapo channels are remnants of old streams, generally shallow with gently sloping margins.
There are two major depressions in the Chobe floodplain, one southeast of the Satau beach ridge and the other north of Kavimba. These areas are characterized by a chaotic network of channels alternated by small higher lying plains with a rough microrelief. Elsewhere, smaller depressions occur with a more regular relief (soil unit F4).

The soils in the floodplain vary from sand to clay, depending mainly on the physiographical position. The regularly flooded soils have a high organic matter content and a heavy textured topsoil. The less frequently flooded soils often are light to medium textured with a argellic and/or calcic horizon. Due to the capillary rise of groundwater, salt accumulation may occur as well.
The beach ridges, well above flood levels, are sandy (soil unit F1S).

The vegetation composition of the floodplain changes continuously as a result of the frequent occurrence of floods. Vegetation patterns strongly correlate with the geomorphological units of beach ridges, deltas and molapos.
The beach ridges are covered with dominant *Hyphaene ventricosa* (palm trees) and *Combretum hereroense*; shrubs are *Terminalia sericea* and *Acacia tortilis*. Dominant grass species are *Cynodon dactylon* and *Chloris gayana*.
The higher delta-like areas are covered by *Hyphaene ventricosa*, *Acacia* species and dominant grass species are *Cynodon dactylon*, *Digitaria* species, *Eragrostis rigidior* and *Chloris gayana*.
The lower delta-like areas consist mainly of grassland with dominant *Panicum coloratum*, *Aristida* and *Chloris* species.
The molapo channels are covered with a dense grass vegetation with *Setaria sphacelata*, *Panicum coloratum* and *Cymbopogon excavatus* species. In the higher lying molapos *Andropogon eucomis* occurs, a grass species which is typical for the Enclave.
In the lowest depressions reeds and weeds like *Amaranthis* and *Hibiscus* are present.

The Linyanti floodplain

The Linyanti floodplain, including the presently dried-up Lake Liambezi, consists of a swampy lowland area with meandering channels and oxbow lakes. Like in the Chobe floodplain, depressions and delta-like areas are present.
Also the soils are similar to those in the Chobe floodplain, varying

from sandy to clay according to the position.
Dominant vegetation species in the Linyanti floodplain are reeds and various weeds, except for the higher delta-like fans (soil unit F3TK) where some *Acacia* shrubs and a few *Hyphaene ventricosa* species occur. These fans are the only places covered with grass; species like *Chloris gayana*, *Panicum coloratum* and *Cynodon dactylon* can be found.

The Chobe flats

Most of the Chobe flats consists of old alluvial deposits. The area is characterized by large high level sandy plains, intersected by low lying narrow channels and small circular depressions.
The soils in the Chobe flats vary with topography. Soils in channels and depressions are medium to heavy textured and have a high organic matter content in the topsoil (soil unit CF3H). Soils in higher positions are light textured and often have a calcic horizon. The occurrence of these calcrete deposits close to the surface indicates that the channels and depressions were probably filled with water when the deposits were formed as this generates capillary rise in the soils, causing the formation of petrocalcic horizons (soil unit (CF1P).
Groundwater tables in the Chobe flats are generally lower than in the Chobe floodplain.
Vegetation species are strongly related to the geomorphological units. The sandy plains (soil unit CF1S) are covered with *Acacia* species and *Colophospernum mopane* (Mopane), and grass species like the not very favourable *Aristida* type.
The channels and depressions have a very dense grass cover with predominantly *Cymbopogon excavatus* and a few *Acacia* shrubs.
The calcrete ridges have a mixed vegetation of *Colophospernum mopane*, and grasses like *Eragrostis superba*, *Digitara* species and occasionally *Cynodon dactylon*.

Climate is an important factor of the natural environment as it largely controls the length of the growing period of the agricultural crops.

The growing period is determined by the mean temperature (T), the mean potential evapotranspiration (PET) and the mean precipitation (P). The growing season is defined as the period of the year when both temperature and soil moisture availability permit crop growth. Since temperature is not a constraint to crop growth in the Enclave, only rainfall and evapotranspiration control the length of the growing season. Due to the variability of the rainfall, the length of the growing season is expressed in days with a probability of occurrence. It has been found that there is a 50 per cent occurrence of a 121 days growing period, i.e. in one out of two years the growing period lasts 121 days which is sufficient for the growth of the major food crops. The occurrence of a growing period of less than 88 days is 25 per cent, which implies that in three out of four years the growing period is sufficient to grow sorghum.
The table below summarizes the main climatological data for Kasane, which are also applicable to the Chobe Enclave.

Table 2.1 Mean rainfall (P) with coefficient of variation (CV) and mean evapotranspiration (PET) for Kasane over the period 1922-86

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Year
P (mm)	1.6	21.3	0.5	150.5	161.4	136.0	96.1	24.9	3.7	667.7
CV (%)	345	106	56	54	63	75	81	175	270	30
PET (mm)	170	191	185	166	158	145	152	138	117	1767

Source: Vossen, 1987

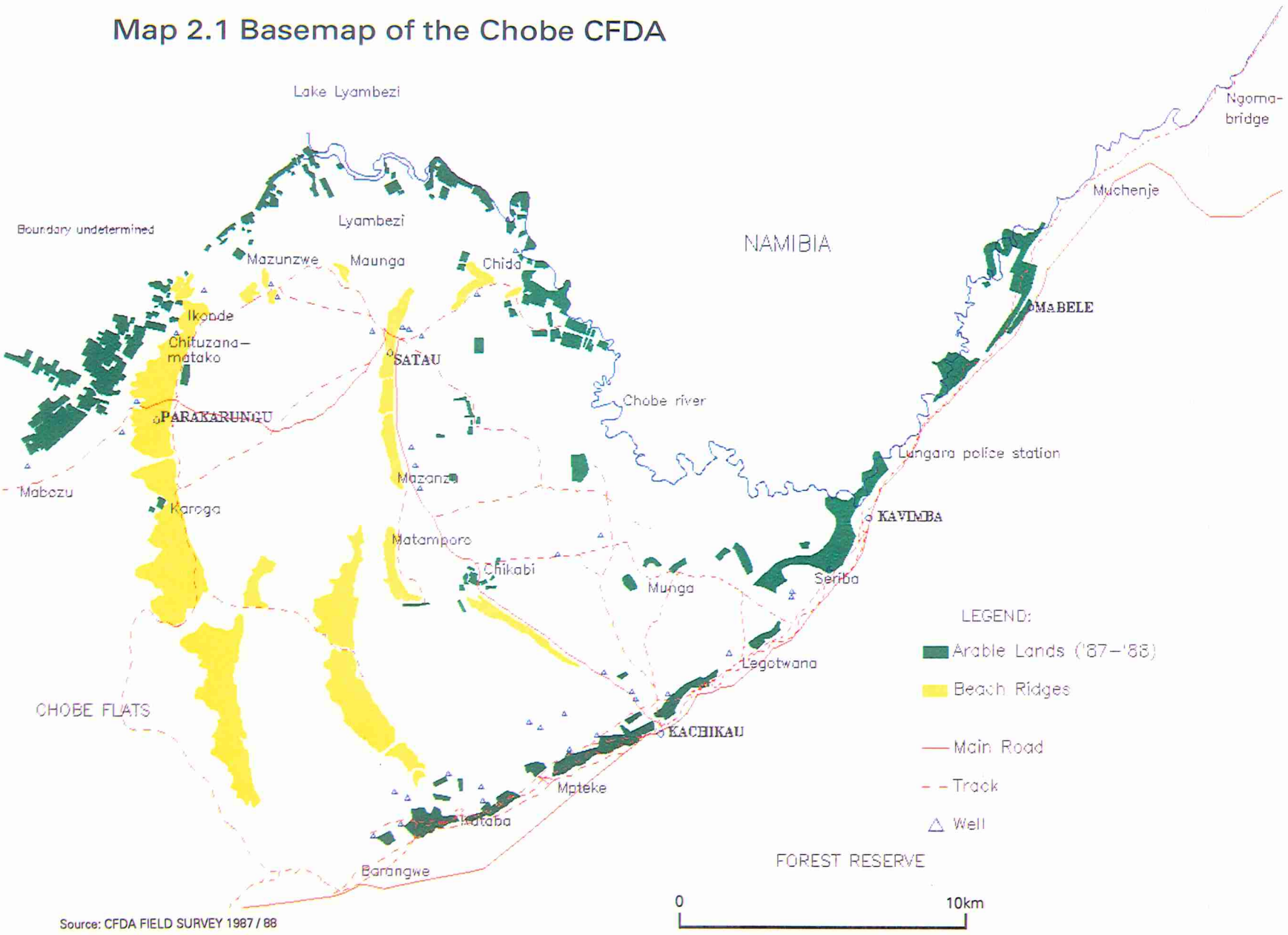
2.2 Population and land use

The current de-facto population of the Chobe Enclave is estimated at roughly 5,000 people. Compared to the 1981 census figure of 3,603 inhabitants, this indicates an average annual population growth of 5 per cent.
The number of absentee household members is around 1,100; they are mostly male and from the working age bracket. The absence of many

Table 2.2 Population in the Chobe Enclave (1981 and 1988)

	1981	1988
Mabele	489	342
Muchenje	na	196
Mawana	79	126
Ngoma	3	na
MABELE	**571**	**664**
Kavimba	145	302
Matabanelo	57	60
Seriba	101	141
Legothwane	136	146
Makose	26	-
Lungara	37	na
KAVIMBA	**502**	**649**
Kachikau	364	648
Kataba	211	146
Mpeteke	91	136
Old Kachikau	24	-
Munga	-	81
Barangwe	89	60
KACHIKAU	**779**	**1071**
Satau	420	739
Mazunzwe	47	135
Liambezi	91	165
Nchenene	138	-
Metsemahaba	28	-
Huhuwe	74	-
Maunga	-	98
Masanzu	-	72
Chida	-	184
Chikabi	-	82
SATAU	**798**	**1475**
Parakarungu	424	715
Karoga	264	54
Ikonde	92	156
Mabozo	173	140
Chituzanamatako	-	124
PARAKARUNGU	**953**	**1189**
CHOBE ENCLAVE	**3603**	**5048**

Map 2.1 Basemap of the Chobe CFDA



Source: CFDA FIELD SURVEY 1987 / 88

able-bodied persons has resulted in a shortage of labour, which limits agricultural and other activities in many aspects.
About 1,000 households live in the area, of which around 40 per cent are headed by females.
The population is distributed over five major villages: Mabele, Kavimba, Kachikau, Satau, Parakarungu, and some twenty settlements (see Map 2.1). The settlement pattern has been highly dynamic as people frequently changed the location of their villages in response to the periodic flooding of the area. After the floods in the 1950s a large number of people left the floodplain and settled on higher grounds. Before these major floods the local economy prospered and the Enclave was known for good crops and large numbers of livestock. The floods were followed by years of depression as cattle diseases entered the area and reduced the large herds. Many people left the area permanently and crop production could not sustain those who remained.
The current situation indicates a rather dramatic change: an increased human population, higher numbers of livestock, a substantial surplus of maize in the past two years, improved communications, but also an increased dependence on remittances from outside the Enclave and government programmes, which has created a kind of subsidy economy.

The villages of Mabele, Kavimba and Kachikau, situated along the escarpment, are accessible from Kasane through an all-weather gravel road. A dirt road links Satau and Parakarungu to the main road and various tracks exist which connect the major villages with smaller settlements. All major villages have piped water supply, a primary school and health facilities. The accessibility to social services is good. In each of the villages mentioned a Village Development Committee is in operation and government extension workers such as Agricultural Demonstrators (ADs) and Family Welfare Educators reside in the area. The ADs are well known in the area and are often consulted in relation to ARAP subsidy payments.

The land in the Chobe Enclave is tribal land administered through the Chobe Land Board with an office in Kasane.
Individual land holdings are widely scattered due to the frequent

population movements in the past, whereby people changed their residence but retained their land holdings. But also due to the variability of the floods and soils, farmers often have fields in different areas.
Only 25 per cent of the total land in the Enclave is properly registered, the remainder is held through the traditional system of inheritage.

The average size of land holdings per household has been estimated at 10.5 hectares. Given the total number of about 1,000 households, it follows that at present 10,500 hectares are used for farming. However, the total land ownership in the Enclave will be more, because almost all families have land rights or claims to land in presently non-utilized areas. Table 2.3 shows the present land utilization in the Chobe Enclave.

Table 2.3 Land utilization in the Chobe Enclave

Land use type:	hectares
Arable agriculture	10,500
Grazing areas	36,000
Presently non-utilized areas, non-suitable under present conditions and inhabited areas	37,500
Hunting area	85,000
Total of communal area	169,000
Chobe Forest Reserve	137,000
Total Chobe Enclave	306,000

Source: University of Utrecht, CFDA field survey 1987/88

To practise arable agriculture the area residents rely on animal traction. However, more than 60 per cent of the households in the Enclave does not own enough draught power. Table 2.4 shows the relation between draught power ownership, land holdings and ploughed areas. A distinction is made in dryland and molapo areas as it is common for a family to have land in both these categories with their distinctive characteristics. It will be clear that the more fortunate cattle owning families own more land and plough more land. Female headed households make up a large share of the households without draught power. More than 90 per cent of them lacks enough animal draught power to plough their own fields. These families rely on borrowing or hiring animals from others to practise farming. Their fields are usually ploughed late in the season which depresses the crop yields.

Table 2.4 Dryland and molapo ownership and area ploughed (in ha) per draught power class

Draught power class	% of total households	Dryland owned	Dryland ploughed	Molapo owned	Molapo ploughed
no draught power	35%	2.5	1.0	2.8	1.5
not enough d.p.	27	2.9	2.0	5.4	3.1
enough d.p.	20	5.1	1.9	8.4	4.7
more than enough	18	7.4	8.1	11.5	5.9

Source: University of Utrecht, CFDA field survey 1987/88

To summarize, the main characteristics of the farming systems in the Chobe Enclave are:

(a) Concurrent use of diversified and fragmented agricultural land

Most farming households own molapo as well as dryland fields. These areas have different elevations, soils and soil moisture conditions which contribute to the spreading of risks as the two types of land respond differently to the variability of rainfall and floods. Fields may be scattered and rather far away from the settlements and transport time to the lands limits the amount of time available to work at the lands. Transporting goods is mainly done by using oxen-drawn sledges and sometimes canoes. Animal drawn carts are not used in the Enclave.

(b) Low capital and limited labour input

Hardly any mechanized farming exists and the lack of draught power and labour limits the use of certain implements such as harrows, planters and cultivators. Kraal manure and fertilizers are rarely used because of labour and financial constraints. Broadcasting is still commonly practised as it serves the spreading of risks well. Weeding is limited and harvesting may take several weeks, both due to labour shortages.

(c) Traditional cropping and intercropping patterns

Many farming families prefer to plant different crops so as to spread the risk of crop failure. Maize and sorghum have highest priority; farmers prefer to plant both crops with maize on molapo areas and sorghum on dryland fields. In addition, interplanting occurs where seeds are mixed before broadcasting; a combination of maize or sorghum with millet, two types of watermelon, sweet reed, pumpkin and cowpea may be seen. Maize and sorghum seeds are supplied under the ARAP package. Lack of seeds of other crops is a reason for the limited diversification of crop production.

(d) Constrained timing and limited yields

Particularly due to the lack of draught power and labour, farmers are not always in a position to plough and plant at the most favourable times. In the real molapo areas timing is least constrained as ploughing and planting takes place in August - September. The months of November and December are more constraining as farmers in both rainfed molapo and dryland areas have waited for the rains and now start ploughing their fields.
Those who do not have their own draught power will have to make arrangements with the more fortunate ones. This may logically lead to less beneficial ploughing and planting times and reduced yields.

(e) Variable production, marketing and incomes

As a result of the above constraints, agricultural production varies considerably. The harvest figures for the 1986/87 crop season, known as a drought year, are far below the potential yields. The production of maize on molapos was on average 225 kg/ha, whilst on dryland it was not more than 53 kg/ha. But yields varied enormously; maize yields of 1,000 kg/ha on molapo soil have been reported. The potential of the Enclave is undeniable as was proved in the 1987/88 and 1988/89 seasons, when the area produced a substantial surplus of maize.
It has been estimated that, when the constraints on labour and draught power could be removed, and all owned land would be planted, the total area harvest could amount to over 7,000 tonnes. Local consumption is around 1,000 tonnes, which leaves a marketable surplus of about 6,000 tonnes.
A clear disincentive to more commercial farming is the absence of a

reliable marketing structure. The surplus crop has to be sold at the regional depot of the Botswana Agricultural Marketing Board (BAMB) in Pandamatenga, a distance of more than 200 km. The Ministry of Agriculture has organized buying trips to the Enclave, but farmers have frequently lamented about the fact that their bags were not collected in time.

(f) Competition with other income generating activities

Arable agriculture competes with other activities such as formal employment, fisheries and rural industries. It is all part of a flexible system which is geared towards the maximization of labour returns. Job opportunities in Kasane and elsewhere have attracted many people from the Enclave, which has resulted in an acute labour shortage.

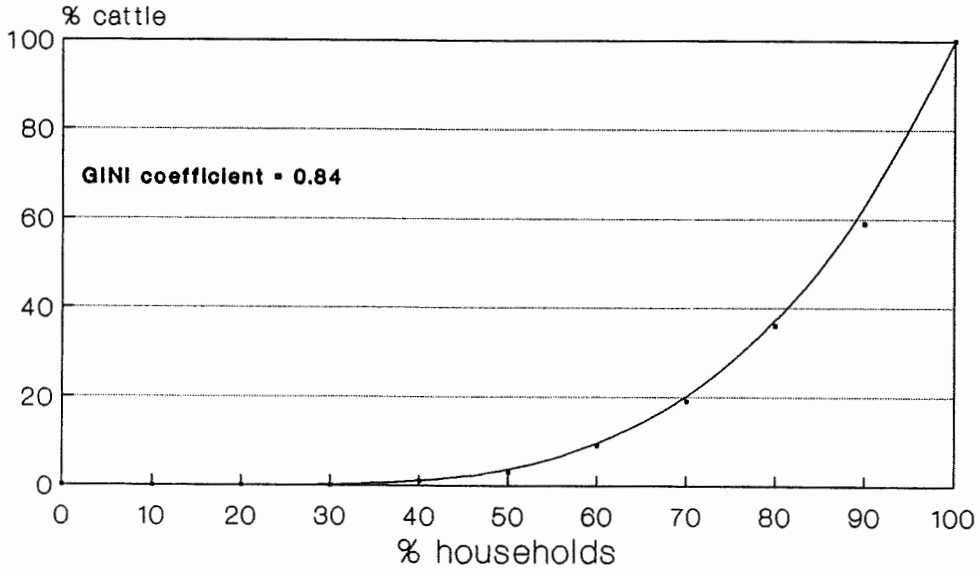
(g) Occurrence of natural hazards and crop damage

The occurrence of drought as well as floods may from time to time restrict arable production in the Enclave. Veldfires and undergroud fires (vumbe) often cause serious loss of fertile topsoil in the molapos. Plagues caused by locust, quelea birds and mice have occurred in the past years. Crop damage is also caused by cattle wandering into the unfenced fields and by game animals.

The cattle population in the CFDA is estimated at slightly over 10,000 head in 1987/88; average figures indicate 11 beasts per household, but as Figure 2.1 illustrates the distribution is highly skewed. Fifty per cent of the households owns a mere 3 per cent of the total number of cattle, whilst 10 per cent owns not less than 40 per cent of the total herd in the area.

The cattle are also unevenly distributed over the Enclave area, which results in overgrazed areas along the escarpment upto Kavimba and in the northern area around Satau and Parakarungu where cattle densities are highest.

Figure 2.1 Cattle distribution in the Chobe Enclave in percentages per household, 1988



Source: University of Utrecht, CFDA field survey 1987/88

Cattle is kept for draught power (about 25 per cent of the herd consists of oxen), milk and sales. The cattle is mainly marketed through the butcher in Kasane. Most farmers apply reasonable standards of herd management like rotational grazing during the seasons, regular dipping and inocculating. Despite this fact, the condition of the cattle in the Enclave is relatively poor. The major reason must be found in the severely limited daily grazing time. The shortage of labour in many households and the presence of predators in many grazing areas confine the herding of the animals to the bare minimum. The isolation of the Chobe Enclave from the main livestock areas in Botswana and the restrictions on imports, due to foot-and-mouth disease regulations, may have contributed to the poor breed.

Survey results indicate that one fifth of the herd is looked after within the context of the mafisa system. The spreading of risks is a major reason as grazing varies considerably, due to erratic rainfall and variable grazing pressure.

Other productive activities in the area include fisheries in the main channels and the Linyanti swamps, forestry through the Chobe Forest Industries, hunting and tourism through local hunting and Hunters Africa safari company, and rural industries like basketry, beer brewing and carpentry. Formal employment in the Chobe Enclave is mainly with the government. Remittances from absentee household members also provide a significant contribution to the local cash flows.

The average household income in the Enclave has been estimated at P1,705 in 1987/88. As Table 2.5 illustrates nearly half of the average income is earned from formal activities. Agricultural activities, including the sales of cattle and ARAP payments account for nearly a quarter of the income. Rural industries and other informal activities make up 21 per cent of the average income. (It must be rembered that the survey was held after two drought years. With the substantial sales of maize in the past two years, the share of agriculture in the average income will be significantly higher.)
The composition of the income differs widely between the various household categories. Households with more than enough draught power have the highest incomes, which surprisingly is not obtained from farming but from formal employment. It seems that these households have a very wide resource base: they have more land, more cattle, more family labour, often employed in the formal sector, which all together provided them with an average income of P2,588 in 1987/88. On the other hand, the households without any draught animals only earned P886.

The female headed households clearly belong to the most disadvantaged group. Some 90 per cent of them do not have enough draught power, so they depend on others which reduces their yields and farm income. The size of the families is small and the absence of labour limits the possibilities to obtain an income from many other sources. With only a few income sources of their own, the female headed households are largely dependent on remittances. For 30 per cent of the families headed by females remittances form the most important source of cash income. (See for a detailed analysis of incomes in the Chobe Enclave the report by Kolhoff & Polet, 1990)

Table 2.5 Composition of the average household income, per household category in Pula

Source of income:	Average income in Pula	%	Household category 1	2	3	4
Non-agricultural	**P1316**	**77 %**	**P776**	**1248**	**1823**	**1834**
Formal activities	833	49	303	887	1170	1420
Informal activities	353	21	330	210	579	368
Remittances	130	8	143	151	74	46
Agriculture	**389**	**23**	**110**	**346**	**620**	**754**
Arable agriculture	142	8	33	97	294	265
Livestock	99	6	9	116	152	192
ARAP payments	147	9	68	133	174	297
Total income	**1705**	**100**	**886**	**1603**	**2443**	**2588**

Household category:
1 - no draught power
2 - not enough draught power (1-10 animals)
3 - enough draught power (11-20 animals)
4 - more than enough draught power (> 20 animals)

Source: University of Utrecht, CFDA field survey 1987/88

In terms of wildlife the Chobe Enclave is an important area with particular significance for the Chobe National Park. The latter contains one of the largest concentrations of game animals in Botswana and is a vital component in the country's tourist industry.
The Chobe floodplain used to be inhabited by a considerable wildlife population amongst which were lechwe, reedbuck and hippo but the recent drought and increasing human populations have decimated the numbers.
Two other areas, the Chobe Forest Reserve and the Chobe flats, are still of enormous importance to the game population as dry season forage areas.
The high game densities have resulted in damages to crop production and

livestock rearing by elephants, kudu, buffalo, hyaena and lion. In the northern Enclave 20 per cent of the farmers incurred damages to crops through wildlife. The villages of Parakarungu and Mabozo are mostly stricken by cattle killings. Most cattle losses occur during the night on stray cattle or inside the kraal.
The wildlife resource also adds to the income situation of many Enclave families through formal jobs with Hunters Africa or through citizen hunting and the sale of meat and skins. The entire CFDA is a controlled hunting area, but hunting is usually confined to the Chobe flats.

2.3 Land evaluation

Agricultural production, which still dominates the Enclave's economy, largely depends on socio-economic conditions and environmental characteristics. In this section the environmental characteristics will be summarized that have resulted in the land evaluation study of the Chobe Enclave. Land evaluation is concerned with the assessment of land performance when used for specific (agricultural) purposes. Basic data like climate, soils, hydrology is used to identify the land qualities that determine the production and management conditions for a certain land use type. Comparison of land qualities with land use requirements leads to a suitability classification for the defined land use type. Similar to the FAO-Botswana land evaluation, the classification used here distinguishes between four suitability classes ranging from S1 (highly suitable land) through S2 (moderately suitable land), S3 and S4 (marginally and very marginally suitable land) to N1 (currently not suitale land) and N2 (permanently unsuitable land).

Environmental characteristics

Compared with other parts of Botswana, the environmental conditions in the Chobe Enclave are favourable. Nevertheless, the Enclave farmers have to cope with erratic rainfall patterns and an irregular flood regime. Both factors have contributed to a highly flexible and dynamic

farming system in which farmers spread their risks by using different combinations of soils, topography and micro-relief to deal with these variable conditions.
As described earlier, the climatological conditions do not pose serious problems to crop growth in the Enclave. The length of the growing season is 121 days in one out of two years and less than 88 days in only one out of four years.

The hydrology in the Chobe Enclave is a variable factor. High water levels in the rivers may cause extensive flooding, thus reducing the area available for crop production and livestock grazing. The influence of floods is exerted for several years because groundwater levels will lower only slowly. In the other extreme, consecutive years of drought may occur which severely hampers arable farming because of water shortages. However, a limited flood will contribute to the availability of water for plants, thus extending the growing period. With the highly variable availability of surface water it is extremely difficult to determine the area suitable for arable farming.

Soils in the Chobe Enclave reflect the differences in topography, parent material and soil formation (see Map 3.2). Based on differences in origin and actual processes, four major physiographic units have been distinguished, each having its specific soil type:

- The escarpment with the sandveld area (soil type R).

- The colluvial zone (soil type C).

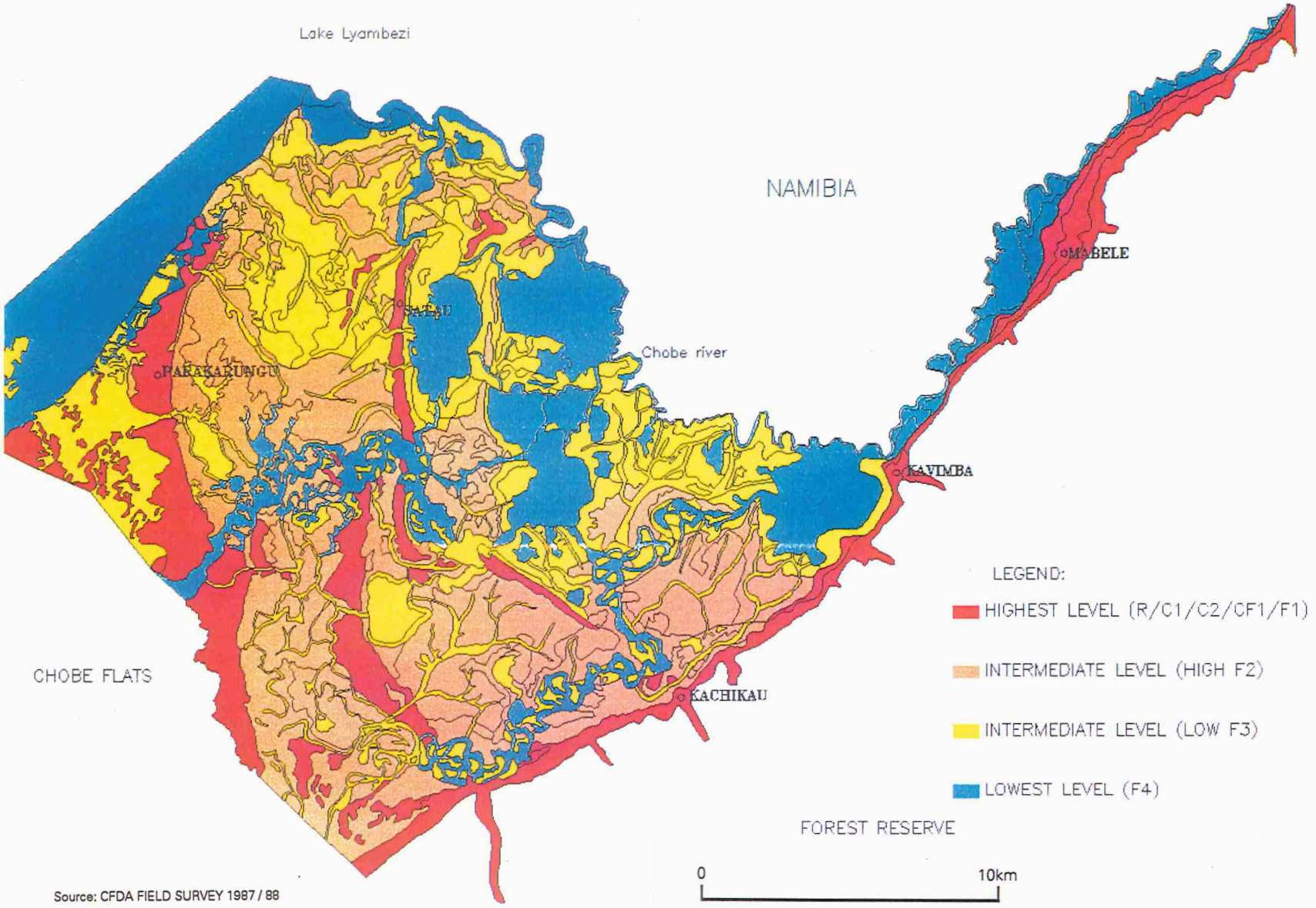
- The Chobe flats (soil type CF).

- The Chobe and Linyanti floodplains (soil type F).

The C, CF and F units are further subdivided on the basis of relative altitude, as described below in the legend to Map 3.2.

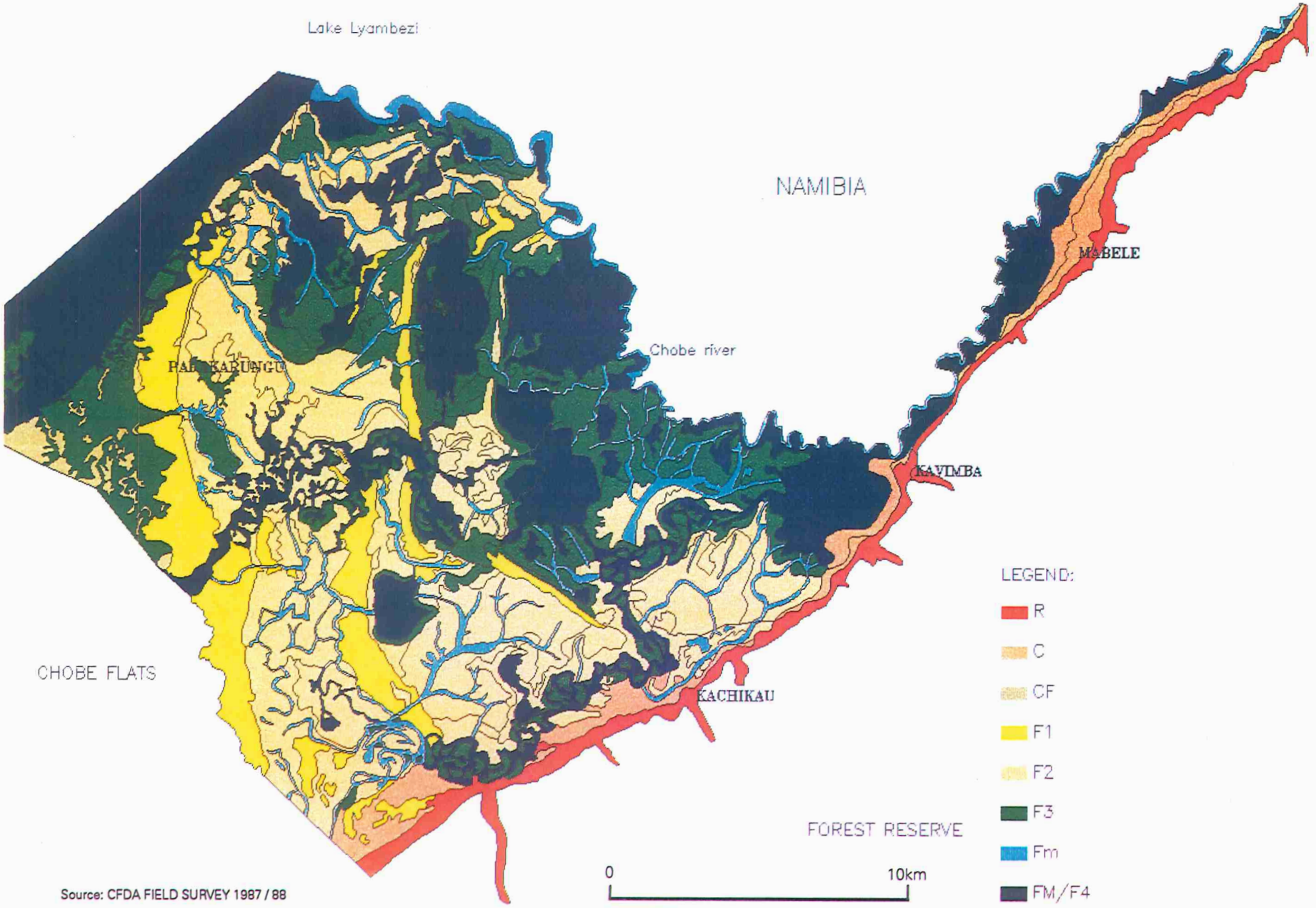
- **C** : The colluvial unit is separated in three classes (1, 2 and 3), where C1 is steeper sloping and situated more up-slope than C2. The C3 unit is situated in the transition zone towards F.

Map 3.1 Chobe CFDA surface levels



Source: CFDA FIELD SURVEY 1987 / 88

Map 3.2 Chobe CFDA major division of land units



Source: CFDA FIELD SURVEY 1987 / 88

- **CF** : The Chobe flats unit is subdivided into two classes (1 and 2). The area is characterized by an alternation of relatively high terraces with low depressions in between. The distinction between CF1 and CF2 is not by absolute altitude but rather by drainage.

CF1 : Soils on higher terraces, which are well drained.
CF2 : Soils in the poorly drained depressions and channels.

- **F** : The soils in the floodplains are highly influenced by their topographical position. This is reflected by differences in parent material, organic matter content in the topsoil, salt and carbonate accumulation, clay migration and drainage class.

The soils in the floodplains are given an extra suffix (M or m) to place before the topographic level in the case of being part of a water receiving area.

FM : Soils situated in the larger depressions and in the lower parts of the major molapo channels. These soils are subject to ponding after intensive rainfall.

Fm : Soils situated in the small molapo channels all over the floodplains. As these units are small but elongated the influence of concentrated run-off differs widely. This results in large differences in the water budget. An excess of water in the lower parts is accompanied by a shortage along the edges. The lower part in the middle of the molapo is highly organic in contrast with the adjacent edges. The temporarily high groundwater table may result in salt and carbonate enrichment at the surface.

Four classes are distinguished in the floodplains:

F1 : Soils in the floodplains, high enough to be clear of floods in all years. These soils are mainly situated on the beach ridges and are further characterized by a tree and shrub vegetation.

F2 : Soils in the floodplains situated on the intermediate areas. These soils are only flooded during short periods of extreme flooding, e.g. one out of ten years. High groundwater tables result in the accumulation of salts and or carbonates through the process of capillary rise.

F3 : Soils in the floodplains low enough to be liable to longer periods of inundation, e.g. one out of four to five years, or to high groundwater tables. Most of these soils have a topsoil with a high organic matter content.

F4 : Soils in the floodplains in low and very low positions, which are liable to long periods of flooding and are very susceptible to ponding. These soils are very rich in organic matter and lack accumulation of salts and carbonates.

In general, given the context of the present farming system, the soils of the Chobe Enclave have a limited suitability, which is largely determined by the variable availability of soil moisture.
The highest potential for arable farming is found in the soils of the floodplains (F), especially those having a topsoil with a higher organic matter content (F3 and F4). But at the same time, these soils are liable to flooding which restricts their use in years of high water levels or high rainfall.

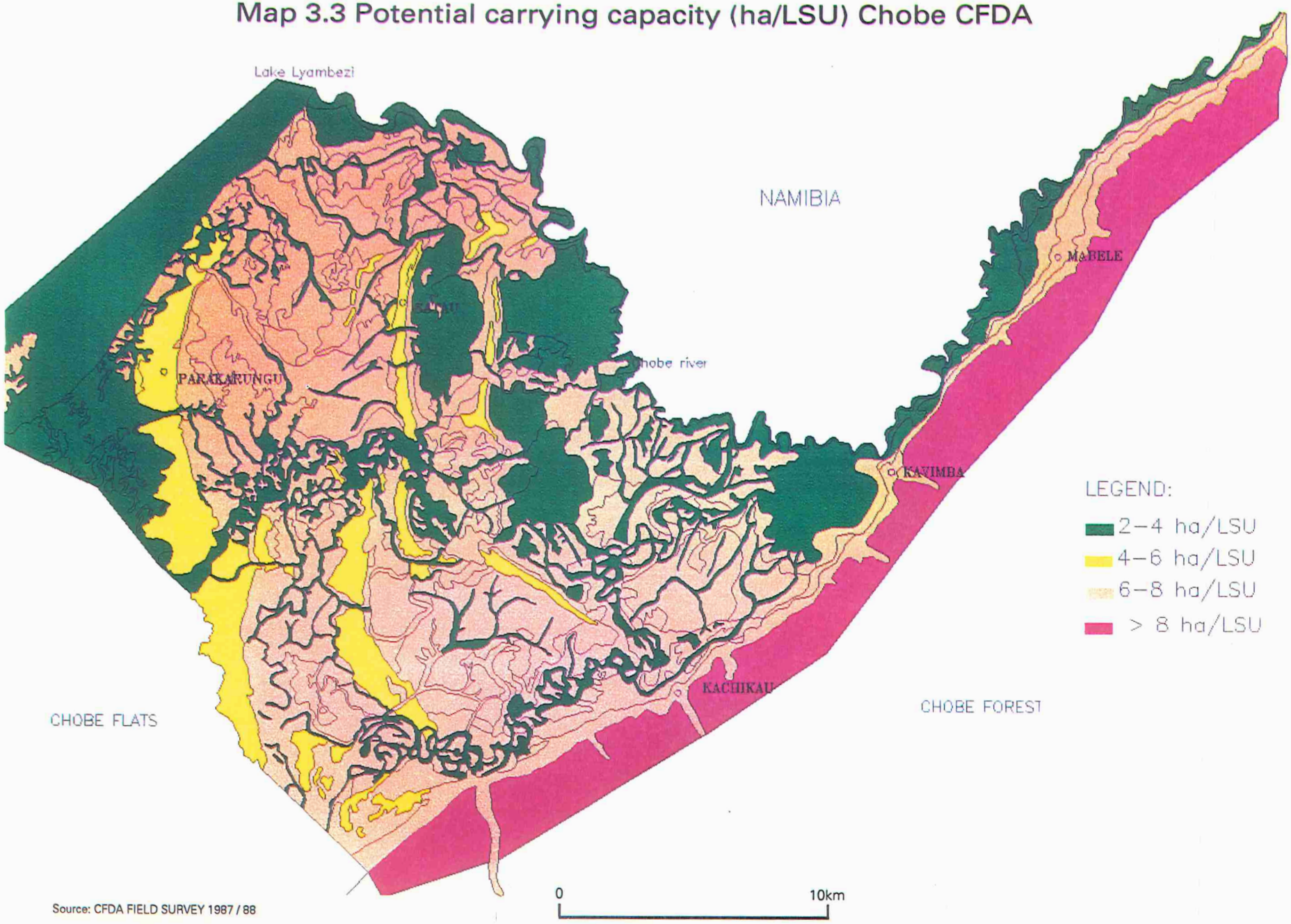
Land evaluation

The erratic climatic conditions, resulting in unreliable annual rainfall, recurrent drought periods and regular inundations, necessitate a flexible and dynamic farming system. As shown, farmers respond to these uncontrollable factors by cultivating different soils in different locations from year to year. In accordance with this attitude the land evaluation exercise has been adjusted to take account of the temporal variability of natural conditions in the Enclave. Three scenarios were designed to represent the flood dynamics. The scenarios depict situations with (1) no floods at all, (2) a high flood and (3) an intermediate flood.
The assessment of land suitability comprised eight different land use types, of which the most important were livestock grazing, the production of maize and the production of sorghum. These three land suitabilities will be summarized in the following section. The others, including the land evaluation according to the FAO-Botswana system, have all been described in the previous report. (see Jansen & Riezebos, 1990)

Grazing capacities

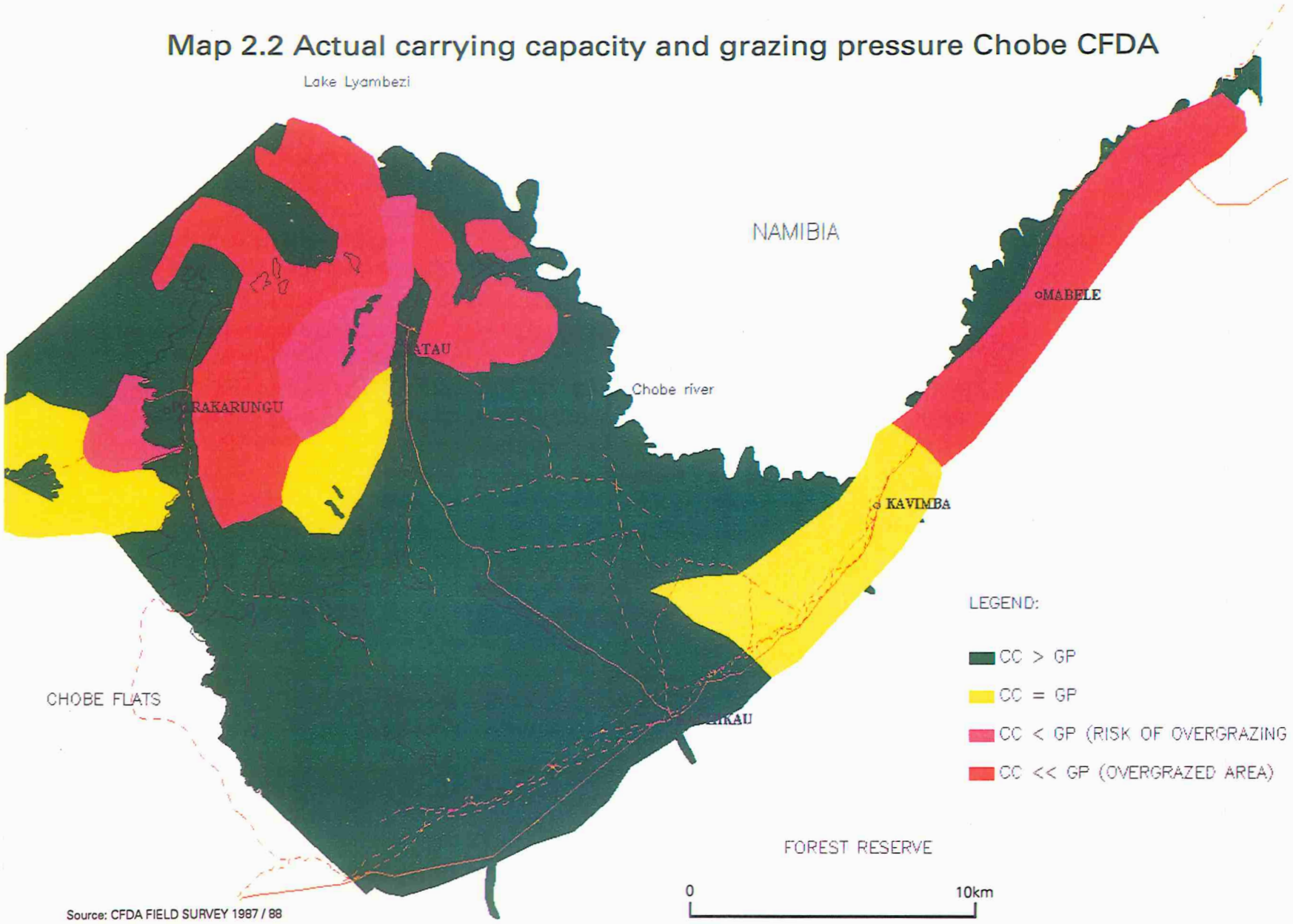
The forage value of grasses is determined by three factors: crude

Map 3.3 Potential carrying capacity (ha/LSU) Chobe CFDA



Source: CFDA FIELD SURVEY 1987 / 88

Map 2.2 Actual carrying capacity and grazing pressure Chobe CFDA



Source: CFDA FIELD SURVEY 1987 / 88

protein percentage, digestibility and palatability. These factors differ for each species and change during the growing season. Moreover, the growth of grasses and the area coverage are influenced by many factors among which natural fertility and water availability are most important under (semi) arid conditions. In addition, grazing intensity, veld fires and former cultivation are important. Interaction of these factors yields a complicated vegetation structure with many small units. Fortunately, these grassland units can be related to the prevalent soil types which have been characterized in terms of grazing capacity. A distinction is made between 'potential grazing or carrying capacity', which is a measure of biomass production under undisturbed conditions, expressed in hectares per standard livestock unit (ha/LSU), and 'actual grazing or carrying capacity' representing the biomass production under the present grazing practice.

The potential grazing capacity under dry conditions, i.e. after consecutive floodless years, varies between 3 and 8 ha/LSU in the Chobe floodplain, between 2 and 4 ha/LSU in the Chobe flats and between 12 and 20 ha/LSU in the Forest Reserve.

The grazing capacity on the land units between Satau and Parakarungu is about 10 ha/LSU in relatively undisturbed areas. The cattle density between the two villages is roughly one LSU per two hectares, which indicates a grazing pressure of at least five times the grazing capacity. Very close to Satau and Parakarungu the situation is even worse. On these units, with a potential of 6.5 ha/LSU, the grass cover has disappeared completely leaving a bare soil.
In general, rangeland conditions in the southern area are better than in the northern part of the Enclave. Areas near Mabele and Muchenje are an exception; here the available grazing area is extremely limited by the proximity of the Chobe river and by the presence of arable fields.

Land suitability

The dry scenario comprises a floodless year and growing season, whereby

surface water is limited to the main channel of the Chobe river, some low lying areas in the eastern part of the Enclave and to a small number of depressions in the floodplain. Groundwater levels are between one and four meters below the surface.
In this scenario some soils in the lower floodplain areas (land units F3, Fm and FM/F4) have the most favourable conditions for the growth of maize, be it a suitability class of only S3 (marginally suitable) or S4 (very marginally). The major constraint is moisture availability or lack of drainage. The same soils are more suitable for sorghum (S3 or even S2), because of the better resistance to drought.

The flood scenario is based on a water level of 930 meters a.s.l. around the beginning of June. At the start of the growing season, around November, the water level is lowered by approximately one meter through evaporation and surface drainage. As a result only the F1 units and parts of the F2 units will be situated above the water level. This situation continues to March since evaporation and drainage are more or less in balance with rainfall.
The area best suitable for the production of maize (although not better than S3) is found on land unit F1 and on the higher, well drained terraces of the Chobe flats (unit CF1P). The same units have a similar suitability for sorghum, but in addition, other units also have a S3 suitability rating (RL, RS, C1 and some C2 units).

In the intermediate scenario it is assumed that water levels are lowered by some three meters, a few years after a high flood. The F3 units have just fallen dry, but the F4, FM and Fm units are still inundated or very wet.
For maize production, best opportunities (S3) are found on unit F2Hk1 where the suitability for sorghum is moderate (S2). A very marginally suitability (S4) for maize can be found in RL and RS units in the sandveld area, in the C1 and C2 units in the Chobe flats, and in some of the F2 areas. In all of these units the suitability for sorghum production is one class better (S3).
Table 2.6 shows the areas, in hectares, for various crops under the different scenarios per suitability class. Maps depicting the location

of the areas suitable for the cultivation of the crops mentioned have been presented in the previous report on the Chobe Enclave. (see Jansen & Riezebos, 1990)

Table 2.6 Area distribution for different crops per suitability class (in hectares)

crops:	S2	S2/S3	S3	S3/S4	S3/N	S4	S4/N	N1/N2
dry scenario:								
maize			3256	1186		50972	3408	623
sorghum	2182	1186	52045	2476	932	356		268
millet	2387	1186	46163	5797	932	2710		268
groundnut	2364	1186	44375	5797	932	4498		268
sunflower	2270	1186	51958	2476	932	356		268
cotton			5630	11230		39771	2547	268
pumpkin			15400	8429	1793	17853	7520	6267
beans			15400	8429	1793	17853	7520	6267
intermediate scenario:								
maize			4			12363	10385	36693
sorghum			12363	10314	932	10858	10538	14435
flood scenario:								
maize			5332			1282	2547	50284
sorghum			6614	1610	932	942	9222	40121
FAO system:								
maize			241			29732	9009	20463
sorghum			30049	8077	932	20120		268

Source: University of Utrecht, CFDA field survey 1987/88.

CHAPTER 3 CONCLUSION: WHICH WAY RURAL DEVELOPMENT IN THE CHOBE ENCLAVE

In the previous sections various characteristics relating to natural resources, population and land suitability have been discussed. Several constraints to rural development and a full utilization of natural resources have been mentioned. The first part of this concluding chapter briefly summarizes and reviews the major rural development constraints in the Chobe Enclave. This serves to establish the starting-point for a discussion of some options for future development in the Enclave, which ends this report.

3.1 Major rural development constraints:

(a) Erratic climatic conditions and constrained natural resources

Although the climatic conditions of the Chobe Enclave are relatively favourable, the area residents have to deal with erratic rainfall patterns. This is supplemented by a dynamic flooding regime, which creates on the one hand possibilities for productive molapo farming and fisheries. On the other hand, extensive floods can seriously hamper arable farming and livestock rearing.
In addition, the soils of the Chobe Enclave have a limited suitability. Micro-topography, variability and soil moisture availability make irrigated agriculture on large or medium scale virtually impossible (see also MacDonald, 1989).
The limits of the water and land resource also effect the livestock sector as grazing is directly influenced by rainfall, flooding and quality of the soil.

(b) Labour shortage and migration

Labour migration from the Enclave to Kasane and beyond has had an enormous impact on the age structure of the population. Many working-age men and women are absent, although they may contribute financially to the incomes of their remaining families in the Enclave. The massive out-migration has resulted in an acute labour shortage which can be regarded as one of the most severe constraints to crop production and livestock farming.
Most severely affected are the female headed households. These families lack the labour to attend to the specifically male tasks, like cattle keeping and ploughing. They only have a few income sources, and usually depend on others to plough their fields, which restricts their food production and farming income.

(c) Uneven distribution of draught power and marginal livestock sector

Although the number of cattle in the Enclave grows at a remarkable rate, the general condition of the animals is rather poor. This may be largely due to the shortage of labour in many households for herding the animals. As a result the daily grazing time is extremely limited and grazing of the animals takes place near settlements where rangeland conditions have become very bad. Marketing opportunities are limited to the butcher in Kasane.
The lack of draught power has been identified as a constraint for many households. Given the total herd of over 9,000 animals, there may be sufficient cattle to plough all arable land in the Enclave, but the very uneven distribution of livestock means that many households depend on other farmers' animal draught power. Those households without enough draught power necessarily plough and plant at a late time which reduces their yields and farming income.
Especially the female headed households have a deficit of draught power: more than 90 per cent of these families have to make arrangements with others to have their fields ploughed.

(d) Underutilized wildlife resources

The Enclave is of particular importance to Chobe's wildlife population and its related tourism industry. However, little use has been made sofar of the Enclave's potential in this respect. Hunting by Enclave residents provides some income through the sales of meat and trophies, and some people are employed by professional safari companies.
On the other hand, wildlife is also occasionally destructive to crops and livestock. Crop damage is mainly a constraint in the southern Enclave where elephants, buffalo e.o. move into the floodplain in search of water, before the crops have been harvested.
Killings of livestock by predators is a problem in the northern Enclave, causing significant losses and restricting the area used for grazing. The regulations with regard the farmers' right to shoot predators and the lack of compensation has caused considerable resentment towards the Department of Wildlife and National Parks.

(e) Limited markets

A constraint regularly mentioned by Enclave residents pertains to the limited markets for goods produced in the Enclave. Examples are the marketing of livestock to the butcher in Kasane and the defective marketing of maize to BAMB in Pandamatenga.
There seems to be more potential to diversify the rural economy, with basketry and carpentry for instance, but the marketing of the products has been a constraint over the years.
Accessibility of the area is problematic, as well as the low population density in Chobe District and the absence of larger settlements in the vicinity.

(f) Agriculture-afflicted hazards

Without doubt the erratic climatic conditions are inflicting hazards upon arable and livestock farming in the Enclave. Farmers respond by a highly flexible attitude towards agricultural efforts.
Arable and livestock farming are also hindered by veldfires. The fires are meant to destroy the tough reeds in the floodplain but may damage crops and vegetation as the fires spread underground and are difficult to control. Wind erosion occurs which threatens arable agriculture on a long term basis.
Arable agriculture at times suffers from attacks by quelea birds and locusts. Post-harvest damage is done by insects and may reduce yields considerably.

3.2 Development options

In spite of the above mentioned constraints, neither land use, agriculture nor rural development in general has reached a limit in the Chobe Enclave. The potential for development of various sectors of the local economy has been clearly demonstrated in some recent studies (see Terry, 1988; MacDonald, 1989; Malikongwa, 1989). Also the Chobe District authorities have distinguished several avenues for improvement of the situation in their District Development Plan IV and the Chobe Enclave Land Use and Development Plan (both in draft). The latter two documents clearly spell out the development priorities for the upcoming years. First priority is given to district agricultural development, including large scale (in Pandamatenga) and small scale (in the Enclave) developments.
The other priorities are the development of the wildlife and tourism sector, the livestock sector and finally the rural industrial sector. On the basis of these priorities, suggestions and recommendations are presented below. Options for development are primarily based on the findings of the CFDA Applied Research Programme; additional information is used from the MacDonald study, Malikongwa's consultation exercise, and the two draft district plans.

3.2.1 Development of arable agriculture

Agricultural development efforts should be geared towards increasing the production potential of the existing natural resources. In the particular case of the Chobe Enclave this implies enhancing the characteristic flexibility of the farming system.
The recent studies have shown that the current farming system, especially the molapo agriculture, offers potential for further development. The studies also indicate that there is a substantial need and demand for assistance in order to enable the Enclave farmers to increase their production levels.

The realization of the area's potential is restricted at present by the uneven distribution of resources, especially draught power, labour and capital. The female headed households represent a particularly disadvantaged group in this respect.

One of the major constraints to tackle is the skewed ownership of draught animals. Nearly two third of the Enclave farming families does not have enough animals to plough their lands. Several options to alleviate this situation can be envisaged: the introduction of a tractor hiring scheme, an oxen purchase project, improved livestock farming concentrating on draught animals, or combinations thereof. Donkeys have been tried before and failed, largely because the molapo soils are too heavy.
Whatever the choice may be, serious consideration should be given to the long term effects, whereby new dependencies should be avoided.
Bull subsidy schemes should pay particular attention to those households who do not own enough draught animals. Livestock management groups could be formed between families who do not have sufficient labour of their own to herd their animals.
Tractors, in combination with draught animals, could be used to plough the productive but heavy molapo soils. Tractors can extract the deep roots of weed and grasses, so preparing the soil for later tillage with animal traction.

The labour constraint will be more difficult to tackle. At present, there is an acute shortage of working-age people in the Enclave which affects all aspects of economic life. In agriculture it limits the cultivated area, it delays ploughing, planting and harvesting. In the livestock sector it reduces the daily grazing time of the animals, and concentrates the cattle near the villages.
The development of agriculture in the Enclave will have to compete for labour with the attraction of formal employment and social amenities in Kasane and elsewhere. However, if opportunities in the Enclave could be realized it would be possible to attract the older and married men back to the Enclave.
Cooperation among groups of people in agricultural work could be promoted. The fishing cooperative in Satau is an example that these efforts could be worthwhile.

This study has shown that different types of farming households, each with their specific constraints and possibilities, operate in the Enclave. Consequently, any agricultural development effort should take note of these specific characteristics so that outside assistance will take appropriate forms. This is of particular significance in the case of the female headed households.

The MacDonald report lists quite explicitly a number of possible improvements in the small scale agricultural sector. Within the perspective of the CFDA Applied Research Programme it suffices to say that advancements in dryland and molapo farming may best be pursued through intensified techniques such as row planting, harrowing and cultivator weeding. Intensification of areas in use seems to provide the better prospects in relation to quality of the soil and topography of the fields, as well as labour aspects.
At the same time, it is acknowledged that especially farmers with sufficient draught power may wish to increase their ploughed areas in order to commercialize their production.

An important component of improved land management would be fire prevention. In drought and dry season situations fires cause

significant losses of surface peat and trash, so reducing the organic matter available for plant growth. If burning could be prevented not only losses of organic matter would be eliminated, but also more dry season grass would be available for livestock.

The land evaluation exercise has shown that the traditional food crops offer the best possibilities for increased agricultural production. Nevertheless, farmers who are willing to produce new commercial crops should not be discouraged. The Malikongwa report indicates that some farmers are showing interest in the introduction of new crops and small scale irrigated farming.

There are possibilities for very small scale irrigation and horticultural production in the Enclave. There seems to be a strong local demand for vegetables in the villages, though the volume required is not large by commercial standards. Small individual or group schemes could be started, using the simplest and cheapest possible farming methods. Experimentation with the equipment, water use, horticultural practices and marketing could be made under a range of conditions.
The low lying areas of the Chobe floodplain offer the best prospects for small scale irrigation development. Also on the sandy soils of the beach ridges there are some opportunities which may be worth pursuing. Soils in areas adjacent to villages could be used for the cultivation of vegetables by applying kraal manure. Farmers could be supplied with carts for transporting manure to the fields, and a system might be devised to protect crops against grazing cattle. Intensive cultivation could be combined with the existing or newly developed woodlots in Satau and Parakarungu into a pilot agro-forestry project.

The improvement of agriculture will further require a smoothly functioning agro-support sector. The present marketing system in the Chobe Enclave needs to be replaced. Farmers should be able to market their surplus of maize and sorghum in the Enclave, in stead of transporting their bags to Pandamatenga.
Agricultural demonstrators should be released from their administrative tasks and concentrate on the real extension work. Seeds for new crops

should be made available and seeds for the traditional food crops should be delivered on time.

In order to assist the Enclave farmers with improved traditional crop production, it is recommended that an agricultural extension project is implemented. The project would concentrate on real agricultural extension and the project staff (possibly one experienced agronomist / farmer with one or two assistants) would help trouble shooting as well as introduce improved agricultural techniques. It is suggested that experience wiil lead to the proposal of measurements to alleviate the draught power shortages; the team should be given time to work out the best long term solution. Cooperation with the Regional Agricultural Office in all phases of the project is important.
The most significant characteristic of the project should be flexibility; it should always be born in mind that the prevalent farming system in the Chobe Enclave is a highly flexible one and assisting a flexible system with a bureaucratic institution is asking for trouble and failure. The interlinkages between arable farming and livestock rearing as well as with fisheries, handicrafts etc also requests a flexible approach. Finally, such an extension project should start as soon as possible as the Enclave farmers have indicated on various occasions that they need help and support and as some momentum still exists.

3.2.2 Wildlife utilization and tourism development

Wildlife resources in the Chobe Enclave are abundant and could be utilized more efficiently and profitably than at present.
Most important is that the involvement of local residents in wildlife management and utilization will be increased. More of the benefits, in terms of employment and income should accrue to the Enclave residents. The previous CFDA-ART report has indicated that in the past years the Enclave residents have been allocated less and less hunting licenses. A rather unfair situation has emerged whereby the residents have increasingly lost control over their local resources. On the other

hand, the effects of wildlife damaging crops and killing livestock seem to become more significant. Unless the Enclave residents obtain some benefits from the presence of wildlife, their is little reason why they should support the presence of game animals in their area.

This study therefore concurs with the views of the MacDonald study and the Chobe District planners that serious consideration should be given to the introduction of a community-based wildlife management and utilization scheme.

Future utilization of the Enclave's wildlife should be in accordance with national wildlife management and tourism plans as well as with the developments in the adjacent Chobe National Park. Fortunately, the preparation of these plans has recently received a lot of attention.

A recent report (Cummings & Taylor, 1989) distinguishes five types of wildlife utilization projects:

(a) Improved subsistence hunting

This involves the improvement of the hunting efficiency and the utilization of the animals shot. As well as organizing hunting groups, village craft groups could also be formed to involve other village members, particularly women. This type of project would need very little capital. Revenues could be substantially increased by local processing of skins and the sale of high value finished products.

(b) Game cropping

This involves the cropping of a number of animals from large herds of game, following careful analysis of herd structure and safe offtake rates. Due to the depletion of Botswana's free-ranging game populations during the drought period, this type is probably only suitable for game ranches.

(c) Game ranching

Game ranching, like ostrich and crocodile farming, has proved profitable in other areas of Southern Africa, but infrastructure costs are high and high levels of management skills are necessary. These factors make this type of wildlife utilization less suitable for rural communities.

(d) Community partnerships with commercial safari companies

(e) Community partherships with commercial tourism companies

These two types of projects are essentially similar in concept. In these arrangements the local community would put forward its land area and wildlife resources and the commercial company would bring in its management and marketing skills. Although the procedures to establish such partnerships still need thorough investigation, there are definite benefits to both sides. Communities would receive employment and revenue from these ventures and the companies would have longer tenure of leases and greater access to trophy animals than at present. (see also Lawson, 1989)

The latter two types offer the best opportunities for the Chobe Enclave where large underutilized wildlife areas exist in the Forest Reserve and the Chobe flats. Furthermore, these areas are known to contain good quality trophies of lion, eland, sable antilope and zebra, which is attractive to potentially interested safari and tourism companies. Important questions, which must be answered, are: how can the community be involved into a partnership with a commercial company and how do the revenues of this partnership accrue to the community ?
Probably the best option for the Chobe Enclave is to establish a Development Trust, which will act in the interests of the community. Through agreements with the Land Board and the Ministry of Local Government and Lands, the Trust would bring in the land as its equity in the partnership. The Development Trust should have a Board of Governors with representatives from all five villages in the Enclave, supplemented by a number of government officials, particularly from the Department of Wildlife and National Parks. Revenues from the partnership can be invested in facilities, like electric fences and kraal improvement, which reduce the damages of game animals to crops and livestock. Revenues can also be used to finance spin-off activities from the partnership like a craft shop, a tannery etc.
The procedures to establish such a partnership will be a long-term process, whereby judical matters have to be resolved between the relevant ministries, district authorities and the local community. Outside assistance to the community with the formation of a Development Trust will be necessary.

3.2.3 Livestock development

As has been concluded, the quality of the cattle in the Enclave is rather poor. Furthermore, the land evaluation has shown that in large parts of the Enclave the rangeland conditions are very bad. Some areas in the northern Enclave are even endangered and need immediate measures to prevent further degradation.
This study therefore supports and reiterates the policy priority of the Chobe District that the emphasis for the livestock sector should be placed on an improvement of the quality of the existing herd. There is hardly any scope for a growth of livestock numbers within the existing grazing area. Except in the south-western part of the Enclave, where rangeland conditions are fairly good, but this area has been abandoned in the past because of attacks by predators and lack of water. However, re-opening of this area for livestock grazing would seriously jeopardize the prospects of a wildlife management scheme in this area. The latter endeavour would be more profitable in economic terms as it is likely to benefit the entire community in stead of only a small number of cattle owners.

At various consultation meetings farmers have requested assistance to improve their herds. The demand for improved bulls has never been met by the Ministry of Agriculture in the past years. (see Malikongwa, 1989) The Ministry could take measures to supply the Enclave farmers with more improved bulls. These activities should result in a better accessibility to animal draught power for all Enclave farmers. This implies that female headed households, or groups thereof, should be the prime target group of the bull subsidy scheme. The incorporation of a bull subsidy and training scheme into the recommended agricultural extension project could be investigated.

The few commercial cattle farmers could be assisted with the marketing of their cattle. The present marketing system is imperfect, as there is only one outlet for the commercial livestock owners. The possibility of marketing cattle, via the quarantaine camp at Dukwe, to the new abattoir in Francistown could be considered.

Interesting for the commercial livestock owners as well could be the increasing demand for high quality meat from the tourism sector. At present this is being supplied from Francistown, but there may be ways to encourage Enclave farmers to fatten and sell their young cattle. (see MacDonald, 1989)

Nevertheless, it should be remembered that the potential for the livestock sector in the Chobe Enclave, as well as in the entire District, is fairly low. Due to the contact with wildlife it will never be possible to breed cattle that are guaranteed foot-and-mouth disease free. This will restrict marketing to non-EC areas with consequently lower prices.

3.2.4 Development of rural industries and employment creation

The employment in the formal sector in the Chobe Enclave is very limited and is mainly with various government institutions, like customary courts, schools, health facilities etc. There is only one industrial enterprise in the area, the Chobe Forest Industries, which employs about 150 people. Despite the limited size of the formal sector in terms of employment creation, it provides most of the purchasing power in the Enclave. In general, half of the cash incomes of the households is earned in the formal sector. It seems that the socio-economic differentiation between rich and poor households is mainly caused by access to formal employment.

Informal or non-agricultural activities in the Chobe Enclave varies from highly renumerative endeavours like street vending and traditional healing to less paying activities like beer brewing and grass cutting. The relatively poor households are more dependent on incomes from informal activities than others, although in absolute terms these incomes are much smaller.

Policies on development of the non-agricultural sector could follow a twotier approach: a demand-side and a supply-side policy.

On the demand-side, an increase of rural incomes through agricultural growth would lead to a rise of the effective demand for products from the non-agricultural sector. In the particular case of the Enclave this policy could be achieved in the long term through the implementation of the recommended agricultural extension project.
Another possibility would be to shorten the relative distance between Enclave producers and demand/consumers elsewhere. As stated earlier, the limited accessibility of the Chobe Enclave is a major constraint to the producers in the area. Access to the area could be improved by the upgrading of the road between Kasane and the Enclave to tar standard and by providing regular bus services between the two places.

A supply-side policy involves direct support to non-agricultural activities through credit, marketing, management assistance and the like. In the case of the Chobe Enclave numerous options are available. The introduction of bank credit facilities in the district centre of Kasane would be an enormous aid to the Enclave producers.
The establishment of a small vocational training centre in the Enclave, providing technical education for youth, could stimulate the school leavers to set up their own business.
The extension services to rural producers should be strengthened, preferably by the posting of extension staff in the Enclave. A business advisor could be posted in Kasane, and the organization of management and bookkeeping courses should have a high priority.
The formation of producer groups in cooperatives or associations could improve the producers' access to marketing, credit etc. The establishment of these forms of local collaboration will probably need some outside support at first. A successful example is the fisheries cooperative in Satau. Further group action can be stimulated in the handicraft and tourism sectors.

To conclude, it may be clear that neither agricultural nor rural development has reached a limit in the Chobe Enclave. Several avenues for improvement of the situation have been presented in this and other reports. In addition, from the consultation reports it has become clear

how the Enclave residents feel that their resources can best be used. Despite the constraints to rural development, notably the skewed distribution of resources, there is ample scope for modest initiatives to develop the potential for the benifit of the local population and the economy of the district at large.

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