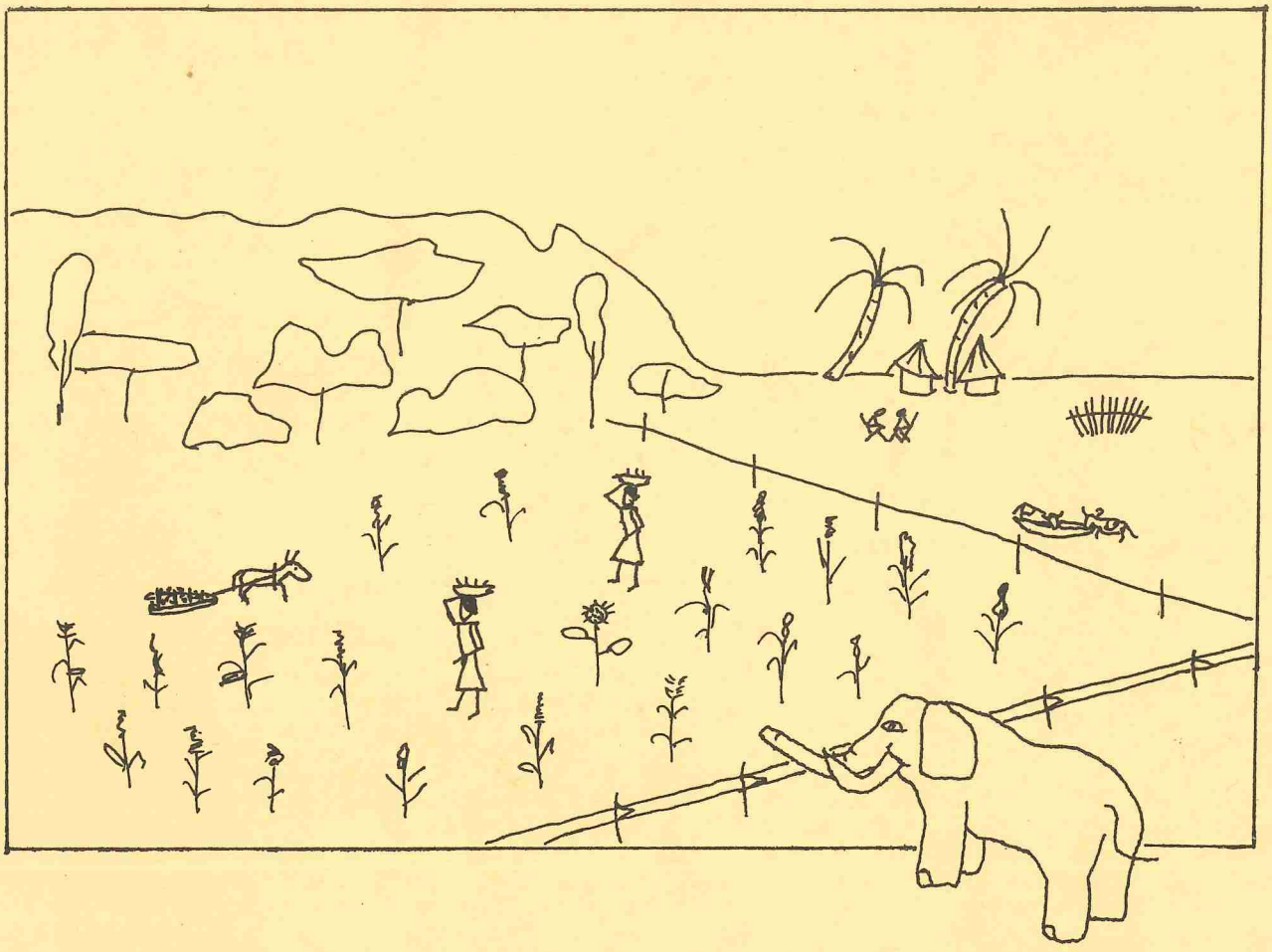
CHOBE ENCLAVE
LAND USE AND DEVELOPMENT PLAN

(1989-1995)



North West District Council

December 1990

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LIST OF ABBREVIATIONS

ACDO	Assistant Community Development Officer
ACS	Assistant Council Secretary
AD	Agricultural Demonstrator
ALDEP	Arable Lands Development Program
AP	Annual Plan (of district)
ARAP	Accelerated Arable Rainfed Program
BAMB	Botswana Agricultural Marketing Board
BDC	Botswana Development Corporation
BEDU	Botswana Enterprises Development Unit
BMC	Botswana Meat Commission
BRIDEC	Brigades Development Center
CAC	Communal Areas Coordinator
CDA	Community Development Assistant
CDO	Community Development Officer
CFDA	Communal First Development Area
CFDA-ART	Communal First Development Area-Applied Research Team
CFDA/C	Communal First Development Area Coordinator
CJSS	Community Junior Secondary School
CLB	Chobe Land Board
CODEC	Cooperative Development Center
CPO	Council Planning Officer
DA	District Administration
DAO	District Agricultural Officer
DC	District Commissioner
DDC	District Development Committee
DDP	District Development Plan
DEXT	District Extension Team
DHT	District Health Team
DLUPU	District Land Use Planning Unit
DOD	District Officer Development
DOL	District Officer Lands
DWNP	Department of Wildlife and National Parks

FAP	Financial Assistance Policy
FC	Farmers Committee
FMD	Foot and Mouth Disease
FP	Family Planning
FRD	Food Resources Department
FWE	Family Welfare Educator
GOB	Government of Botswana
IFO	Industrial Field Officer
KHC	Kasane Health Center
LB	Land Board
LBRP	Labour Based Relief Program
MCH	Maternal and Child Health
MCI	Ministry of Commerce and Industry
MFDP	Ministry of Finance and Development Planning
MLGL	Ministry of Local Government and Lands
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOH	Ministry of Health
MP	Member of Parliament
MWC	Ministry of Works and Communications
na	not available
NDB	National Development Bank
NDDC	National District Development Conference
NDP	National Development Plan
NWDC	North West District Council
PDC	Production Development Committee
PTA	Parent-Teacher Association
RAO	Regional Agricultural Office(r)
RDU	Rural Development Unit

TSP	Tirelo Sechaba Participant
VA	Veterinary Assistant
VDC	Village Development Committee
VEXT	Village Extension Team
VHC	Village Health Committee

INTRODUCTION

This document is the Land Use and Development Plan for Chobe District's Communal First Development Area, which is commonly known as the Chobe Enclave.

For background information purposes it is important to know that the Communal First Development Area (CFDA) Strategy was adopted during the National District Development Conference in 1980. The following year the implementation of the strategy commenced by the selection of CFDA-areas in various districts of Botswana.
The CFDA strategy is an integrated rural development programme which envisages general improvements of rural living standard and the enhancement of rural incomes through concentrated efforts in priority areas within the district.

Implementation of the strategy in Chobe District started in 1981 as well, with the selection of the Mabele - Kachikau axis as the district's CFDA. This decision was based on the assumption that development attention should be shifted from Kasane to an another potential area. Later in 1986, the entire Chobe Enclave was designated as the CFDA because the whole area has ample rural development potential and would cover roughly 25% of the district population. Moreover, it was considered a functional unit which was deemed important in terms of concentrated development effort envisaged by the CFDA strategy.
Initially, progress on the implementation of the strategy was rather slack but more attention was paid to the CFDA after some baseline studies were done in 1984. This was substantiated when in 1986 a CFDA coordinator was posted in Kasane who functions within the North West District Council structure.

Another key component of the CFDA approach is the accomplishment of a Land Use and Development Plan, based on a balance of area residents, felt needs and technical considerations pertaining to the optimal use of resources and development potentials. However, a proper data base for such a plan has not been available until recently.
It was for this reason that a CFDA Applied Research Programme was initiated through MLGL, MFDP and the University of Utrecht, the Netherlands. The CFDA Applied Research Teams operated in the area from July 1987 till August 1988 and have since then submitted numerous valuable reports.

Simultaneously, the MOA commissioned a prefeasibility study to assess the agricultural potential of the Chobe Enclave. The study was carried out by Sir MacDonald and Partners in 1988.

Both the work of the University of Utrecht and the studies by MacDonald have contributed to a large extent in the accomplishment of this Land Use and Development Plan.
The district would like to acknowledge with thanks the assistance of the University of Utrecht and Sir M. MacDonald and Partners for providing the vast amount of data which forms the basis for this document.

The general objective of the Land Use and Development Plan has been to investigate the natural and socio-economic potential of the Chobe CFDA, to assess the land use and development needs of the local communities, and to formulate development guidelines which include proposals for project implementation.

The structure of this document reflects the components of the above mentioned objective. Chapters 1 to 4 summarize the resources of the Enclave in terms of the natural environment, population and land. Chapter 5 describes the development proposals with regard to public services in the area. The last four chapters contain development proposals for the five productive sectors of the economy: agriculture, wildlife and tourism, livestock, and industry and commerce.
Finally, chapter 10 briefly summarizes the major issues regarding rural development in the Chobe Enclave.

All of the development proposals have been discussed at length in various fora: in meetings of DLUPU and CFDA Working Group in Kasane and during the DDP 4 consultation seminars in the villages in the Enclave.

The plan has been approved by the North West District Council in its meeting of 21 to 23 May 1990.

Kasane, December 1990

CHAPTER ONE LOCATION, HISTORY AND ACCESS

The Chobe CFDA, also referred to as the Chobe Enclave, is situated between the Chobe National Park to the east, south and west and Namibia's Caprivi Strip to the north. The partly undetermined international boundary is formed by the Chobe and the Linyanti rivers (see map 1).

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, the Chobe flood plain, which covers 91.000 ha (see map 2).

The settlement history goes back to the 18th century when Basarwa (San) were known to reside in the area.
Due the expansion of the Lozi empire in the upper Zambezi territory, the San were later joined by the Basubiya and Bayei, who were forced to move. Basubiya settlements seem to have spread westward along the Chobe from Mpalila Island near Kasane, in the last decades of the 18th century. They were joined in the late 1890s by the Basubiya from the Mababe Depression, who were forced to leave because of tsetse infestation.

The Batawana moved in during the 1910s when, because of succession struggles for the Tawana chieftainship, a group of Tawana split up from the main tribe at Tau and moved to the Chobe flood plain to found the settlement of Kachikau.

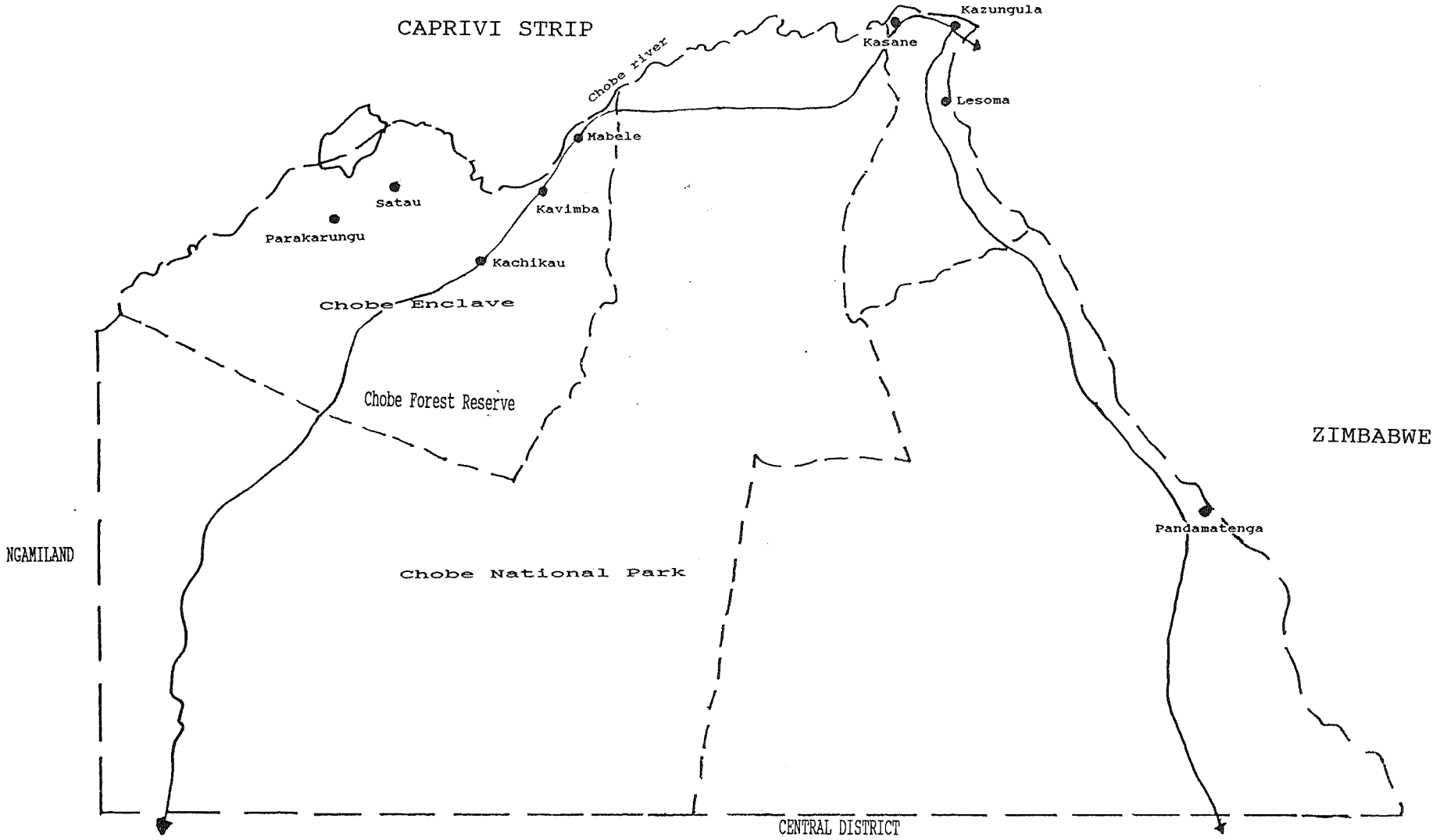
The 1930s through to the 1940s are remembered as years of prosperity. The herds of both Batawana and Basubiya increased and large numbers of cattle were sold at Kazungula to traders from Northern Rhodesia. Also Greek traders came into the area, buying cattle and maize, and having retail shops at various places.
During the 1940s it was estimated that the average level of maize exports from the Enclave was over 500 tons a year.
The main maize producing area was north of Satau and Parakarungu where the fertile molapos were intensively cultivated.

Prosperity came to an end in the 1950s when, after subsequent years of heavy rainfall, the land was inundated. The presence of surface water caused the spread of malaria, tsetse fly and senkobo. The herds were drastically reduced and people had to leave the settlements on the flood plain and move to higher ground. The people of Munga, for example, were dispersed over the area. The Tawana village of Old Kachikau, with over 1.000 inhabitants, was abandoned, some people moved to the present site, others returned to Ngamiland.
In 1958 there were again major floods and more people were forced to move to the escarpment. Cattle continued to die, the molapo lands became inaccessible and only small areas upland could be cultivated.

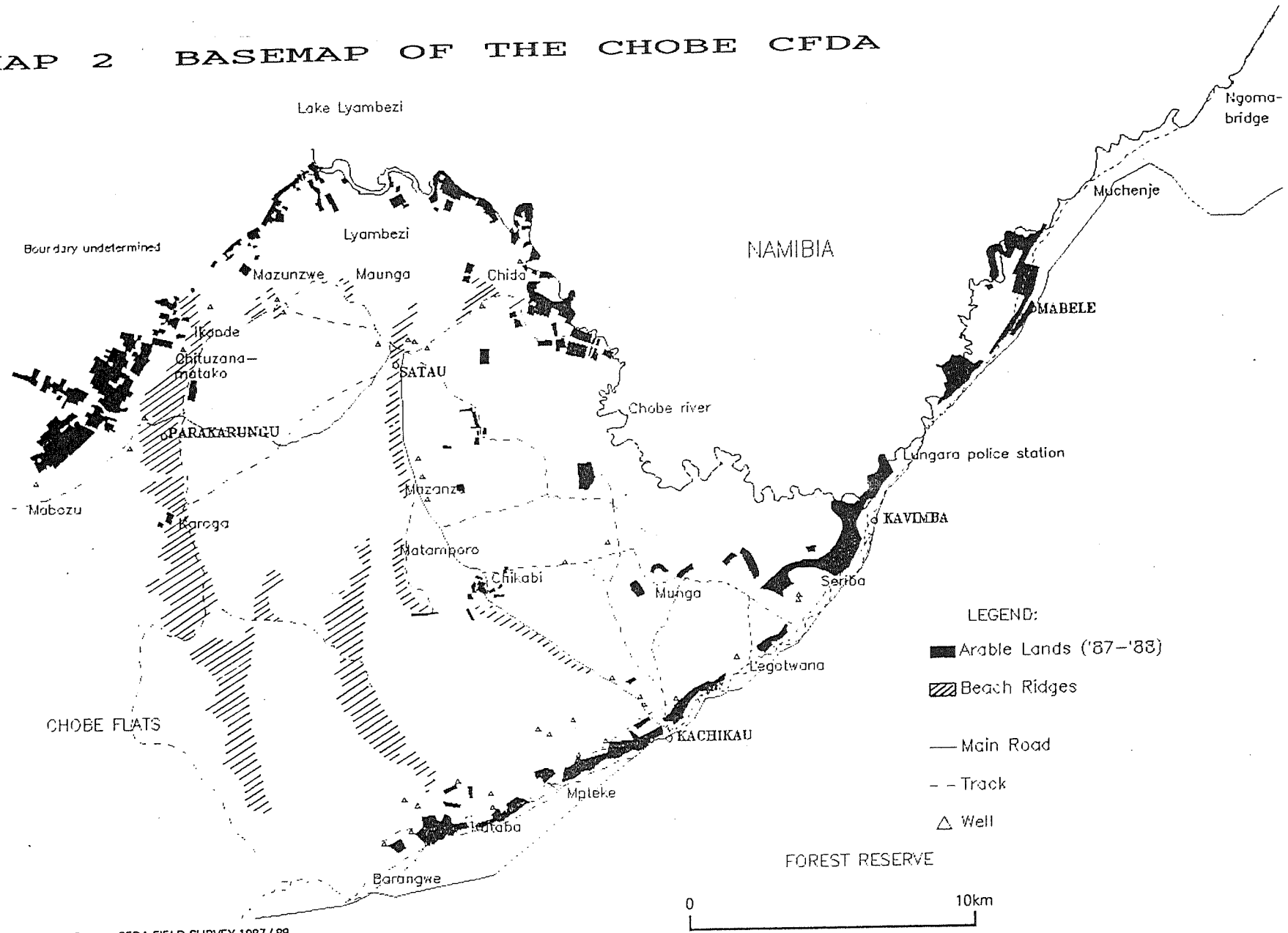
The current settlement pattern has been largely influenced by the flooding of the plains.
At present there are five larger villages: Mabele, Kavimba, Kachikau, Satau and Parakarungu and a number of small settlements.
According to the 1981 census about 3.600 people resided in the Enclave. Today the population is estimated at slightly over 5.000 persons.

The Enclave is connected with the district capital of Kasane by means of an all-weather gravel road, which passes through the National Park. The road has been recently upgraded but is poorly maintained and frequently damaged by trucks heading from and to Namibia. After heavy rains the road becomes nearly impassable. Access to Maun (275 km) is poor because of the narrow and sandy road.

MAP 1 CHOBE DISTRICT



MAP 2 BASEMAP OF THE CHOBE CFDA



Source: CFDA FIELD SURVEY 1987 / 88

CHAPTER TWO NATURAL ENVIRONMENT

This chapter provides an overview of the natural environment of the Chobe Enclave. It begins with a section on climatic factors which determine the possibilities for agriculture, followed by sections on geology, hydrology and vegetation.

2.1 CLIMATE

In general terms, the Chobe Enclave is characterized by a semi-arid to sub-humid climate, with a mean annual temperature of 30 degrees C and a potential evaporation of 2300 mm. Most of the mean annual 664 mm rain falls in the months October to April. Rainfall exceeds the evaporation in general only in January.

Rainfall

Rainfall has been recorded at several stations but records cover a relatively short period with a large proportion of dry years and are far from complete.
Longer records are available for Kasane and Katima Mulilo (Namibia). A comparison has been made of data of common record (Namibia, see table 2.1).

From the table it may be concluded that the amount of rainfall in the Enclave is slightly less than in Kasane.
The long term average annual rainfall (1922-1987) for Kasane is 664.2 mm, with a standard deviation of 204.6 mm.

TABLE 2.1 Average Annual rainfall for stations of complete common record.

Station	Common complete years	Average annual rainfall
Kasane	11	574.8
Kachikau	11	509.7
Kasane	13	586.2
Kavimba	13	580.8
Kasane	7	569.6
Katima Mulilo	7	561.0
Kavimba	7	526.4
Kasane	33	680.0
Katima Mulilo	33	650.0

Source: Jansen (1989)

There are large variations in rainfall from year to year and within the years. The maximal amount ever recorded is 1707 mm during the 1958-1959 season. The lowest annual precipitation has been recorded in 1982-1983 when the amount of rainfall did not exceed 299 mm.
December and January are the wettest months but recorded rainfalls vary from less than 20 mm to more than 150 mm. At the time of the great flood of 1958/1959, the rainfall recorded in Kasane in the period from December to February totalled 1174mm.

Temperature

The mean monthly and minimum temperatures for Kasane are given in table 2.2. Lowest temperatures occur in July. Highest maximum temperatures are in October, which is just before the beginning of the rainy season.
With the lowest mean temperature of 11.2 degrees C occurrence of night frost is rather unlikely. The production of winter season frost-susceptible crops is possible, but the low winter season temperature in the Enclave will restrict the rate of crop growth.

Relative humidities

The mean monthly relative humidity comes to a minimum during August and September. Relative humidities in the Enclave are likely to be lower than in Kasane, which is in close proximity to a large body of water.

TABLE 2.2 Summary of climatic data for Kasane

	Tmax	Tmin	Hum	PET	R1	R2
Jan	31.0	20.0	65.2	187.9	89.9	161.4
Feb	31.1	19.3	66.8	185.0	135.0	136.0
March	31.3	19.2	63.6	224.1	48.3	96.1
April	30.0	17.3	57.4	203.2	32.0	24.9
May	28.9	15.1	47.0	157.9	22.1	3.7
June	26.8	11.7	42.1	136.0	0.0	1.5
July	26.3	11.2	38.2	145.4	0.0	0.0
August	28.6	13.0	31.4	183.5	0.0	0.2
Sept	33.5	17.3	26.9	224.5	1.4	1.6
Oct	33.6	20.2	36.6	278.9	27.5	21.3
Nov	32.7	20.2	49.4	211.3	38.5	70.5
Dec	31.5	20.0	63.1	195.1	175.9	150.5
Year	30.4	17.0	49.0	2332.8	550.0	667.7

Tmax = mean maximum temperature in C
Tmin = mean minimum temperature in C
Hum = relative humidity in %
PET = Potential Evapo Transpiration in mm
R1 = mean monthly rainfall (1983-1986) in mm
R2 = mean monthly rainfall (1922-1986) in mm
Source: Jansen 1989

Low humidity levels occur before the beginning of the growing season but in case of irrigated agriculture and molapo farming during the dry season, it could affect plant growth in the flowering stage (MacDonald, 1989).
The low relative humidities also have an effect on the fire hazard; vegetation becomes so tinder dry that extensive dry season fires are a regular feature in the Enclave.

Windspeed

The winds in the Chobe Enclave have a predominantly easterly direction. The mean monthly windspeeds in Kasane are highest during August to October. The vast open plains of the Enclave cause a much greater exposure resulting in significant higher windspeeds.
Wind bouts and whirl winds are very common in the Enclave. The high wind speeds occur at a time when soils and vegetation are dried out, causing wind erosion and accentuating the fire hazard.

Potential Evapo-transpiration (PET)

Calculations for the Enclave are based on only 4 years of recording and results are of limited value. Using the interpolated data for the PET yields a slightly more favorable picture whereby rainfall exceeds PET in January (see table 2.3).

TABLE 2.3 Mean rainfall (P), coefficient of variation (CV) and mean evapo-transpiration (PET) for Kasane

	sept	oct	nov	dec	jan	feb	mar	apr	may	year
P(mm)	1.6	21.3	70.5	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

Growing season

It has been calculated that the length of the growing season is more than 121 days in one out of two years and less than 88 days in only one out of four years (Vossen, 1987). On average the season lasts from November 25th to the 23rd of March. Extended humid periods, in which rainfall exceeds PET, occur in January and February. During a humid period water is stored in the soil for use during dry days. Dry periods of consecutive days with less than 2 mm of rainfall have an average length of 7 to 9 days.

It can be concluded that the agro-climatological conditions in the Chobe Enclave belong to the most favorable in Botswana. However, it should be kept in mind that there are more factors involved in crop production than the climate alone.

2.2 GEOLOGY

There are three fault lines recognizable in the area, all belonging to the Okavango Graben system.

1) The Shaile fault, a 0-5m low escarpment along the Linyanti river;
2) The Liambezi fault, forming the south eastern shore of Lake Liambezi;
3) The Kachikau fault, a well developed escarpment along the floodplain. The height reduces from about 70m at Ngoma Bridge to almost nothing at Sisuma Pan in the south west.

The escarpment marks the border of the Sandveld area which consist of layers of aeolian Kalahari sands underlain by rock. These rocks, which crop out to the north east of Kavimba, consist of Karoo sediments (sandstones, shales). At various locations along the escarpment calcrete banks occur being the result of weathering of basalt.

The area in between the faults is a rift which has been slightly tilted towards the east. It consist of layers of alluvial and lacustrine sediments. There is evidence that the Kwando/Linyanti system used to flow in a southerly direction before and as a result of tectonics, was forced in the direction of the Zambezi.

2.3 GEOMORPHOLOGY

In terms of geomorphology the area can be divided into five major units: the sandveld, the colluvium area, the Chobe flats, the Chobe floodplain and the Linyanti floodplain.

The sandveld, bordered by the southwest - northeast escarpment, forms an undulating flat with sandy sediments of aeolian origin. The presence of the forest reduces the vulnerability of the soils to wind erosion.

The colluvium north-east of Kavimba consists of a layer of accumulated material which originates from metamorphous rocks on the ridge. Where small rivers of the sandveld drain into the floodplain alluvial fans have been formed. The altitude of these fans is a few meters above the surrounding area. Some settlements like Kavimba, Seriba and Kataba are located on these fans.

The Chobe flats consist of old alluvial deposit and are characterized by large high level sandy plains, intersected by low lying channels and small depressions. Calcrete deposits have been found in some of the channels and near depressions.

The Chobe floodplain consists of lacustrine material partly alluvial and aeolian reworked (FAO, 1987). These processes caused an extremely complicated pattern in which different forms are present. The most distinct features are the elongated higher sandy areas covered by a tree and bush vegetation. Their level is 3 to 6 metres higher than the surrounding floodplain, keeping them clear of floods. The orientation is mainly north-south bending slightly east at both ends. Settlements are located on these ridges.

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 coarser texture and a rough micro relief. At various places in the rest of the floodplain smaller depressions occur with a more regular relief.

The molapo channels, prevalent all over the floodplain, are remnants of old streams. Apart from the major molapos with steep margins, the other molapos are generally shallow.

The Linyanti floodplain forms a swampy low-land area characterized by meandering channels and oxbow lakes which, after successive dry years, form closed depressions.

2.4 HYDROLOGY AND FLOODING

The hydrology of the Chobe Enclave is a very important factor of the natural resources potential of the area.
In some years large parts of the floodplain may be flooded resulting in the restriction of arable agriculture and cattle grazing to the higher parts of the area. In the other extreme case, the whole floodplain may be dry after successive drought years and crop production may be low due to the lack of water.

The Chobe Enclave is drained by the Chobe river to the north east. However, the area may receive water from the following sources:

1. The Chobe - Zambezi river system

The Chobe river receives water from the Zambezi by a complex system of channels, which intersect the Caprivi swamps between Kasane and Ngoma. The Chobe river bed upstream is very flat, and high water levels at Kasane thus result in Zambezi water flowing back towards the Enclave. There are one or more bars across the river upstream Ngoma Bridge. These bars result in the water spilling into the surrounding low-lying areas of land and slow the passage of water upstream. In normal years the backflow of the Zambezi reaches as far as Kavimba causing a relatively reliable flood between Ngoma bridge and Kavimba.

In this part of the Enclave the so-called real molapo farming is practiced annually. Molapo farming is an arable farming system in which stored soil moisture is used for crop water requirements

after the receding of a flood.

The Enclave occasionally receives water from the Zambezi via the Bukalo molapo in the Caprivi Strip. If the Zambezi water level is above 939.82 Namibia datum at Katima Mulilo the water may reach Lake Liambezi. Water from the Bukalo molapo seems to have entered Lake Liambezi on eight occasions during the period 1953-76, and possibly on three occasions since then (MacDonald, 1989).

2. The Kwando - Linyanti River system.

The Kwando river rises in the Angolan highlands and drains into the Linyanti swamps. During periods of high discharge, part of the water passes the swamps and enters Lake Liambezi. In periods of low or moderate discharge, all water of the Kwando river evaporates.

3. The Okavango River

When levels in the Okavango river are extremely high, water may reach the Chobe Enclave via Selinda Spillway.

Due to these various sources there is a high variation in water levels in the Enclave. The most important consequence is the occurrence of regular floods. Local people indicate a ten year cycle of high floods (1948,1958,1968 and 1978), but no accurate data is available to 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. This flooding coincided with very heavy rainfalls, of twice the annual average over a three months period.

Most recently the area east of Satau and around Munga was flooded, caused by a considerable backflow of the Zambezi and Chobe rivers. Large parts of the eastern Enclave have been inundated, restricting the area available for cattle grazing. The other river systems did not contribute to the flood and Lake Liambezi stayed dry.

In case of high groundwater levels, flooding may also be caused by heavy rainfall during the rainy season.

Some figures on groundwater levels were obtained by the CFDA - ART. Although the years before the survey were relatively dry, the groundwater levels appeared to be fairly high, between 1 and 4.5 meter below surface.

Present development of groundwater within the Enclave is limited to a small number of boreholes to supply the five villages. Smaller communities drain water from shallow handdug wells. These wells are poorly constructed, often relocated after collapse. They are primarily used for domestic purposes with very little usage for stockwatering and no usage for arable agriculture (see MacDonald, 1989).

2.5 SOILS

The soil types in the research area are strongly correlated with the geomorphological units identified in the above.
On the escarpment, bordering the area in the southeast, soils have been developed on bedrock (mainly basalt) or on deposits of Kalahari sand (FAO, 1987). Soil developed on bedrock are medium-textured and contain gravel. They are moderately fertile but have limited depth. The soils developed on Kalahari sand are deep, sandy and have low natural fertility. At the foot of the escarpment soils are formed on colluvial material. These soils have in general the same characteristics as the soils have in general, the same characteristics as the soils on the escarpment but are deeper and more compact. Along the escarpment extensive calcrete layers occur that restrict rooting depth.

The soils in the Chobe and Linyanti floodplain are formed on sediments of lacustrine origin which are often alluvial or aeolian reworked (FAO, 1971). The texture varies from sand to clay, depending mainly on physiographical position.
Soils that are flooded regularly have a high organic matter content and a heavy textured topsoil; these soils are mostly underlain by fine sand. Soils that are situated somewhat higher and are consequently less frequently flooded often are light to medium textured and often have an argillic horizon (clay accumulation in the lower horizons of the profile) and/or a calcic horizon. Salt accumulation in the profile, due to capillary rise of groundwater, may occur as well. The highest parts of the floodplain are the sand ridges. The soils on these sand ridges are not susceptible to flooding; they are sandy and barren.

The soils in the Chobe flats vary with topography. Soils in depressions and channels are medium to heavy textured and have a high organic matter content occurring in the topsoil; soils in higher positions are light textured and often have a calcic horizon. Groundwater tables in the Chobe flats are lower than in the Chobe floodplain.

2.6 VEGETATION

Five major geographical vegetation units can be distinguished, which are strongly correlated with the geomorphological units. Vegetation is in general mainly determined by water surface levels.

1. Sandveld

This area, south of the escarpment, covers the Chobe Forest Reserve. Dominant species are Baikiaea plurijuga (Rhodesian Teak), Pterocarpus angolensis (Mukwa), Bwikea africana and Erytropleum africanum.

Grass species are Panium maximum, Hyperthellia dissoluta (thatching grass) and Digitaria species.

2. The Colluvium

The slopes of the escarpment are covered by shrubs of Acacia and Combretum hereroense and trees like Terminalia sericea and Andansonia digitata (Baobab).

Grasses show a wide variety of favorable species like Dactyloctenium giganteum, Digitaria milanjiana, Lynodon dactylon and Urokloa trichopus.

The alluvium fans are covered by shrubs of Acacia species, dominant grasses are Chloris virgata and Aristida stipitata and congesta (an indicator for heavy grazing).

3. The Chobe flats

The large relatively high sandy plains are covered with Acacia species and Mopane; grass species are mainly of the Aristida type.

In the low channels and depressions many different grass species occur.

On the small calcrete ridges the dominant tree species is Mopane; grass species are Eragrastis superba, Digitaria species and occasionally Cynodon dactylon.

4. The Chobe floodplain

A distinction can be made in five vegetation units.

a) the high beach ridges are covered with Hyphaene ventricosa (palmtrees), Combretum hereroense and jeffreysi caffra; shrubs like Terminalia sericea, Acacia tortiles and Grewia species; and grass species like Cynodon dactylon and Chloris gayana.

b) On the lower delta -like areas scattered termite mounts with palmtrees are present. The major part is grassland with Panicum Coloratum and Aristida and Chloris species.

c) The higher delta-like areas have a similar vegetation as the beach ridges but with additional Acacia species and grass species like Digitaria and Eragrostis rigidior, indicating an increased grazing pressure.

d) The molapo channels are covered with a dense grass vegetation with dominant Setaria sphacelata, Panicum coloratum and Cymbopogon excavatus species, with a typical grass species of the Enclave, Andropogon Encomis on the higher parts of the molapos.

e) The lowest areas and depressions are covered by reeds and weeds, Amaranthis and Hibiscus species. Some grass (Cynodon dactylon) is present.

5. The Linyanti Floodplain

The dominant species are reeds and various weeds, except for the delta-like areas some acacia shrubs and palm trees occur. Grass species like Chloris gayana, Panicum coloratum and Cynodon dactylon are also present.

CHAPTER THREE POPULATION

The total de facto population of the Enclave has been estimated at slightly over 5000 persons in 1988 (all demographic data are based on the CFDA-ART studies and are fairly accurate).

The majority of the population lives in the five major villages: Mabele, Kavimba, Kachikau, Satau and Parakarungu. The number of smaller settlements in the Enclave is 21 (see table 3.2 on page 15).

The 1981 census figures mention a total population of 3.603 persons. This means that the total population has grown at an average rate of 4.5 % per annum. But as shown in the table wide differences have occurred between the villages. As in the past, the period 1981-1988 was also marked by population movements as a response to changing conditions. The settlements of Nchenene and Huhuwe, for example, were deserted because of lion attacks on cattle and the difficulty of maintaining wells (see map 3 for population distribution).

For the coming plan period it is assumed that the population will continue to grow at the same rate of 4.5 percent per annum. The total number of inhabitants of the CFDA will be roughly 5.700 persons in 1991 and will increase to 6.800 in 1995.
The expected growth per village is depicted in table 3.1 below.

TABLE 3.1 Population projections for Chobe Enclave 1988-1995

	1988	1989	1990	1991	1992	1993	1994	1995
Mabele	664	694	725	758	792	828	865	904
Kavimba	649	678	709	741	774	809	845	883
Kachikau	1071	1119	1170	1222	1277	1335	1395	1457
Satau	1475	1541	1611	1683	1759	1838	1921	2007
Parakarungu	1189	1243	1298	1357	1418	1482	1548	1618
total	5048	5275	5513	5761	6020	6292	6574	6869

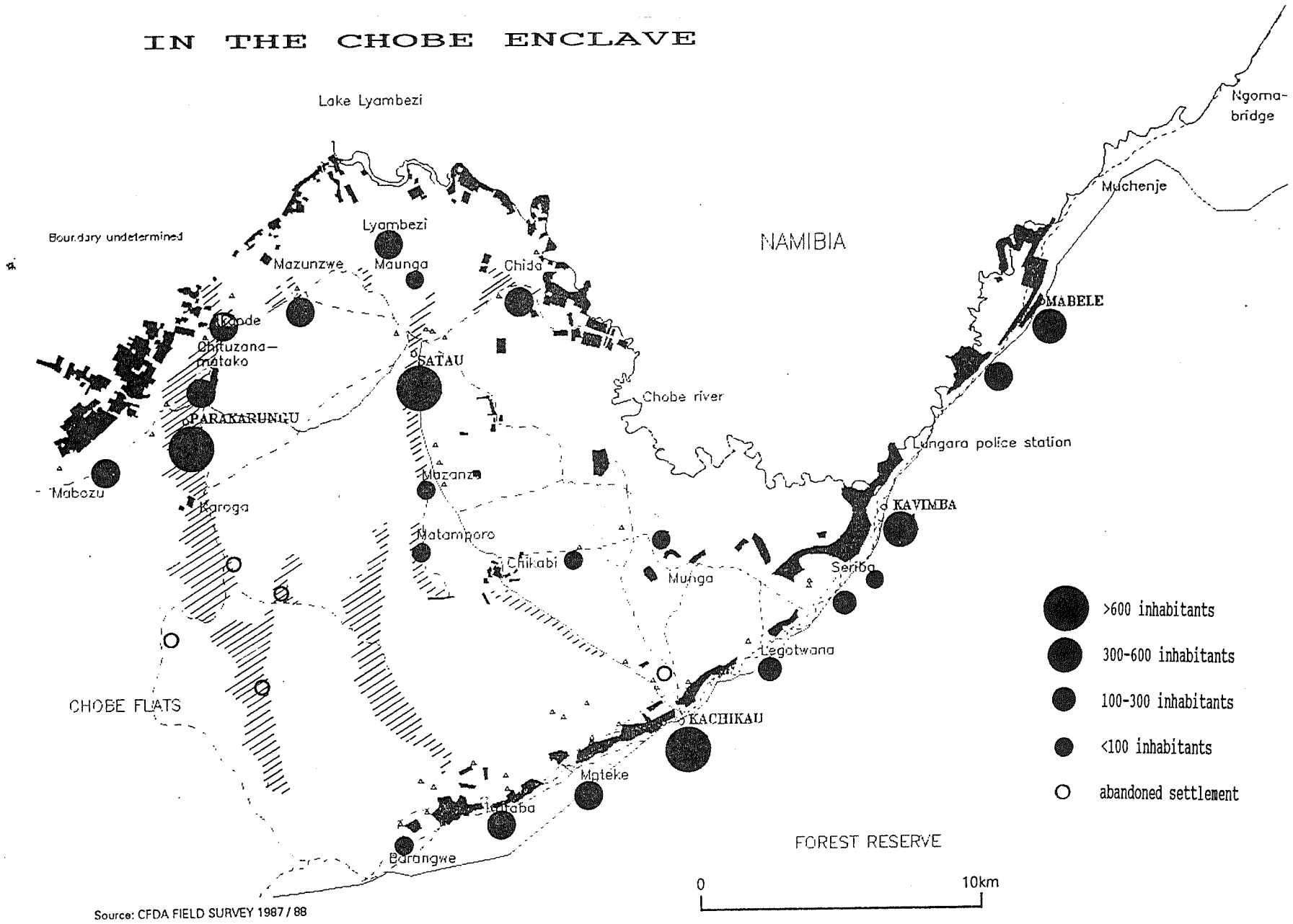
As for the past period, no distinction could be made between natural growth and migration, because of lack of reliable data. It is expected that outmigration will remain at the high levels of the past years, despite the improvement of the Enclave's economy as a result of the developments which will take place in the next years. On the other hand, Kasane will continue to attract people from the Enclave because of its better formal jobs opportunities.

Table 3.2 Population in Chobe Enclave (1981 and 1988)

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

sources: 1981 - National Census Reports
1988 - University of Utrecht, CFDA field survey

MAP 3 POPULATION DISTRIBUTION IN THE CHOBE ENCLAVE



Source: CFDA FIELD SURVEY 1987 / 88

The average household size in the Enclave is five persons. However, many households have absentee members: in the southern villages each household has on average 1.5 member who is absent, in the northern area the average is 0.7 member. In total there are some 1000 people absent, or 20% of the de facto population.

The absentee household members usually stay in Kasane (67%), some are living elsewhere in Botswana, and only a few are staying outside the country. Kasane as the administrative and business center of the district, attracts people because of employment opportunities and education facilities.
The Kasane job market has improved in the past period which has attracted many of the adult absentee people.
Furthermore, an increasing number of children from the Enclave continue their Junior Secondary education in Kasane.
Half of the absentees left the area during the last two years, and more than 75% of them are less than 30 years old.

The structure of the population is heavily distorted by the absence of men and to a lesser extent women between the age of 20 and 44. The working age group between 20 and 44 years makes up to 18% of the population, compared to a national figure of 27%.
The skewed age distribution is mainly due to the attraction of (formal) employment outside the Enclave, causing people to leave the area.
The result of the absence of many able bodied persons, and children at school, is that nearly all the work is done by middle-aged or elderly people. This leads to a shortage of labour which limits agriculture, livestock and other activities in many aspects.
First, it restricts the area that can be ploughed, and the labour problem arises again at weeding and harvesting.
Secondly, the use of heavier, more productive, molapo soils has made it very difficult as ploughing them needs considerable physical strength and stamina. Molapos further away consume too much of the scarce labour.
Thirdly, the shortage of labour curtails the grazing time of cattle and goats, which is reflected in their poor condition. Defence of livestock against predators is made more difficult.
It results in a concentration of people, lands and livestock in a limited area, causing overgrazing and damage to arable production.

Of the households 58% are headed by resident males whilst 42% are female headed households.
The average age of the male headed household is 55 years. The average ages of female headed households is clearly less: 49 years for de jure female headed and 38 years for de facto female headed families.
Close to 65% of the heads of household is married, and about one third is either single, divorced or a widow/widower.
In terms of ethnics, the Basubya and the Batawana are the two major groups in the Enclave. The Batawana are mainly situated

in and around Kachikau, while the Basubya dominate the other villages. There are in addition small numbers of Bayei, Basarwa and Bambukushi (table 3.3).

TABLE 3.3 Distribution of ethnic groups in Chobe Enclave

	southern villages	northern villages	entire area
Basubya	53.5%	97.2%	76.5%
Batawana	36.8	-	17.4
Basarwa	2.9	-	1.4
Bayei	1.4	1.2	1.3
Bambukushi	2.0	-	0.9
Others	3.4	1.6	2.5

source: University of Utrecht, CFDA field survey

CHAPTER FOUR LAND TENURE

Land tenure in the Chobe Enclave may be more complex than in most other parts of Botswana, although methods of acquiring land are generally similar.
The Enclave is tribal land, the allocation of which is the responsibility of the Chobe Land Board in Kasane. A Land Board sub-office exists in Kachikau, but is not in operation.

Most farmers in the Enclave hold their land on the basis of inheritance and only a few, mostly Batawana, have been allocated land through the Land Board. The Basubya usually indicate that they inherit the land. Roughly 25% of the total land in the Enclave has been registered or allocated through Land Board, the remainder has been acquired through inheritance or self-allocation.

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 which enables them to select the most suitable fields for varying conditions.

The changing pattern of land utilization is clearly illustrated by a comparison of two land inventories, carried out in 1983 and 1988 (see Gelmroth, 1984 and Jansen, 1989 respectively).
The area in between Satau and Parakarungu, for example, had been used intensively up to 1983, but is not used for arable agriculture anno 1988. Instead the molapo areas along the Chobe main channel, near Satau and Parakarungu, are heavily used to this date, but not at all in 1983.
Areas south of Parakarungu were cultivated in the early 1980s but later abandoned and have to this date never been used again.
Particularly in the flood plain a situation occurs whereby people have numerous land rights and genuine claims on currently and formerly utilized arable lands.
The lands are not properly registered but instead are held through the traditional system of inheritance.

The ownership of different land areas is reflected in the following table. Note that the figures do not include land rights or claims in presently non-utilized areas.

TABLE 4.1 Average dryland and molapo land holdings in the Chobe Enclave

	Northern Enclave	Southern Enclave	Enclave total
Molapo	7.9 ha	4.9 ha	6.4 ha
Dryland	4.0	4.1	4.0
Total	11.9	9.0	10.4

source: University of Utrecht, CFDA field survey

The total communal area in the Chobe Enclave is estimated at 169.000 hectares (Gelmroth, 1984).
From the above average land ownership of 10.5 ha, and given the total number of about 1.000 farming families, it is estimated that at present 10.500 ha are used for arable agriculture.
The total land ownership in the Enclave will be more, because as indicated in the above, almost all families have land rights to other fields located in the flood plain.

The total grazing area in the Enclave is estimated at roughly 36.000 hectares (Jansen, 1988).
During the crop season, a portion of the Chobe Forest Reserve is used for grazing as well. Including a strip of roughly 2 km inside the Forest Reserve, the total grazing area for the Enclave livestock population would be almost 45.000 ha.
The reasons for the limits of grazing areas are the non-suitability of the vegetation, cultivated arable lands, residential areas, limited access to waterpoints and, in hunting area, the occurrence of cattle diseases and the presence of predators.

TABLE 4.2 Land utilization in the Chobe Enclave

Arable agriculture	10,500 hectares
Grazing areas	36,000
Presently non-utilized areas, non-suitable under present conditions, inhabited areas	37,500
Hunting area	85,000
Total Communal Area	169.000
Chobe Forest Reserve	137.000
Total Chobe Enclave	306.000

Communal grazing is open to all stock owners, subject only to rights of access to water. Open, naturally occurring water is free to all stock owners, but water sources as wells are owned by individuals and grazing is restricted to those who have the rights to the water.

The entire Chobe Enclave is designated as a Controlled Hunting Area (CHA 1), but hunting is confined to the south-western area (85.000 ha).

Land rights are a very sensitive issue in the Enclave.
Local residents claim that in the past national interests have always taken precedence over their own. They cite the formation of the National Park and the Forest Reserve, which displaced a number of cattle post and small settlements, and the CHA 1, which they regard as a benefit to foreigners but not to themselves.
Moreover, many local residents have claimed that all land in the flood plain and some on the escarpment is the property of somebody in the Enclave, and that there is no spare land.
Whether this claim is true or not, it should be taken as an appeal to Government, Land Board and other authorities to be very cautious with issues like land rights and land allocation.
The varying conditions of the Enclave necessitate a flexible system of land use by its residents. Some areas may not utilized for years, but conditions may arise when these areas will become essential for farming and grazing.

It is recommended that Chobe Land Board, in conjunction with the Ministry of Local Government and Lands, encourage the Enclave residents to register their lands.
This could be done through a pilot project on land registration, operated from the vacant Land Board offices at Kachikau. Chobe Land Board should therefore be reinforced with additional manpower, transport and equipment to implement such a project.

CHAPTER FIVE PUBLIC SERVICES, ROAD NETWORK AND VILLAGE INSTITUTIONS

5.1 EDUCATION

All five main villages have a primary school of standard seven level. The enrollment figures are given in table 5.1 below.
For attending Junior Secondary education the students from the Enclave have to go to the Community Junior Secondary School in Kasane, where they will have to stay with relatives in the township.

TABLE 5.1 Primary school enrollment in the Enclave (1989)

	Standard							
	1	2	3	4	5	6	7	total
Mabele	35	25	28	29	26	31	30	204
Kavimba	27	22	19	17	24	24	42	175
Kachikau	55	51	28	31	31	32	42	270
Satau	52	25	37	54	37	30	44	279
Parakarungu	50	46	55	51	30	52	43	327
Total	219	169	167	182	148	169	201	1255

source: NWDC, Education Department

The present classroom facilities seem to be fairly adequate for the coming years. Over the past years the enrollment has grown on average with 1.6% per annum, and given the age distribution of the population this moderate growth is likely to continue.
Furthermore, with the change of the educational system for seven years of primary education to six years, some classrooms will become available at each school.
In view of these developments, North West District Council (NWDC) has planned a limited construction programme for the plan period:

- two classrooms at Kachikau, where growth is expected to be higher;
- administration blocks at Parakarungu, Satau, Kachikau;
- teachers quarters at Parakarungu and Kavimba.

NWDC further aims to provide the primary schools with security facilities and secretarial services, and where

necessary the teachers quarters will be connected to the water system.

The existing facilities are shown in table 5.2 below. From the table it follows that the student/classroom ratio is 33.9 for the whole Enclave. However, the schools in Kachikau and Kavimba are worse off with ratios of 38.6 and 35.0 respectively.

TABLE 5.2 Existing school facilities in the Enclave (1989)

	no.teachers	no.classrooms	no.teachers quarters	student/ clrm.ratio
Mabele	7	6	5	34.0
Kavimba	7	5	3	35.0
Kachikau	9	7	6	38.6
Satau	9	9	7	31.0
Parakarungu	12	10	6	32.7

source: NWDC, Education Department

Parent Teacher Associations (PTA) are existent in all villages. The CFDA-ART has found that the existence of the PTA, which discusses education matters, is known to 75% of the families in the northern Enclave, whilst in the southern part only 30% of the households knew of the PTA and its function (Jansen, 1989, p.23).

Literacy Assistants, attached to the Department of Non-Formal Education, are posted in Satau and Kachikau, although the latter post has been vacant for a while.
Basically, they teach adults how to read and write. In the southern area more than 50% of the heads of household know the literacy assistant personally, in the northern area more than 70% of the family heads know the person (Jansen, 1989,p.23).

It was further found that 25% of the population in the 15-65 age bracket had received no education and of the residents over the age of 65 more than two-third had had no education. Women have clearly less formal education than men, although nowadays they are joining literacy groups in greater number than men. For the entire population the literacy rate (having received some years of formal education) has been estimated at roughly 57% (Tsimako,1983).

The opportunities for secondary education for pupils from the Enclave are not very bright. Government's long term objective for secondary education is to provide universal access to

junior secondary education. The immediate aim (NDP6) is to allow 70% of standard seven entrants to gain access to Form I in 1991.
In Chobe District these objecties are far from being realised. In the past years the CJSS at Kasane has only been able to admit between 24 and 36% of the standard seven leavers, which is far below the goal of 70% (see table 5.3).

TABLE 5.3 Number of Standard 7 pupils and number of CJSS (Form I) admissions (1986-1989)

	no.Standard 7 pupils	no.Form I admissions	percentage
1986	272	80	29%
1987	342	82	24%
1988	354	127	36%
1989	353	119	34%

The Ministry of Education has planned an expansion of the Kasane CJSS in the early 1990s. However, it is feared that the proposed expansion will only slightly benefit the students from the Enclave. The township of Kasane is to be expected to grow very rapidly in the next years, resulting in higher demands for secondary education in the township and filling the additional capacity of the Kasane CJSS.
Meanwhile, there is still clearly need for a CJSS in the Enclave. The enrollment figures show that the number of Standard 7 leavers will be varying between 150 and 200 persons a year in the period till 1995. The number is sufficient to warrant a CJSS with a capacity of 120 Form I students.
In view of Government's objective to provide universal access to junior secondary education, it is strongly recommended the Ministry of Education considers the construction of a CJSS in Kachikau, as the centre of the Chobe Enclave.

A pilot day care centre project should be implemented in the Enclave in the plan period. This could strenthen the link between child care and the income generating potential of the mother.

5.2 HEALTH FACILITIES

Health facilities are present in the five major villages. Kachikau has a clinic with maternity ward and the other four villages have health posts. The Kachikau clinic is headed by a nursing sister while the health posts have either a staff nurse or enrolled nurses. In each of the facilities a Family Welfare Educator (FWE) operates and all facilities are provided with transport.

Although the health facilities in the Chobe Enclave are of a respectable standard, the nutritional status of the population is very low. Chobe District has had the highest malnutrition rates in the country over the past years. The reasons must be sought in the weak food and economic security of many households. Female headed households are among the worst affected, as they have generally poor crops, despite hard work, and lack the necessary cash to supplement their diets. Many of them live far-off the major villages which hampers their access to the direct feeding programmes.
Food and economic security can only be improved by an integrated approach to enhance agricultural employment, to create more jobs and to provide opportunities for self employment. Specific attention should be paid to the needs, contraints and options of the female headed households.
In the next chapters some development proposals for increased productive employment and income are discussed.

During the plan period the health services in the Enclave will be further improved. NWDC aims to staff the clinic in Kachikau with a Family Nurse Practitioner, to raise the standard of primary health care and to reduce the number of referals to the Kasane Health Centre.
Communication between the facilities in the Enclave and with the Health Centre at Kasane will be improved by the installation of radios. The lack of communication has been a major concern for the Enclave residents for many years. Where necessary, health posts will be connected to the water system.

For statistics of the health facilities in the Chobe Enclave see table 5.4.

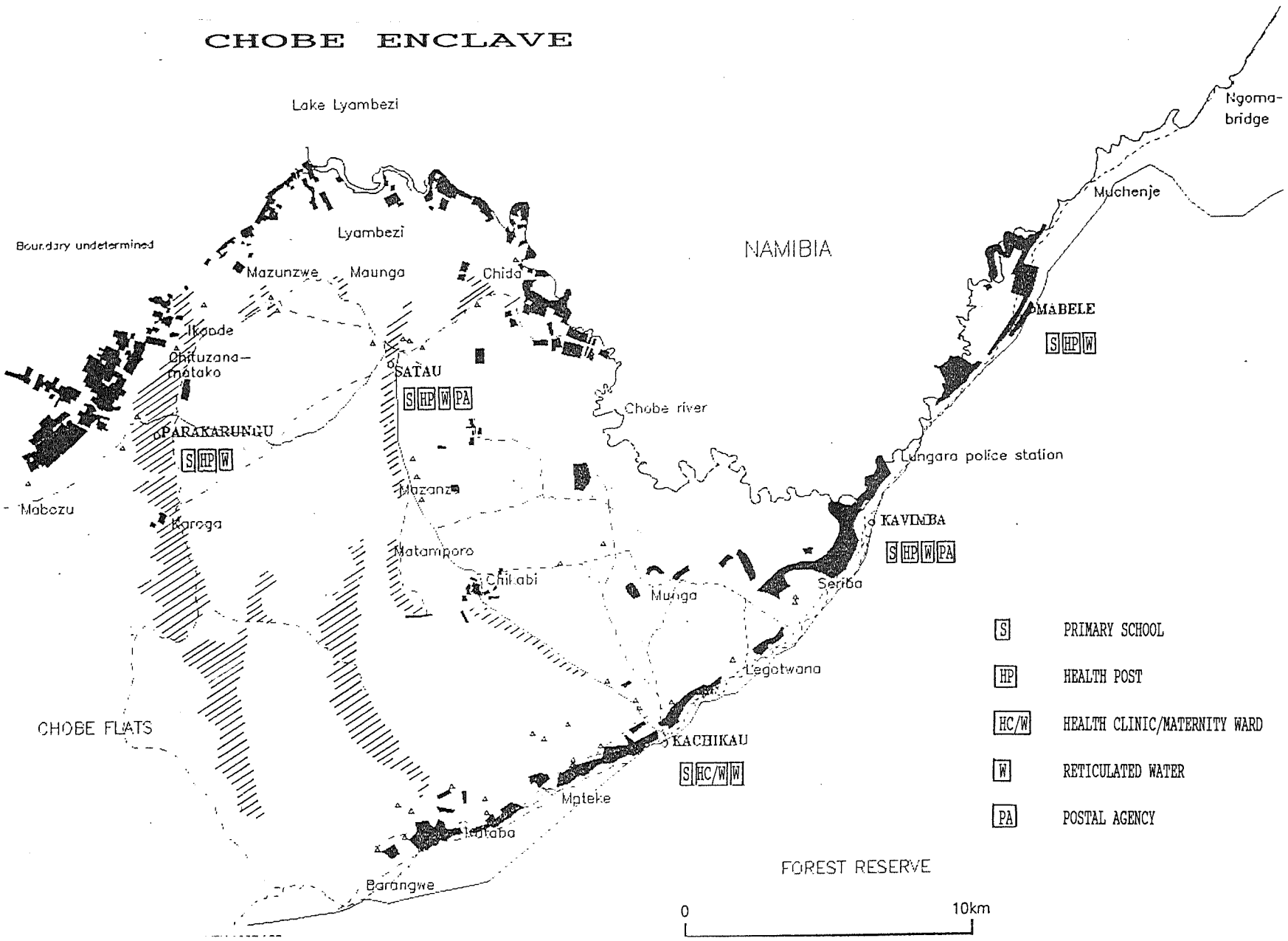
TABLE 5.4 Outpatient statistics by type of attendance for facilities in the Enclave (1987,1988)

	Gen. Diag.		Inj.+Dr.		MCH		FP	
	1987	1988	1987	1988	1987	1988	1987	1988
Kachikau	2298	3243	898	766	1808	2081	183	114
Mabele	1317	2323	256	401	1366	1497	188	162
Kavimba	621	1235	55	34	894	1092	109	103
Satau	1067	2100	198	299	1517	1981	87	131
Parakarungu	2143	3034	489	498	1411	1947	171	179

Gen.Diag.= General Diagnosis
Inj.+Dr. = Injection and Dressings
MCH = Mother and Child Health
FP = Family Planning

source: District Health Team, Annual Reports.

MAP 4 PUBLIC SERVICES IN CHOBE ENCLAVE



5.3 WATER AND SANITATION

Although the five major villages all have a reliable water system, many people in the smaller settlements rely on open water sources.
Contamination of drinking water is a serious problem which requires a health education programme. The programme should be coupled with practical solutions appropriate for households under different circumstances. The position of the female headed households, with less cash and labour resources at their disposal needs special attention.

During the past two years the water reticulation system has been extented in the three southern villages. Under the same programme, more standpipes will be installed in Satau and Parakarungu in the next years.

No water-borne sanitation system exists in any of the villages and only some people use pit latrines. In order to improve the standard of environmental health, the NWDC aims to provide 500 pit latrines under the LG 51 programme to all villages in the Enclave.
The health education activities will be intensified by organising workshops and seminars on proper sanitary practices. The environmental health department will be strengthened with more manpower, equipment and transport.

New boreholes will be needed in Kachikau and Satau. Several developments are planned for Kachikau, which will cause a sharp increase in the demand for water.
In Satau, the quality, taste and colour of the water has been a concern for many years. It is hoped that the drilling of a new borehole will overcome this problem.

5.4 COMMUNITY DEVELOPMENT

Social welfare programmes are coordinated by the Social and Community Development Department in Kasane. The department's activities have been seriously hanpered by the lack of personnel and transport. Only recently the situation has improved with the posting of an ACDO in Kachikau.
Apart from the programmes for destitutes, youth and village committees, the department is also responsible for the implemention of the LG 17 village projects. For the plan period a number of projects have been approved and will start shortly:

- postal agency in Mabele
- village markets in Kachikau and Parakarungu
- fencing of guesthouse in Kavimba

During various consultation seminars and meetings local residents made proposals for LG17 village projects which are shown in table 5.5 below.

TABLE 5.5 Proposals for LG17 village projects for the Chobe Enclave

Mabele:	village market; village vegetable garden; VDC-office; community hall.
Kavimba:	village market; vegetable garden; workshop for game tanning and handicrafts; brick moulding project; cooperative shop.
Kachikau:	school for industries for carpentry; knitting and sewing; postal agency.
Satau:	village bakery; VDC-office; readers room for literacy courses; community hall.
Parakarungu:	postal agency; community hall.

When considering these proposals, for which genuine interest exists, priority should be given to the income and employment generating projects.
Employment creation will be essential for Chobe Enclave in the coming years. More jobs will reduce the massive out-migration and provide livelihood for the many schoolleavers and the jobless women.

The department should be provided with more staff and transport to carry out its many activities in the Enclave. The posting of an ACDO or CDA in Parakarungu should be given high priority.

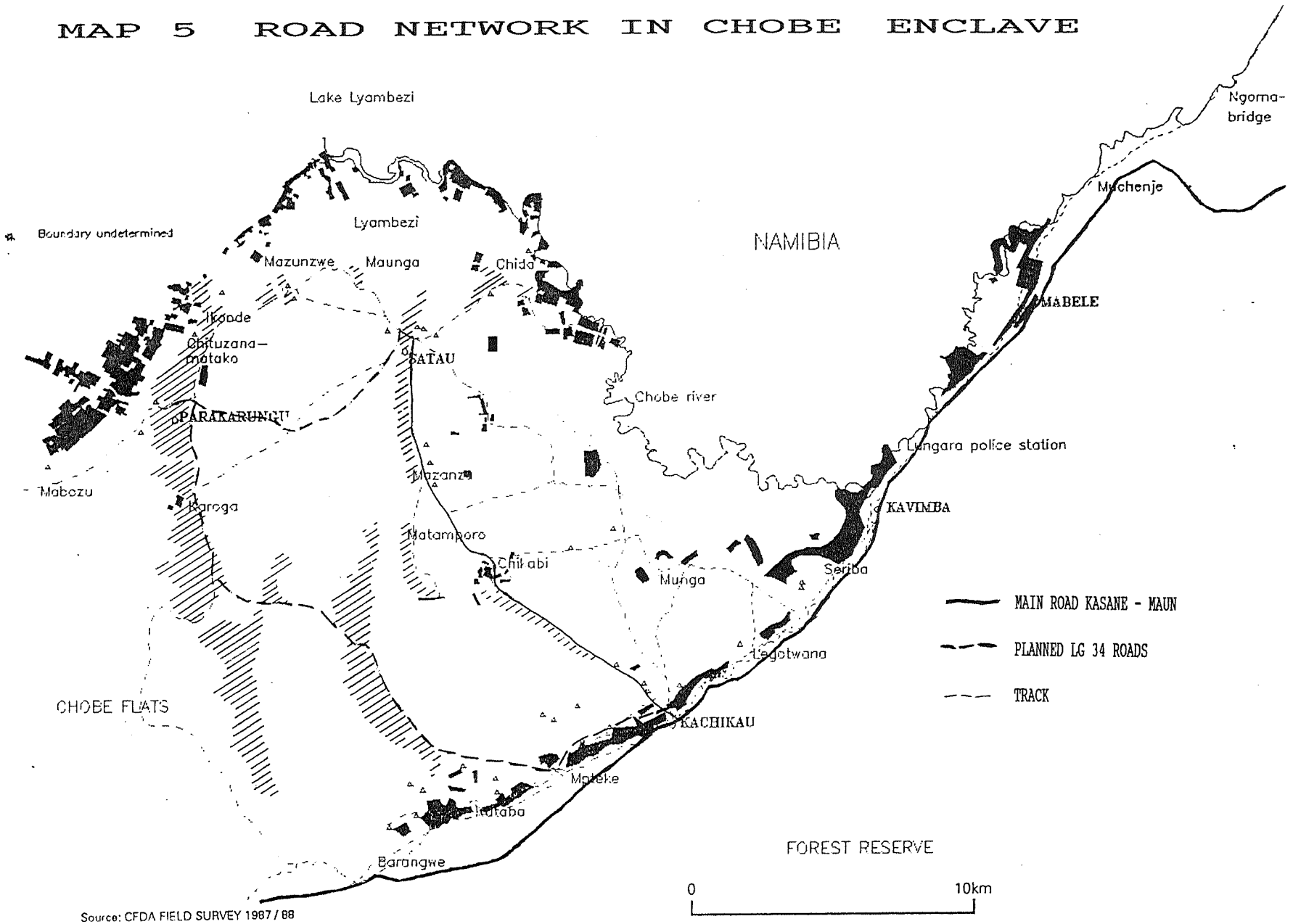
See map 4 for an overview of all the public services in the Chobe Enclave.

5.5 ROAD NETWORK

The road from Kasane through the Chobe National Park to the escarpment villages is a gravel road. The road has been improved in 1987/1988, but after that poorly maintained and frequently damaged by heavy trucks. After prolonged rains the road becomes nearly impassable.

The traffic volume is likely to increase during the plan period. Local traffic within the district is increasing rapidly, tourist traffic will continue to grow, and Namibia's independence will cause further growth in the traffic volumes.
In view of this, it is recommended that the road between Kasane and Ngoma bridge and from there to Kachikau be upgraded to tar standard.

MAP 5 ROAD NETWORK IN CHOBE ENCLAVE



Source: CFDA FIELD SURVEY 1987 / 88

From the escarpment many tracks lead into the flood plain. Most of them are difficult or impassable after prolonged rainfall.
The central route from Kachikau to Satau has received some spot improvements in 1988, in the form of embankments leading over depressions and molapos. These are narrow and steep, and without maintenance, they will deteriorate quickly. Since the construction of the embankments, the road is under responsibility of the Ministry of Works and Communication. The MWC is urged to carry out regular maintenance.

The track from Satau to Parakarungu is going to be improved under the labour intensive LG 34 project.
Construction started in 1988, but sofar progress has been slow due to the lack of donkeys to haul materials. The problem has been solved recently, and it is expected that the road will be completed within the plan period.

In 1990, the construction will start of the road from Kachikau to Kataba, also under LG 34, followed later by the Kataba-Parakarungu road. The latter will provide the Enclave with a permanent route, which will not be vulnerable to floods as it follows the higher ground of the Chobe Flats. Map 5 shows the road network in the Enclave.

5.6 LOCAL INSTITUTIONS

The Enclave is part of Chobe District, which is administratively a full district with its own District Commissioner (DC) and staff.

However, it does not have its own District Council but forms a subdistrict, headed by an Assistant Council Secretary (ACS). On the level of political representation Chobe provides five Councillors to the NWDC, of whom two are from the Enclave.
The Member of Parliament (MP) for Maun also represents Chobe district.

The Chobe Land Board (CLB) operates from Kasane and administers all the tribal land in the district. As mentioned earlier many Enclave residents still claim tracts of land through chief's allocation in the past and subsequent inheritance. The Tawana, mostly around Kachikau, seem to have a tendency to request for land through the CLB and to have their land holdings registered.

The Tribal Administration in Chobe District is differently organised than elsewhere in Botswana as there is no paramount chief. Instead, the tribal authorities in the villages are all subordinate to the DC in Kasane.

According to local traditions a Subya chief, Ditswane, was living in nowadays eastern Caprivi during the last century.

He and his men were beaten in a fight with the Barotse, north of the Zambezi. However his son Nkonkwena was allowed to return to his home om Mpalila Island in Caprivi. Later the royal house moved to Kabulabula, near Serondella, and moved again to Bukalo, between Ngoma and Katimo Mulilo.
Nkonkwena married several wives. His senior son was the father of the present chief of the Basubya in Caprivi.
His second son was Sinvula, father of the present sub-chief at Kavimba. His third son was Chika, who became chief in Satau and whose son is now gazetted headman in Parakarungu.

Although the seniority in royal lineage of the chief at Bukalo is recognized by the Basubya of the Enclave, he exercises virtually no authority over them. The Basubya in the northern Enclave now take Chika as their preeminent traditional authority and those in the southern Enclave Sinvula.

The tribal authorities in Satau and Mabele are gazetted headmen, not of the royal line, but elected to their positions.

The Batawana of the Enclave came originally from Tsau in Ngamiland. Following a dispute over succession to the chieftainship, Sekume broke away with his following and came in about 1912 to the Enclave. The present sub-chief of Kachikau, Mologasele, is a direct descendant of Sekume.

The sub-chief of Kavimba sits on the House of Chiefs, but is like other tribal authorities in the Enclave, subordinate to the DC in Kasane.

At the village level in the Enclave Village Development Committees (VDC) operate whose main function is to provide a forum of discussion and participation in the development of the village.
The VDCs in the Chobe Enclave can be said to funtion rather satisfactorily given the fact that the institution has been established relatively recently. The CFDA field survey confirms this as almost all heads of household in the Enclave know about the VDC and the majority knows the function (Jansen, 1989, p.25).

In the past years the VDCs were involved through various district development conferences and seminars in the preparation of the Annual Plans, DDP4 and this present plan. During these seminars the villagers were in a position to vent their ideas about possible development projects as well as about problems, constraints and felt needs.
The VDCs were also involved in the selection and implemention of the labour based drought relief projects.
On a less regular basis, the VDCs worked together with the Village Extension Teams (VEXTs), which groups the extension workers in the village, in the monitoring of the Village Annual Plans.

The Social and Community Development Department will continue to support the VDCs. Visits to committee meetings will be intensified to enhance their competence in carrying out their tasks. Supervision will be given to the election of VDC members and they will be advised on the maintenance and utilisation of their buildings and other facilities.

5.7 OTHER VILLAGE ORGANISATIONS

Each of the four Agricultural Demonstrators works with a Farmers Committee (FC) elected by the farmers of the extension area, to help the AD plan and implement the agricultural programme for the year.
FCs exist in Mabele/Kavimba, Kachikau, Satau and Parakarungu. In practice, the agricultural programmes are very similar and closely resemble the programme of previous years. It suggests that the AD's programming is largely based on his training and directives from his seniors rather than on the specific wishes of the FC.
There have been complaints in the Enclave that FCs are mainly interested in the welfare of larger farmers, and tend to neglect the female and poor farmers.
The CFDA field survey found that 33% of the heads of household did not know of the FC's existence and a further 40% thought it was no value.
This indicates that the FCs are not functioning optimally. Theoretically they could play a more meaningful role in the agricultural development of the Enclave. One of the prerequisites is to include more female farmers in the committee.

Dipping groups, consisting of cattle owners, exist around the spray races at Mabele, Kavimba, Kachikau, Satau, Parakarungu, Kataba and Mabozo. The group is responsible for the upkeep of the equipment and for buying the fuel and the dip. The interest in dipping groups has fallen off, because the incidence of Senkobo disease has declined, the high cost of dip and the difficulty of getting water to the dip.

There are three water syndicates, all newly formed, in the Enclave. These groups of stockowners exist in Mabozo, Munga and Satau. The Satua syndicate intends to use the old council borehole for livestock watering and to supply the sprayrace.

There are four 4B clubs in the Enclave, based on schools and encouraging the pupils to start up small agricultural enterprises. The 4B clubs at Mabele and Kachikau had vegetable gardens, those in Kavimba and Satau were interested in poultry production. At present the movement is very weak, probably because of several undertakings which failed and discouraged the participants.

The most active cooperative society in the Enclave is the Liambezi Multi Purpose Cooperative Society in Satau, which has an enterprising fisheries unit. Fishing was undertaken on Lake Liambezi until it dried up, and was recently moved to the Linyanti swamps.
The society has received strong support through the Canadian agency CUSO and FAP (Financial Assistance Policy), for cooling facilities, a new storeroom and fishing gear.

The Kachikau Cooperative Society, registered in 1987, operates a small grocery shop. The society has clearly suffered from the lack of assistance from the Cooperative Department (CODEC).

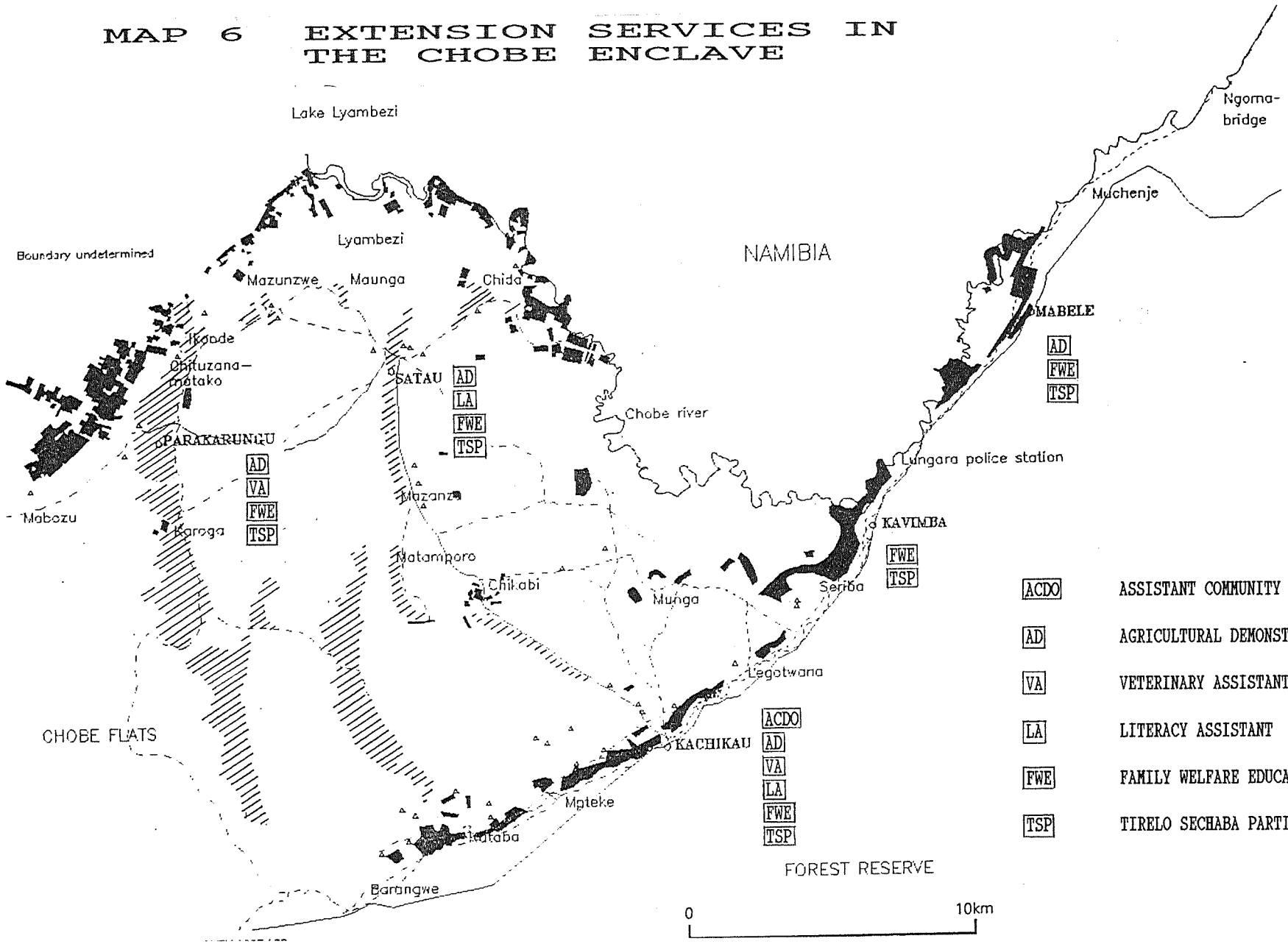
In most of the villages other voluntary organisations exist like PTA (Parent Teacher Association) and VHC (Village Health Committee). However, the coordination of activities of these organisations leaves much to be desired. In general, the members lack the knowledge of committee procedures and are not always very committed to their tasks. The Social and Community Development Department (S & CD) aims to stengthen the voluntary organisations into committees that are able to play a leading role in the transformation of their villages.

5.8 GOVERNMENT EXTENSION SERVICES

Various extension workers operate in the Enclave and an effort has been made to group them into the VEXT for each village. The work of the VEXTs is coordinated by the DEXT (District Extension Team) which functions from Kasane. The main purpose of the DEXT is the formulation and implementation of extension activities.

The most widely known extension officer is the Agricultural Demonstrator (AD), whose task is to assist the farmers and to work with them with the aim of increasing agricultural output in a sustainable manner.
In the southern area all heads of household indicated they knew the AD, and about 85% of them had regular contact with him. In the northern area all people knew the AD and had regular contact with him.
Most people visited the AD in relation with ARAP subsidy requests and the supply of free seeds. It is estimated that half of the number of farming families have had contact with the AD concerning technical farming assistance, either on individual basis or through group meetings on issues like row planting, crop rotation, use of fertilizers etc. Female headed households also have regualr contact with the AD, although they seem to visit the AD more often than that they are being visited by him.

MAP 6 EXTENSION SERVICES IN THE CHOBE ENCLAVE



The Veterinary Assistant (VA), at present not residing in the Enclave, is also a well-known officer. Especially for those who own cattle: some 80% of the livestock owning households in the Enclave have received some kind of assistance from the VA. The services of the VA pertain to inocculation, dipping, spraying and medical provision.

Of the other agricultural extension officers working in the Enclave, the Forestry Officer and the Fisheries Officer are quite well-known.

The Assistant Community Development Officer (ACDO), a post which has been vacant for a long time, is not well known in both the southern and the northern Enclave villages.

The Industrial Field Officer (IFO) is hardly known in the southern villages but well-known to the northern Enclave residents because of the basket buying trips which were organised through the IFO's office in the past.

In addition to these extension workers, Tirelo Sechaba Participants (TSPs) are posted in the five major villages. They perform a variety of duties at the village level which may range from assisting in the operation of the health post to helping out at schools. As they live in the village and work closely with the villagers they are fairly well-known to the Enclave residents (Jansen, 1989, p.26-27).
See map 6 for an overview of the extension services in the Enclave.

CHAPTER SIX AGRICULTURE

6.1 LAND OWNERSHIP AND DISTRIBUTION

Farming is clearly the major activity for the Enclave residents. About 85% of the heads of households consider farming as their first productive activity in terms of time spent (Jansen, 1989a, p29).
Almost all households own land. Around 2% of the households do not own any piece of land (Tsimako, 1983; Jansen, 1989, p28).

Arable agriculture is practised in two forms: dryland farming on the coarse and sandy upland areas and molapo farming in the flood plains.
Molapo agriculture is a farming system which is characterized by the utilization of temporary flooded areas as ploughing takes place when the flood recedes. Farmers make use of the soil moisture, available through inundation and rainfall dependency is considerably reduced.

A large area of the Enclave is liable to inundations in times of high floods, but only the north eastern tip between Ngoma and Mabele is flooded annually.

Land holdings in the Enclave are fragmented in response to variable flood levels, and to ensure that each farmer has access to some recently flooded molapo in most years. Nevertheless, in high flood years nearly all molapo areas become unusable whilst in years of insignificant flooding the molapo area may be confined to the lowest depressions, lake beds and remnant channels.

Family homesteads are located on the sand ridges at elevations above the maximum flood levels. This dispersed location of settlements and fields means that farmers have to travel rather long distances.

Because of the higher productivity of the molapo areas they are cultivated in preference to dryland. This is most clearly shown in the northern villages of the Enclave: on average households own 8 ha. of molapo fields and 4 ha. of dryland. Due to relatively high population pressures in the southern part, the average land ownership both for molapos (4 ha) and dryland (3 ha) is more restricted.
The CFDA-ART reports contain more detailed information on land ownership for all villages (see Jansen, 1988 and 1989a).

In general terms it can be said that in the northern Enclave the dryland farming is limited and the molapo areas are substantial in size, especially those belonging to Satau and Parakarungu residents.
The situation in the southern Enclave is characterised by medium sized dryland and molapo fields.

It should be borne in mind that above figures on land ownership are averages. Wide differences occur between different types of households. The female headed households for instance, own less land than the male headed households. In the northern Enclave, the female headed households (35% of the total number) own 6.1 ha on average, whilst the total area average is almost 12 ha per family.

The skewness of land distribution is also reflected in table 6.1 below, showing the relation between cattle ownership, land holdings and ploughed areas. The table shows that the more fortunate cattle owning households on average own more land and plough more land.

TABLE 6.1 Dryland and molapo ownership and area ploughed (in ha) per draught power typology class (1986/1987)

no. draught animals	dryland owned	ploughed	molapo owned	ploughed
none	2.5	1.0	2.8	1.5 ha
1-10	2.9	2.0	5.4	3.1 ha
11-20	5.1	1.9	8.4	4.7 ha
more than 20	8.1	3.2	11.4	5.9 ha

source: CFDA field survey 1987/1988

The skewness of land distribution is further illustrated by the fact that 10% of the households own about 50% of the total dryland area in the Enclave.
The distribution of molapo fields is slightly more even, but even here 50% of the total molapo area is in hands of 20% of the families in the Enclave (Jansen, 1989, p.30).

6.2 FARMING SYSTEMS

Farming systems of the Enclave are based on the production of the main food crops maize and sorghum. Maize is the preferred food crop.
Other minor crops are sparsely interplanted with these grain crops and include pumpkin, watermelon, squash and cow pea. Millet is grown by a few farmers on dryland along the edge of the escarpment.

6.2.1 Maize

The maize crop is generally confined to the molapo lands, which have better moisture and fertility conditions than the dryland areas.

Land preparation usually starts with burning of weeds and reeds in August and September. The burning of dry molapos has the danger of igniting the high organic surface layers causing serious losses of fertile topsoil. This may even result in extensive underground fires, locally known as 'vumbe'.
Although burning of weed is a destructive practice which should be dissuaded, at present it seems to be the only option for farmers, due to the shortage of labour and lack of mechanical equipment.

After land clearing, the maize seed is broadcast on an unprepared seedbed and then covered with a single pass with a moldboard plough. Seeds are thus covered with varying depths of soil and germination is irregular which limits the yields. A better seedbed, weed control and higher yields are obtained by making more passes with plough and harrow. Only a few farmers use these more intensive practices. However, the practice can have adverse effects on the soils, as through pulvarisation of the organic topsoil it becomes vulnerable to dehydration, oxidation and winderosion.

Row-planting is another more intensive land preparation practice, but not very common. In 1987/1988 only 12% of the total area ploughed under the ARAP scheme received also payment for row-planting.

The time of planting is less critical on molapos where residual moisture is sufficient to germinate the seed and to sustain crop growth until it rains. In addition to climatic advantages of increasing daylight and temperatures, the early planted crops suffer less from the incidence of pests and diseases. In years of early receding floods, planting can start in August with a harvest in December, which can even be followed by a second crop. However, early plantings are often restricted by a lack of draught power and a limited supply of manual labour.

Maize seed, Kalahari Early Pearl variety, is provided to farmers by the MoA. The rate is 8 kg per hectare but, given the method of planting and germination rates, the amount is inadequate. Farmers add some of their own seed to that provided by the ARAP package.

After crop establishment, weed control is attempted by using a short shafted hoe. The weeding operations are generally undertaken by women, but weed control is restricted by the shortage of labour.
Only a few farmers try to improve plant populations by infilling. Again the lack of labour restricts the infilling practices. The labour problem is aggravated by the long distances between home and fields.

Inputs in the traditional maize crop are restricted to the seed; fertilizers are not used nor are other agrochemicals, like herbicides or pesticides. Although there is demand from

the farmers, the chemicals are not made available to them in quantities they can afford to buy.

Production figures for maize, obtained by the CFDA field survey, are available for the 1986/87 season, which was regarded as a dry year.
The maize harvest in the northern Enclave was about 7,300 bags in 1986/87. Some 6,900 bags of maize were produced on molapos and 400 bags on dryland fields. On average this amounts to 17 bags of maize from molapos per household.
The southern area produced much less maize: in total 1,014 bags were harvested, which is on average only 8 bags per farming family.
Dryland production of maize was less profitable. 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 vary enormously; harvest figures of 1000 kg/ha on molapos have been reported (Jansen, 1989a, p36).

The maize is harvested by hand by women, who place the cobs in the sledge. The men are generally responsible for transportation using a span of four or six oxen to haul the sledge.
The maize stover is grazed by livestock following the harvest.

6.2.2. Sorghum

Sorghum with its greater drought tolerance is generally planted on upland areas and around the fringes of molapos. Land preparation and planting operations are combined in the same way as for maize. Similar problems arise in achieving the establishment of satisfactory plant populations. Growing conditions in the upland areas are much less favourable than on molapos and the weed problem is much less important.

The time of planting is a critical factor for crops grown under rainfed conditions. It is advantageous to plant in November-December, despite the dangers of a drought period in January. Nevertheless planting is usually extended over a much longer period, due to the competition for draught power, but the late planted crop is more vulnerable to locust attacks.

Sorghum seed is provided under ARAP at 8 kg/ha, but most farmers add some local seeds to a total rate of 12-15 kg/ha. Infilling to improve the sorghum stand is not practised. Weeding control is confined to one or two passes with the hoe, and fertilizers are not applied.
The minimal input approach to sorghum reflects the subsistence nature of the crop and the high risk of crop failure on the sandy soils under rainfed conditions. The harvesting of the sorghum crop is generally undertaken by women. Threshing takes place when the sorghum grain is required either for consumption as porridge or for brewing

beer.

Production figures for sorghum in 1986/87 were extremely low. In the northern Enclave the sorghum harvest was on average about 30 kg/ha. In the southern area some sorghum was harvested but quantities were negligible. The poor sorghum yields are largely attributable to low and erratic rainfall combined with the poor moisture holding capacity of dryland soils in the Enclave. Other contributing factors for crop failures include poor planting methods, lack of weed control and widespread locust attacks (MacDonald, 1989; Jansen, 1989).

6.2.3. Other crops

Maize and sorghum are generally interplanted with a range of minor food crops like pumpkin, squash and water melon. Crop densities are variable and so are production levels. These cucurbits are well adapted to the conditions in the Enclave and make an important contribution to the variety of diets. Cowpeas are interplanted with maize and sorghum by only a few farmers. Lack of cowpeas seed is one of the main reasons for not planting. Seed shortages occur because of poor storage conditions, and crop failures. Despite interest shown by farmers, the MoA has been unable to supply more seed.

6.3. ANIMAL HUSBANDRY

Livestock are integrated in the farm to the extent that they provide the farmers with draught power, consume crop residues and are a source of nutrition to the family in the form of meat and milk. Cattle and goats are also a source of cash income for the larger livestock owners.

The availability of draught power is one of the most essential factors in the farming system of the Enclave. With the availability of labour it determines the total hectarage that can be ploughed by a farming family. Table 6.2 shows the distribution of draught power in the Enclave.

TABLE 6.2 Distribution of draught power per household by typology class (in %)

no. draught animals	northern Enclave	southern Enclave	total area
none	27%	41%	34%
1-10	34	23	29
11-20	18	19	18
more than 20	21	17	19

source: CFDA field survey 1987/1988

As the table shows, some 63% of the Enclave households have none or less than 10 cattle, which generally means that they have insufficient draught animals to plough with.
For female headed households the situation is far worse: more than 90% of them lack 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 wich depresses the crop yields. Many farming households mentioned that they would be able to increase arable production if the draught power constraints could be lessened.

Hardly any use is made of the farm yard manure which has been accumulating in kraals for many years. This can be mainly attributed to the shortage of labour and the long distances between homestead and fields. No other attempts are being made to conserve or improve soil fertility levels. However, the variability of floods has resulted in continual rotation of cultivated molapos, which has assisted with maintenance of soil fertility levels.

6.4 MAJOR AGRICULTURAL CONSTRAINTS

In summary, arable agricultural practices in the Enclave are strongly influenced by the prevailing climatological and weather conditions as well as by the availability of agricultural labour and draught power. These contraining factors lead to a risk spreading and flexible type of agriculture with the following main characteristics:

(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 characteristics which contribute to the spreading of risks as the two types of land respond differently to the erratic rainfall and flooding conditions.

(b) low capital and limited labour input

Hardly any mechanised 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 fertlilizers are rarely used because of labour and financial contraints. Weeding is limited and harvesting may take a long time due to the labour shortages.

(c) traditional cropping patterns

Many farming households prefer to plant different crops so as to spread the risk of crop failure. Maize and sorghum have highest priority and intercropping occurs with cucurbits.
Lack of sufficient supplies of seed is one of the reasons for low yields and a limited diversification of crop production.

(d) constrained timing and limited yields

Particularly due to lack of draught power and labour farmers are not always in a position to plough and plant at the most favourable times. Those who do not have their own draught power will have to make arrangements with the more fortunate ones. This logically leads to less beneficial planting times and limited yields.

(e) variable production, marketing and incomes

As a result of the above contraints, production levels vary considerably. The harvest figures for the 1986/1987 crop season, known as a drought year, are far below the potential yields of maize which were reported to be as high as 100 kg/ha on molapo soil. That the area can produce a surplus in an average to good year is not a fallacy as was proved in the 1987/1988 and 1988/1989 seasons.

It has been estimated that, when the contraints on labour and draught power could be removed, and all land owned would be ploughed, the total area harvest could amount to over 7,000 tonnes. Local consumption can be estimated at 1,000 tonnes, which leaves a marketable surplus of about 6,000 tonnes.
The potential of the Enclave is undeniable and could be tapped more effectively. The next paragraphs elaborate in more detail on the development of farming systems.

A clear disincentive to more commercial farming at present is the absence of a reliable marketing structure. The surplus crop has to be sold to the BAMB (Botswana Agricultural Marketing Board) regional depot at Pandamatenga. The MOA (Ministry of Agriculture) has organised 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 conpetes with other activities such as formal employment, fisheries and rural industries. It is all part of a flexible system which is geared towards 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 underground fires (vumbe) often cause serious loss of fertile topsoil in the molapos.
Plagues caused by locust, quelea birds and mice have occured in the past years.
Crop damage is also caused by cattle wandering into the unfenced fields and by game animals.

6.5 AGRICULTURAL EXTENSION SERVICES

Agricultural extension activities within the Enclave are directed and supervised by the DAO in Kasane. The office comes under the RAO in Maun, which implies that all subject matter specialists are based in Maun.
The Rural Training Centre for farmers is located near Maun in Nxarage.

For extension purposes, the Enclave has been divided into four extension areas, each having an AD. An extension area covers between 200 and 300 farming families. The extension areas are : Mabele/Kavimba, Kachikau, Satau and Parakarungu.
In each of the four areas a modern house with office has been contructed for the AD. In general, the ADs have no transport and suffer from the lack of communication with Kasane. There are no phones or radios.
The ADs have no assistance in the office with administrative duties and they have hardly any extension aids.

Much of the AD's time is spent on the administration of the ARAP programme. This involves not only a large amount of paperwork but also many hours of fieldwork, measuring the fields of claimants. Time spent in the field is increased considerably by lack of transport.

The majority of the farmers in the Enclave received asistance through the ARAP prgramme: 955 in the northern and 75% in the southern Enclave. The total area ploughed under ARAP increased from 900 ha in 1986/1987 to 1.920 ha in 1987/1988. The ploughing component is clearly most popular: more than 500 farmers received support, whilst about 100 farmers mede use of other packages in 1987/1988 (Jansen, 1989, p.34).

In addition to ARAP, the ADs also administer the ALDEP (Arable Lands Development Programme) programme. This provides a number of investment packages for farmers owning less than

forty cattle. The packages include implements, animal draught power and fencing. The impact of the donkey draught power purchase scheme has been limited as the donkeys did not adjust very well to the climate and the soils are in fact too heavy to be ploughed by a span of donkeys.
The supply of ploughs (259 in 4 years time) and harrows (75 in 4 years time) can be said to have been more successful, although complaints were heard about long delivery times (MacDonald,1989).

6.6 DEVELOPMENT PROPOSALS

This section is largely based on the findings of the prefeasibility study on the agricultural potential of the Chobe Enclave (see also MacDonald, 1989, annex A).
Where applicable, information is added from the land evaluation/land suitability exercise that was carried out by the CFDA Apllied Research Programme (see Jansen, 1989).
The classification of land units is from the MacDonald report, which is appropriate for the purpose of this plan.

The critical factor influencing agricultural production is water. In low rainfall years crop production is seriously limited, whilst in flood years inundation can cause losses. These alternating extremes limit the opportunities for improving existing agriculture but they do exist. The most important include the use of additional physical imputs on land and higher labour and mechanical imputs. It will require a change from a low imput farming system to a more high imput system. The response of farmers to these opportunities will depend on the potential rewards, their assessment of the risks involved in relation to their resources of capital and labour, and their motivation to change.

The MacDonald report makes a distinction between agricultural improvements with and without major flood protection works, and also considers the potential for small scale irrigation. Agricultural development on dryland and molapo areas is dealt with separately. A similar distinction will be followed in the next paragraphs.
Table 6.3 shows the classification of the various land units.

6.6.1 Development of dryland areas

The dryland areas, which are all located above high flood levels, can be grouped into several land units. These land units are found in the Forest Sandveld, the Chobe Flats and in the flood plain (the beach ridges).

The land units all have similar soil characteristics, except for the fine/medium colluvial footslope of the Forest Sandveld. In general, they are all of coarser textures

varying from loamy sands to sands with medium grain size. The moisture holding characteristics of the soils are very poor and fertility is extremely low.
Consequently, with a few exceptions these land units have been classified as (very) marginally suitable for arable agriculture.
More favourable areas for dryland development are the fine/medium colluvial footslopes of the escarpment and some small patches of sandy loamy soils in the Chobe flats, which are moderately suitable for millet and groundnuts (see Jansen, 1989, p79).

There is some scope for expanding the cultivated areas on the fine/medium colluvial soils located between Mabele and Kavimba. These soils are found on basalt, have fine to medium textures and relatively high fertility levels.
The land offers opportunities for the cultivation of food crops (maize and sorghum) and also for cash crops like groundnuts, sunflower and cowpeas, all under rainfed conditions.
The present constraints of labour and draught power supply will have to be removed, for instance through an increase in tractor use or formation of draught power groups.
In addition, much of this land is subject to serious erosion, due to run-off from the higher parts of the escarpment. Consequently, soil and water conservation measures should be an essential component of any development of this land unit so as to ensure the preservation of this valuable soil resource.

In general the fine sandy soils in the floodplain, which form the higher beach ridges, have no potential for rainfed arable crop production. However, there is a small scale development opportunity in areas adjacent to villages which may be worth pursuing. By making use of kraal manure these soils could be used for the cultivation of vegetables. At present, kraal manure is not used because of the high labour demands to transport it to the field. Farmers could be supplied with carts and a system might be devised to protect crops against grazing cattle, through a combination of stock-proof fencing and more careful herding. Intensive cultivation could be combined with the existing or newly developed woodlots in Satau and Parakarungu, into a pilot agro-forestry project.

The cultivation of those well manured soils within the village could be a rewarding exercise, especially for the female headed households with less labour at their disposal. It would provide them with some cash income and would improve their poor dietary standards.

6.6.2. Development of infrequently flooded molapo areas

The molapo areas in this context have a marginal to moderately high risk of flooding, with a frequency of two to five years of flooding in a 10 years period. After years of

inundation the area loses the characteristics of high water tables and high soil moisture levels and becomes, in effect, dryland areas with crop production dependent on rainfall.

TABLE 6.3 Classification of land units in the Chobe Enclave

DRYLAND AREAS	area (ha)	land suitability
(a) Chobe Forest Sandveld		
1. Gently undulating forest upland	CFR	N2 st
2. Coarse colluvial slopes	6070	N2 st
3. Fine/medium colluvial footslopes	830	S2 st
(b) Chobe Flats		
1. Gently undulating mopane forest	13190	N2 st
2. Undulating bush tree savanne	13190	N2
3. Undulating acacia forest	3000	N2 sta
4. Shallow calcrete areas	4890	N2 stz
(c) Chobe Flood Plain		
1. High beach ridges	4620	N2 st
2. Intermediate ridges	5480	N2 st
MOLAPO AREAS		
(d) Infrequently Flooded Areas		
1. Ridge margins and low ridge	6920	S4 adf
2. Intermediate forested plains	1340	S4 ad/sa
3. Intermediate plains and channel borders	1940	S4 saf/adf N2 st
4. Sodic areas	200	S4 sa
5. Low lying grasslands	1070	S4 adf
6. Low lying sandy grassland	3330	S4 af/sf
(e) Typical Molapo Areas		
1. Low lying highly organic grassland	9610	S4 f(s)
2. Low lying reedbeds and channels	6700	S4 ef(a)
3. Channel complex and lakebeds	17610	S4 efs
total hectarage	100120	

S1 : highly suitable
S2 : moderately suitable
S3 : marginally suitable
N1 : currently unsuitable land
N2 : permanently unsuitable land
a : accumulation of salts in soil
d : low lying land subject to drainage deficiencies
e : erosion hazard; combined effects of slope and soil surface characteristics
f : flood hazard; risk of flooding during the potential growing periods
s : soil limitation in topsoil, subsoil or both
t : topographic features; texture, water holding capacity, fertility and drainage status
z : soil depth; shallow soils, rock, gravel

source: MacDonald, 1989, Annex S

Most of the infrequently flooded molapos have been defined as (very) marginally suitable for arable agriculture; only low productivity can be expected even with substantial levels of input (MacDonald, 1989, pA25).

However, the more detailed land suitability exercise by the University of Utrecht shows better prospects. Under the no-floods scenario situation, the suitability class has been upgraded to marginally suitable, a situation whereby yield benefits are just high enough to justify the required inputs. Some patches of land at intermediate levels are even moderately suitable for the cultivation of sorghum, millet, sunflower and groundnut.
The common restrictive factor under dry as well as flood situations is oxygen availability which can be attributed to low infiltration rates of the topsoil, causing water logging after heavy rainfall.

Large areas of these lands on intermediate positions have been cultivated intensively in the past and when not cultivated have been used for grazing. Both these land uses have drained soil nutrients, so that much of the original soil fertility has been lost. Periodic flooding checks the decline in the level of organic matter to some extent.

The most effective form of development for the occasionnally flooded areas is improved smallholder agriculture, using a long term low cost approach. A system of improved land management is needed to halt the drain of soil nutrients and the decline in productivity.
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 incorporation in the topsoil. If burning could be prevented not only losses of organic matter would be eliminated but more dry season grass would be available for livestock. Another component could be demarcation and fencing of individual or group holdings to allow full control over land use. Enclosure of lands would also facilitate the adoption of rotation systems of cropping

and grazing aimed at increasing the organic matter levels and therefore improving soil fertility levels.

6.6.3.Development of typical molapo areas

In the past years the cultivation of maize on the typical molapo soils has expanded rapidly.
Also here, the use of fire to clear the lands prior to planting has led to extensive peat fires and loss of valuable fertile topsoil.
The further expansion and development of molapo agriculture should seek to minimise the use of fire and encourage the practice of mulching to conserve both organic matter and soil moisture.

On the molapos a more intensive system of cultivation could increase productivity. For example, the present practice of broadcasting the maize seed on uncultivated soil would could be replaced by a more thorough seedbed preparation with a harrow in addition to the plough, and plant in rows, using an animal drawn planter.
Other means of improving the maize production would be to effect better weed control, to apply some fertilizers and to control insect pests.

The overall potential for the improvement of maize production on molapo also depends on the frequency of flooding and its timing, depth and duration. The depth of flooding, for instance, is a critical factor in determining whether simple development options, undertaken by farmers, are feasible.
Where molapos are subject only to shallow flooding a possible option would be the construction of wide beds. Under this system trenches are excavated and the soil is placed on the beds, thus raising the level and providing the maize with adequate depth of soil.

Another measure which might bring substantial benefit to many farmers is the more widespread use of tractor cultivation. Female and poor farmers often have great difficulty in cultivating the productive molapos. The soils are often hard and roots dense, so that ploughing is very hard work and subsequent weed growth is prolific. Tractors might be used to loosen these soils and to drag the roots out, so preparing the soil for later tillage with oxen.

The suitable areas for improved molapo farming include the following land units: low lying grasslands, low lying reed beds and channels, and channel complex and lake beds.
Together these units occupy some 35.000 ha which is roughly 20% of the entire communal area.

Flood protection measures would create much better opportunities for the extension and identification of molapo farming.

Water control measures would also change the status of the land units which were down graded due to flooding hazard (those with f-suffix in table 6.3.).
Flood protection would have to serve the following purposes:
- to control the entry of floodwater from the Chobe and Linyanti rivers;
- to facilitate a pre-planting flood and the controlled removal of surface water;
- to control the ground water table during the crop season.

Large scale control measures will obviously require large scale mechanised farming to be cost effective. However, the MacDonald report clearly rules out the possibilities of large scale farming in the Enclave. Large scale operations with tractors need a dry topsoil, but the cultivation of dry soils will lead to a rapid decline in soil organic matter levels and therefore in soil fertility. The decline is the result of oxidation and wind erosion.
Systems of drains, canals and other costly infrastructure would be required which can only be justified by intensive land use. Intensive farming of molapos can not be sustained in the long term as these soils need regular fallowing to maintain their fertility levels.

Small scale development would permit greater flexibility in the cropping pattern and would permit a fallow to be included in the rotation. In longer term, fallowing will be necessary to maintain soil fertility.
With full water control of the molapo areas, a wide range of crops could be grown, and even two crops per season.

6.6.4 Development of small scale irrigation

Most of the farmers in the Enclave do not have any basic theoretical knowledge and practical experience of irrigated farming. A period of training, which might take some years, would be necessary to achieve satisfactory yield levels. Agro-support services need to be provided as well (input supply, marketing and water management); specialized extension workers should reside in the Enclave to assist on a day to day basis.
A land suitability classification for small and medium scale irrigation was done by MacDonald and a summary of the results is presented in table 6.4.

TABLE 6.4 Classification of land units for small scale irrigation

	area (ha)	land suitability
Fine/medium colluvial footslopes	830	S2 te(z)
Undulating bush tree savannah	4000	S4 ad
Undulating flood plain	450	S4 ad, sd
Intermediate forested plains	400	S4 sda
Low lying grasslands	9600	S4 def(s)
Low lying sandy grasslands	1700	S4 dsf
Low lying reedbeds and channels	6700	S4 def
total hectarage	23680	

source: MacDonald, 1989, Annex S.

Only the land unit fine/medium colluvial footslopes, which is found in the vicinity of Mabele and Kavimba, is regarded as suitable for irrigation. Development of this unit, which covers 830 ha, would require special measures to overcome the erosion run-off problem and soil depth limitations.

All the other land units have been classified as only marginally suitable for small scale irrigated agriculture. The undulating soils in the Chobe Flats can only be made productive with the highest level of management of soil and water and nutrient application. This implies high costs, which are generally not associated with pioneer small scale irrigation. Furthermore, these soils are located in small scattered areas, which will be difficult to protect against game animals in the Chobe Flats.

Parts of the intermediate forested areas in the Chobe flood plain are considered as very marginally suitable. This land unit consists of two large blocks of land to the west of the Parakarungu ridge, of which a scattered 400 ha may be used for irrigation.

The low lying areas of the organic soils of the Chobe flood plain offer some prospect for small scale irrigation development. The major factors responsible for the downgrading of the organic soils are the high flooding frequency, high water tables and the need for drainage. The removal of these limitations will be a costly affair.

Of the crops presently grown by farmers in the Enclave, maize would be the preferred crop for irrigated farming. Planting of maize could take place in early summer with irrigation to supplement rainfall. High maize yields can be anticipated with relatively low inputs of fertilizer on the organic soils.

Cowpeas could be planted in early summer as well. Although this crop has a low yield potential, it is a traditional crop in Botswana with an assured market.
The vegetable and salad crops are well suited to small scale irrigation farming and adapted to the Enclave environment. Satisfactory production of tomatoes, cabbage and potatoes are attainable on the organic soils. These crops, together with onions, could be grown in the winter season. For the winter season crop full irrigation would be required.

The MacDonald report contains detailed information about the methods of application of irrigation water and its sources (see MacDonald, 1989, Annex W).

CHAPTER SEVEN WILDLIFE UTILIZATION AND TOURISM

7.1 WILDLIFE UTILIZATION

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 of the country's tourist industry.
From the wildlife viewpoint the Enclave can be divided into three units: the floodplain, the Chobe Forest Reserve and the mopane woodlands in the south-west of the Enclave.

In the past the floodplain contained a large population of lechwe, puku, sitatunga and reedbuck. All these species, other than reedbuck, were killed or moved out of the area in the 1981/87 drought period. Also in neighbouring Namibia the wildlife population was decimated. Given the substantial human population in the Enclave it is unlikely that the floodplain's game population will ever recover.

The other two ecological units are still of enormous importance. During the dry season large numbers of animals move into the area south of the Linyanti (near Shaile) and into the northern part of the Forest Reserve, within easy reach of the rivers. These animals are elephant, buffalo, zebra, wildebeest, tsesebe, giraffe, sable and roan antelope, eland and associated predators. During the rainy season the animals move back into the National Park and only a few elephants, waterbuck and resident predators remain. The rains fill the pans along the boundary of the Forest Reserve, enabling elephants and buffalo to utilize the reserve's vegetation during this period.

The Enclave is of particular importance for the wildlife populations of the Chobe National Park in three ways:

1. The Shaile area and the northern part of the Forest Reserve act as dry season refuge areas and this alleviates the overgrazing and elephant problem in the National Park.

2. The pans along the escarpment allow elephants and buffalo to utilize the teak forests during the rains.

3. The Enclave, which also forms Controlled Hunting Area 1 (CHA 1), is a suitable area for the utilization of excess wildlife, which is, under the present legislation, impossible to achieve within the Chobe National Park boundaries.

If the Enclave were lost to wildlife, overgrazing in the Park would increase, eventually leading to a population crash. The regeneration of the teak forest population would be diminished and a valuable source of employment and income

TABLE 7.1 Hunting quotas and recorded kills for CHA 1 (1986)

Species	citizens			non-citizens	
	quota	licenses sold	recorded kills	quota	recorded kills
Buffalo	100	63	10	30	5
Eland	5	2	1	-	3
Sable A.	-	-	-	8	6
Zebra	150	81	48	40	6
Kudu	20	20	1	25	2
Wildebeest	50	50	4	40	3
Tsesebe	15	15	1	40	4
Impala	40	40	5	20	4
Lechwe	15	10	-	30	6
Reedbuck	15	11	-	20	-
Lion	2	1	-	5	4
Leopard	-	-	-	3	2
Bushbuck	-	-	-	5	1
Duiker	-	-	-	5	1
Steenbok	-	-	-	5	3
Sitatunga	5	2	-	20	3
Ostrich	-	-	-	10	1
Crocodile	-	-	-	5	1
Warthog	50	41	2	40	2
Total	467	326	72	361	56

source: MacDonald, 1988, pB8, from Ngami Data Services

Also citizen hunting is widely practiced. In 1986, a total of 326 licenses were sold, out of a quota of 467 heads. Only 72 kills were recorded officially, but most of the citizen hunters do not report their kills. Moreover, it has been estimated that for every license held, at least two, possibly three are killed. The total number of animals hunted by citizens is assumed to be 650 and 975 head.

The hunting of zebra and buffalo is clearly favoured by the Enclave residents. Skins of zebra are being sold for as much as P400 each. Apart from the above numbers, some animals are killed for crop and livestock protection.

Each year a number of licenses are acquired by the residents of the Enclave. But in recent years there has been a trend that less and less zebra and buffalo licenses for CHA 1 have been sold to Enclave residents (see table 7.2).

TABLE 7.2 Distribution of zebra licenses for CHA 1

	1984	1986	1988
Enclave residents	39%	15%	21%
Chobe District residents	52%	63%	32%
Botswana residents	9%	22%	47%

source: CFDA

During the consultations Enclave residents have expressed their concern about this trend. They claim it is not fair that they have to endure the hardships resulting from wildlife, while people from outside are enjoying the benefits.

Negative aspects of the interaction between people and wildlife are clearly crop damage and loss of livestock. Crop damage mainly occurs when late rains fail and large herbivores in search for water move into the flood plain before the crops have been harvested. The worst affected area is Kataba, where elephants, buffalo and zebra water at a pan near the settlement.
About 20 percent of the Northern Enclave residents said to have had crop damage due to wildlife, another 20 percent mentioned straying cattle as equally damaging (CFDA-ART, 1989).
Loss of livestock to predators is even more widespread. In 1987, 40 percent of the Northern Enclave residents reported losses of cattle to lions and hyenas.

Enclave residents have raised bitter complaints about the inadequate reactions of the Department of Wildlife and National Parks (DWNP) on wildlife destruction. Cases have to be reported at the DWNP office in Kasane, but when the officers arrive on the spot, the raiders have left.
There is no compensation paid, unless the animals are shot by the owner of the cattle or crops, and DWNP then takes the trophy.

In view of the intense distrust of the DWNP it is strongly recommended that the Department takes steps to improve their image in the Enclave.
The establishment of a sub-office in the Enclave, to shorten the lines of communication, could be a first measure.

The development of buffer zones between the wildlife areas and farming or grazing areas could be an alternative solution. In these buffer zones potential raiders could be hunted, either by professional hunters or by the DWNP, or a combination of the two.
Development of a buffer zone however would need more detailed planning, which could be looked into.
Electric fencing would be another alternative. Detailed information on power fencing can be found in MacDonald's

report (1988, Annex B).

Livestock losses can be substantially reduced by improvements in the herding system, ensuring that cattle are in kraals at night and improving the quality of the kraals.

Wildlife resources in the Enclave are abundant and could be utilized more efficiently and profitable 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.Unless they obtain some benefits from the presence of wildlife, there is little reason why they should support the presence of the game animals in their area.

Future utilization of the Enclave's wildlife should be considered in relation to the national wildlife management plans and the developments in the adjacent Chobe National Park.

It is suggested here, that a viable approach for wildlife management in the Enclave could be based on a scheme for communal areas in Zimbabwe, which is called 'CAMPFIRE' (Communal Areas Management Programme for Indigenous Resources).

The programme is based on the following principles:

1. There is a buffer zone around residential and farming areas of approximately 1 km. Within this zone the residents are permitted any use of natural resources (wildlife, forest, grazing, water).

2. The rest of the area is divided over the various communities. Hunting fees for small game shot within a community's area are paid directly to the community.

3. Big game trophy fees are paid to the District Council, whereafter the money is returned to the communities in the form of projects.

(More details are described in MacDonald's report Annex B).

Introduction of this type of community exploitation of wildlife in the Enclave should be given serious consideration. The enormous wildlife resource makes the Enclave one of the few places where this wildlife utilization approach could be successfully implemented. At present, the negative effects of wildlife are, in the local residents' view, exceeding the benefits. Introduction of a community wildlife utilization scheme could rectify this imbalance and provide the residents with an incentive to preserve their rich resources for the future generations.

7.2 TOURISM DEVELOPMENT

At present, the only tourism in the area is the hunting safari camp of Hunters Africa in Shaile. In addition, a substantial number of tourists pass the Enclave on their way from Kasane to Savuti/Maun and vice-versa.
Except from some bottle stores and shops in the villages, no other facilities exist to attract the flow of tourists and consequently no income is being generated. It should be seriously considered how this underexploited potential for income and employment could be used to the benefit of the Enclave residents.

The MacDonald report identified two areas with tourism potential: the extreme north-east of the Enclave near Ngoma bridge, and along the Linyanti upstream of Shaile. In fact, plans already exist for the construction of a tourist lodge near Ngoma bridge.

The district will have to prepare a comprehensive tourism development plan. Land could then be zoned for tourism purposes and advertised by Landboard.

Meanwhile, some activities in which local residents can be easily involved can already be identified.

1. Craft production and sales
At the consultation seminars, Kavimba residents suggested to build a craft workshop (under LG 17) in their village. The proposal should be considered, since it provides employment for a number of people as well as income for the community.
2. Campsites
A camping ground, managed by the Village Development Committee, could be a possibility in one of the villages on the escarpment to attract passing tourists.
3. Fishing trips
The exploitation of the fishing grounds near Muchenje through organized trips, boat rental etc. could be explored.
4. Guesthouses
Guesthouses, managed by the VDCs already exist in the villages on the escarpment. VDCs should be encouraged to exploit these houses more effectively and profitably.
5. Game viewing
Local residents could be involved as guides, drivers etc. in game viewing trips and walking safaris into CHA 1.
6. Commercial activities
Local entrepreneurs could be encouraged through IFS and with FAP assistance, to set up businesses like petrol stations, restaurants etc.

All future tourist developments in the Enclave will largely depend on the effects of the increase in Park fees. Government has substantially increased the Park fees from July 1989. At present it is difficult to estimate the impact,

but it will likely change the nature and volume of tourism. The medium budget tourists with own transport will probably no longer visit Chobe District, but instead spend their vacations in the much cheaper parks in Zimbabwe. To a certain extent, they might be replaced by high-budget tourists, accommodated in luxury lodges around the Chobe National Park, but it is doubtful whether this development will benefit the Chobe Enclave.

CHAPTER EIGHT LIVESTOCK

The livestock populations of the Enclave are fairly isolated from those in the rest of Botswana. The Enclave has long been classified as an area of high foot and mouth disease (FMD) risk and cattle exports were prevented by veterinary regulations; imports of cattle were also restricted.
The isolation and lack of outlets may have contributed to the very high increase in the herd over the past decade. Isolation has probably also resulted in relatively archaic grazing and management methods among Enclave farmers, compared to their colleagues elsewhere.

In the first decades of the century settlements and cattle posts extended over a much wider area then today, although both human and livestock populations were far lower. There were Basubiya villages along the Chobe river and Linyanti towards the swamp. The Batawana had cattle posts along the floodplain towards the Mababe Depression. Also cattle posts existed in the valley of the Ngwezumba river.

It was around 1920 that a regular trekking route between Ngamiland and the then Northern Rhodesia was established. The route moved frequently eastwards due to incursion of tsetse fly. The Enclave itself was infested by tsetse fly in the 1930s.

During the 1940s stock numbers increased greatly both in the Enclave and on the cattle posts, which were set up by Greek traders, who used them as holding ground for cattle to be sold to Northern Rhodesia. In 1950, it was estimated that there were over 20,000 head of cattle in and near the Enclave. Some 10,000 head of cattle, of which 3,000 originated from the Chobe, were exported in that year through Kazungula (MacDonald, 1988, p1.2).

In the 1950s the decade of prosperity came to an end. Following years of heavy rain and floods, there was a severe outbreak of senkobo disease (Streptothricosis) and tsetse fly encroached into the floodplain. It is estimated that only 300 to 600 cattle remained in the Enclave after the 1958 floods.

Tsetse control was initiated in the early 1960s and in subsequent years the tsetse was driven westwards, and the entire Enclave became resettled by farmers and stock keepers. In the past five years however another eastward migration has taken place. Several settlements on the western sand ridges had to be abandoned, due to stock losses to predators, shortages of water, and shortages of labour (which also affects the first two factors). Close herding to avoid predators is labour demanding, as is drawing water from deep and weak wells which have frequently to be cleaned and deepened.

8.1. CATTLE NUMBERS AND DISTRIBUTION

The cattle numbers below derive from the FMD vaccination records and represent a high proportion of the total herd. Goat and donkey numbers come from the annual livestock census.

TABLE 8.1 Livestock numbers in the Enclave

crush	cattle (May '88)	goats (Jan.'88)	donkeys
Mabele	1543	258	7
Kavimba	1231	170	21
Kachikau	1333	256	81
Kataba	850	164	53
Satau	2593	339	9
(Liambezi)	-	256	10
Parakarungu	1272	530	13
Mabozo	369	-	-
Enclave total	9191	1973	194

Note:-Mabozo livestock not counted separately in census
-Liambezi is not a crush, its cattle is vaccinated at Satau

Source: Department of Animal Health, Kasane

The livestock population of the Enclave is subject to major fluctuations from year to year. Droughts but also floods can greatly reduce cattle numbers. Goat numbers increase during dry periods. The livestock census records a drop of 40 % in the goat population between 1987 and 1988, when good rains fell. Cattle increased by 6 per cent over the same period.

Cattle are very unevenly distributed among the households of the Enclave, in the southern villages even more than in the northern (see table 8.2).

TABLE 8.2 Livestock distribution per household

	southern CFDA	northern CFDA	total CFDA
no cattle	41%	27%	34%
1-10 head	23%	34%	29%
11-20 head	19%	18%	18%
more than 20 head	17%	21%	19%

source: CFDA field survey

In the Enclave roughly 63 percent of the households have none or less than 10 cattle, which generally means that the household has insufficient draught animals to plough with. A clear majority of farm families therefore have to borrow or hire animals for ploughing, which can delay the time for ploughing and so depress the crop yields.

Female headed households do not own a lot of livestock; more than 60 percent do not have any livestock at all, and on average these households have about three head of cattle.

The mafisa system is still existent in the Enclave. Some 20 percent of the households have mafisa-in livestock, i.e. they are looking after somebody's cattle, which they use as well for ploughing purposes. The mafisa system enables stock owners with a shortage of labour to have their animals looked after, it reduces the risks of diseases affecting the entire herd and it helps an owner to get the cattle onto better pastures elsewhere. Through the mafisa system, access to cattle and draught power is more widely spread than the strict ownership of cattle suggests.

8.2 SMALLSTOCK

The number of goats is estimated at about 2000, but varies widely from year to year. In the southern villages goats are held by 30 percent of the households; in the northern part by 50 percent. There is no commercial market for goats, and the entire off-take is more or less locally consumed. Goats are generally in a poor condition in the Enclave. This may be due to heavy parasite infestation, inbreeding and short grazing periods. The last factor is closely related to the shortage of labour for herding and the presence of predators.

Donkeys are not kept by many households. In the southern part 15 % of the households own donkeys; in the northern part only 4 %. Donkeys were bought under ALDEP but contrary to the idea of the program, they are hardly used as draught animals. Farmers clearly prefer oxen for ploughing.

8.3 MANAGEMENT AND MARKETING

The type of grazing and the amount available varies greatly throughout the Enclave.
Mabele and Muchenje, for example, have very little floodplain grazing but there is usually surface water in the river, and there is the Forest Reserve where the animals graze.

In Kachikau no cattle is allowed to be kept in the village. Instead the animals are kept at cattle posts in the vicinity

CHAPTER NINE INDUSTRY,COMMERCE AND EMPLOYMENT

The employment in the formal sector in Chobe Enclave is very limited. Formal employment is mainly with various government institutions like customary courts, schools, health facilities etc.
The number of government employees in the Enclave is about 125. Furthermore there are some 15 shops and bottle stores that employ roughly 40 people in a more or less formal manner. There is only one industrial enterprise in the Enclave, the Chobe Forest Industries, which employs about 150 people.

Employment in the informal sector is much more widespread. Arable agriculture is practiced by nearly every household. The majority of the households farm on a subsistence basis, but some farm more commercially. Livestock production is of secondary importance and only a small number of cattle is marketed.
The more important activities providing a cash income are : beer brewing, fisheries, hunting and handicraft production.

Fishing and hunting are clearly the more profitable activities. It is estimated that 60 percent of the households involved in non-agricultural activities does not earn more than 100 Pula cash per year. However, fishing lifts the average income to about 350 Pula per household.
Hunting is also widely practiced and can contribute largely to the household's cash income. Skins of zebra, for example, are being sold for as much as P400 each.

The brewing and sale of traditional beer is significant with about a third of the Enclave households engaged in this activity during some parts of the year. An important market is created by the 150 employees of Chobe Forest Industries in Kavimba.

Although less than in the past, handicrafts are being produced by a substantial number of people. The majority of handicraft producers are women. They use the leaves of the mokola palm to make baskets of various shapes. Other products made by women include sleeping mats, palm bracelets, palm beaded necklaces, beer strainers and palm hats. In fewer numbers, also men still produce wooden crafts. Products made by men are : wooden spoons, pounding sets, tool handles, stools, drums and kgotla chairs.

The majority of handicraft producers make their crafts for selling. Nearly half of the products are sold locally in the village; the other half is sold outside the Enclave, through the IFO's office, at Agricultural Shows or directly to tourists and curio shops in Kasane.
A handicraft development study clearly indicated the need for assistance to the handicraft industry. The production

capacity of Chobe weavers is potentially quite good with a ready supply of mokola palm and the existing knowledge of traditional basketry skills. The market already exists and will only become larger in the future. Assistance is needed to encourage the producers to make more items, to improve the quality of their products and to introduce new items and styles of products. A reliable marketing system must be set up that ensures that the high quality crafts are available for sale and can compete against produce from Zimbabwe and Zambia. There should be more local Chobe crafts available for the tourists to promote every aspect of Chobe District, not just the game animals. The study has resulted in the posting of a handicraft advisor, to be expected in late 1989.

For those practicing small scale industries like bread baking, sewing, grain milling and carpentry, the return is an important part of their cash income. However, only a very few do participate in such activities because of the small internal market and transportation difficulties for 'exporting' out of the Enclave. Other conditions limit the potential of rural industries such as lack of technical training facilities, limited access to business education and difficulties with obtaining raw materials.

Employment opportunities outside the agricultural sector are presently very few in the Enclave. Moreover, agricultural incomes cannot compete with formal and casual wages elsewhere and consequently people tend to look outside the Enclave to earn a living.
The outmigration of a very high portion of working age men, and also young women, has resulted in an acute shortage of labour in the Enclave. It was found that in the southern CFDA each household had on average 1.5 member who is absent. In the northern CFDA absenteeism was less: 0.7 person per household (CFDA-ART, 1989). The shortage of labour affects all aspects of economic life.
In agriculture it limits the area that can be cultivated, it delays planting and harvesting, and it puts some of the best land, which is distant from the villages, beyond the reach of many farmers. Also the livestock sector is affected by the labour shortage. There is insufficient time for herding the cattle, so that the daily grazing time is too short, and the condition of the cattle suffers. For the same reason, cattle is grazed near the village, causing range degradation and wind erosion. The poor condition of the cattle reduces their draught capacity, so that agricultural activities are restricted again.

Working age people have left the Enclave because they do not see an economic future for themselves there. Most of the migrants have moved to Kasane, and a few further south. Although the Enclave has an economic potential in agriculture, wildlife and tourism, it can hardly be realized because of the scarcity of working age people. This is a trap from which the Enclave can only escape through external assistance in developing the latent economic opportunities.

The chapters on agriculture, wildlife and tourism provide some proposals on how the resources and potentials can be used to the benefit of the local economy. Migrants can be attracted back to the Enclave if the local economy was seen to be emerging from its present recession.

Also for the industrial and commercial sectors initiatives should be taken to create more employment in the Enclave and to reduce the massive outmigration of people. Initiatives should concentrate on the following:

1. Development of supportive services for the industrial and commercial sector.
   Private enterprises in the Enclave would be stimulated by the establishment of wholesalers, especially for building materials, in Kasane.
   The introduction of bank credit facilities in Kasane would also help the small scale industries in the Enclave. A branch of NDB should be established in Chobe District.
   Regular transport services from Kasane to the Enclave should be developed. The road from Kasane to Ngoma and Kachikau should be tarred to reduce transport costs and improve access to the Enclave for small vehicles.

2. Promotion and stimulation of small scale industries.
   A school of industries should be established in the Enclave to provide technical education for youth. Having more technical training and management skills youth can be stimulated to start their own business. Kachikau residents have shown interest in establishing a school of industries with courses in carpentry, sewing and knitting.
   The IFS department should be strengthened and extension staff be posted in the villages. A business advisor should also be posted in Chobe District, and courses in management and bookkeeping should be held more frequently.
   Factory sheds or selling sheds could be constructed in the villages. VDCs could manage them and rent them out to local producers. Kavimba residents have shown interest in the construction of a crafts work and sales shop. Other possibilities could be explored.
   Production cooperatives and development trusts should be encouraged.

3. Development of small scale commercial agriculture.
   Apart from the proposal for the development of arable agriculture in the Enclave, there are more possibilities that should be explored.
   A prerequisite for the development of the agricultural sector is the posting of specialized officers like poultry officer, dairy officer, irrigation officer in the district. Furthermore, a small rural training center should be established in Kachikau, where agricultural courses can be organized.

Sectors which could be expanded on a commercial scale are: fisheries, poultry, beekeeping, horticulture. At numerous occasions residents have shown interest in the development of these sectors. So far, they have lacked the assistance of specialized officers but it is hoped that this situation will be rectified during the DDP 4 plan period.

CHAPTER TEN CONCLUSION: RURAL DEVELOPMENT IN CHOBE ENCLAVE

Neither agricultural nor rural development in general has reached a limit in the Chobe Enclave. Several avenues for improvement of the situation have been presented in this plan.
This plan follows the priorities for development as set for Chobe's District Development Plan 4 (1989-95). First priority is given to agricultural development. The other priorities are the development of the wildlife and tourism sector, the livestock sector and finally the rural industrial sector.
The residents of the Enclave have given these sectors a very high significance during the consultations for DDP 4, and have also indicated how the resources and potentials of the area can be utilized to the benefit of the local economy. In the following, the main proposals for development for each of the priority sectors will be briefly summarized.

The first and foremost development option in the Enclave is the improvement of small scale agriculture. Arable agriculture is the mainstay of the Enclave's economy; the area has been able to produce a regular surplus of food crops over the years, and future improvement of farming systems would be in line with national objectives of economic independence and self-sufficiency in food.
It is recommended that concerted efforts be geared towards improvement of small scale agriculture. Major constraints to tackle include the lack of draught power and the labour shortages. Particular attention should be given to the problems of female headed households.
Advancements in dryland and molapo farming may be pursued through intensified techniques. Expansion of the cultivated area is another possibility. The introduction of a tractor hiring scheme or an oxen purchase project or combinations thereof should be considered. Other options, for which farmers have shown interest, are: introduction of new crops and small scale irrigated farming.

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 some assistants) would help solve practical problems as well as introduce improved farming techniques.
The most significant characteristic of the project should be flexibility; prevalent farming systems in the Enclave are highly flexible and a response to variable conditions.
Such a project should start as soon as possible as the Enclave farmers have indicated on various occasions that they need assistance in developing the area's potential and, following the two studies and rounds of consultation, some

momentum still exists.

Given the abundance of the wildlife resources, the introduction of a wildlife utilization project and the development of tourism facilities form an important option in the Enclave. Discussions on the implementation of a wildlife utilization project in the Enclave have already been held. Again it is important that the momentum is not lost. It is recommended that the DWNP assists the district planning staff (DLUPU) in the formulation of a wildlife utilization project. Most important aspect of such a project 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 local population.
Attempts should be made to involve the local community more directly in the tourism industry. Several activities have been identified in the above. The newly established District Wildlife and Tourism Advisory Committee could play a lead role in this regard.

The emphasis on the livestock sector in the plan period is clearly on the improvement of the quality of livestock and not on quantity. Cattle distribution over the households in the Enclave is extremely skewed with 50% of the households owning a mere 3% of the total number of cattle. The cattle are also unevenly distributed over the Enclave which results in overgrazed areas along the escarpment up to Kavimba and in the areas around Satau and Parakarungu. It is recommended that activities be undertaken that result in a better accessibility of animal draught power for all Enclave farmers. Of particular importance are the female headed households. An oxen purchase and training scheme could be investigated under the agricultural extension project recommended in the above.
It is further recommended that initiatives are taken to introduce better rangeland management systems in the Enclave. Over the past years the number of cattle has increased rapidly to a point whereby, if no precautions are taken, dramatic consequences for the ecosystem will follow.

For the rural industrial sector efforts should be geared towards the encouragement of handicraft production, tourism facilities and small scale commercial activities. The development of support services, like wholesalers, transport, bank credit facilities etc, is of the utmost importance.

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