

Chapter 3

Administration, governance and services



Land-use types

The 20 009 km² of land making up Caprivi is either under state or communal administration. State controlled areas make up a total of about 8 770 km². They consist primarily of game reserves and national parks, the state forest, and diverse agricultural projects administered by various ministries and the National Development Corporation (NDC).

Land generally regarded as communal covers an area of about 11 239 km². The dominant form of land use in these areas is subsistence farming. In addition, several other commercial uses are made of these areas, including tourist lodges, and hunting concessions authorized by the Ministry of Environment and Tourism. This ministry is also in the process of supporting the establishment of conservancies by rural communities.

One major characteristic of land in many parts of Caprivi is the fact that uses allocated to land are often uncertain, uncontrolled or arbitrary in nature. For example, the state forest has never been proclaimed as a state reserve. Some people assume that it is proclaimed and respect that status, while others have settled and cleared land in the reserve. The Caprivi Game Park is another disputed area, although in this case it is legally proclaimed as a game reserve. Some people living in the Caprivi Game Reserve have been living there for decades and have become accepted inhabitants, but the establishment of new settlements and farms by other people is less accepted. The triangular area between the Caprivi Game Park and the Kwando River is thought to be a conservation area by many people and this status is generally upheld. While it presently enjoys no such formal protection, the Ministry of Environment and Tourism is motivating for its proclamation. In many communal areas, control over land occurs in arbitrary ways. Some people need special permission and permits to set up certain commercial enterprises, but none of these controls are required for other people who now use large areas for commercial farming.

Recent history of administration

Caprivi has seen a multitude of administrative changes during the last 100 years. It has been subject to three colonial governments (Germany, Britain and South Africa) and was administered through three separate countries before 1992: Botswana, South Africa and what was then South West Africa.

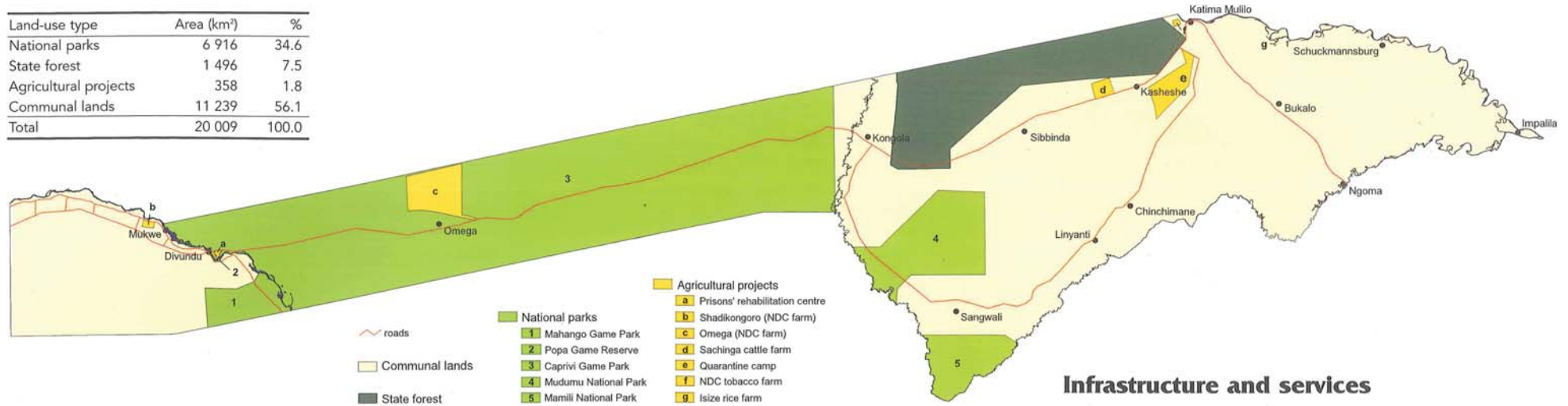
1600s and 1700s	First Lozi Empire
1820s–1864	Kololo Empire
1864–1890	Second Lozi Empire
1890	Caprivi is added to German South West Africa as a result of negotiations at the Berlin Conference
1914–1918	Along with the rest of German South West Africa, Caprivi is placed under British military rule
1921–1929	Administered as part of British Bechuanaland
1929–1939	Administration is allocated to the South West African Administration in Windhoek
1940–1981	Administered by South Africa from Pretoria
1981–1990	Under the Administration for Caprivians as part of the South West Africa Administration
1990–1992	Transitional period following Namibian Independence
1992	Caprivi becomes one of the 13 political regions in Namibia with its own regional governor and six councillors

Before 1992, the Okavango River formed the western boundary of Caprivi. In 1992, the boundary was moved west, adding the Mukwe area between the Okavango River and the line of longitude running along 21° East.

Traditional authorities

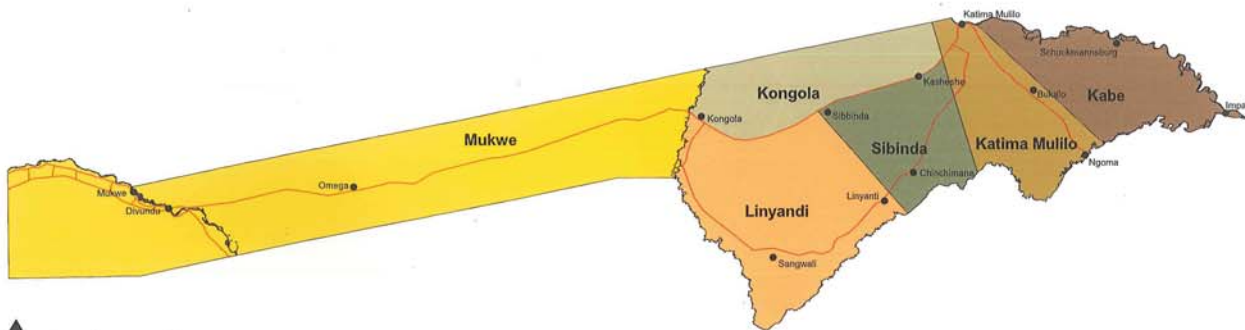
Within communal areas there are several levels of traditional authority. In eastern Caprivi, each village has a head who is the most senior male member. He advises the senior headman who represents a number of villages, or a ward. The senior headmen act as local representatives on the tribal council, or *kuta*, which is presided over by the *ngambela* (chief councillor). The *kuta* is the highest legislative, administrative and judicial body in the tribal area. The *ngambela*, who is appointed by the tribal head or chief, communicates the wishes of the chief to the tribe through the headmen, and vice versa. In western Caprivi, traditional authorities are less structured, but are similar in that authorities range from local village headmen to a chief who presides over a large area. Not surprisingly, the boundaries and zones of influence are often the subject of considerable competition and dispute.

Land-use type	Area (km ²)	%
National parks	6 916	34.6
State forest	1 496	7.5
Agricultural projects	358	1.8
Communal lands	11 239	56.1
Total	20 009	100.0



▲ Land administration

Land in Caprivi is either under state or communal administration. The status of some of the state areas is equivocal. Consideration is being given to changing the status of the Caprivi Game Park and designating some of it as a multiple use area. This would resolve the apparent contradictions that have arisen as a result of agricultural and other activities now occurring within the proclaimed nature reserve. Other areas in the Caprivi Game Park would be zoned as core conservation areas. The status of the state forest is also unclear since legislation has not been passed to designate this as a protected reserve. Timber was harvested extensively for many years, but formal or commercial logging is no longer allowed.



▲ Local and regional government

There are six constituencies in Caprivi. They were described in 1992¹ when the Namibian Government introduced a system of regional and local government for each of the 13 regions. Regional government is headed by an elected governor, while local representation is through six elected councillors, each of which represents a constituency. Note that the spellings of the constituencies are those used in the Government Gazette and in the case of Kabe, Sibinda and Linyandi differ from spellings commonly used for the villages after which they were named.

Constituency	Area (km ²)
Kabe	2 113
Katima Mulilo	1 960
Kongola	2 024
Sibinda	1 726
Mukwe	8 519
Linyandi	3 667

Infrastructure and services

Katima Mulilo is Caprivi's capital and administrative centre. Some public services for the Mukwe area are still run from Rundu (Kavango's main centre), since that area used to belong to the Kavango Region. Prior to the establishment of Katima Mulilo as an administrative centre in 1935, Schuckmannsburg had served that purpose since 1903. As the capital centre in Caprivi, Katima Mulilo not only serves as the seat for the regional government and ministerial offices, but is the only commercial centre in the region. Small retail outlets can be found in other centres, but Katima Mulilo is the only centre in Caprivi which provides banking, postal and other commercial services. A map showing infrastructure, services and the larger villages follows on pages 10 and 11.

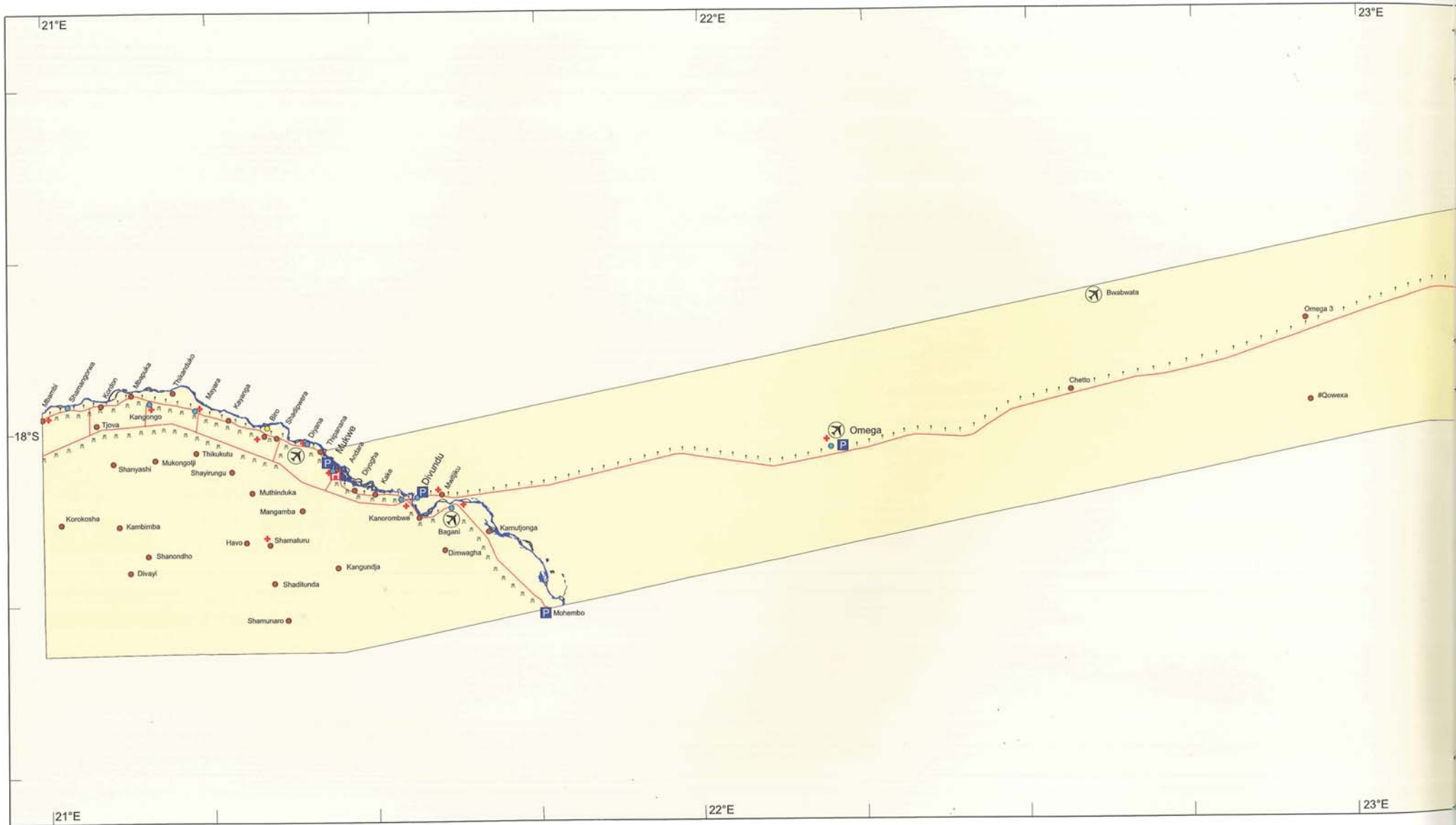
Health services

There are two hospitals, one at Katima Mulilo and the other at Andara, and three health centres equipped with some beds at Sibbinda, Chinchimane and Bukalo. Clinics and primary health care facilities are found at 34 other places throughout Caprivi. Outreach or mobile health teams are based at Andara and Katima Mulilo from where they serve outlying villages.

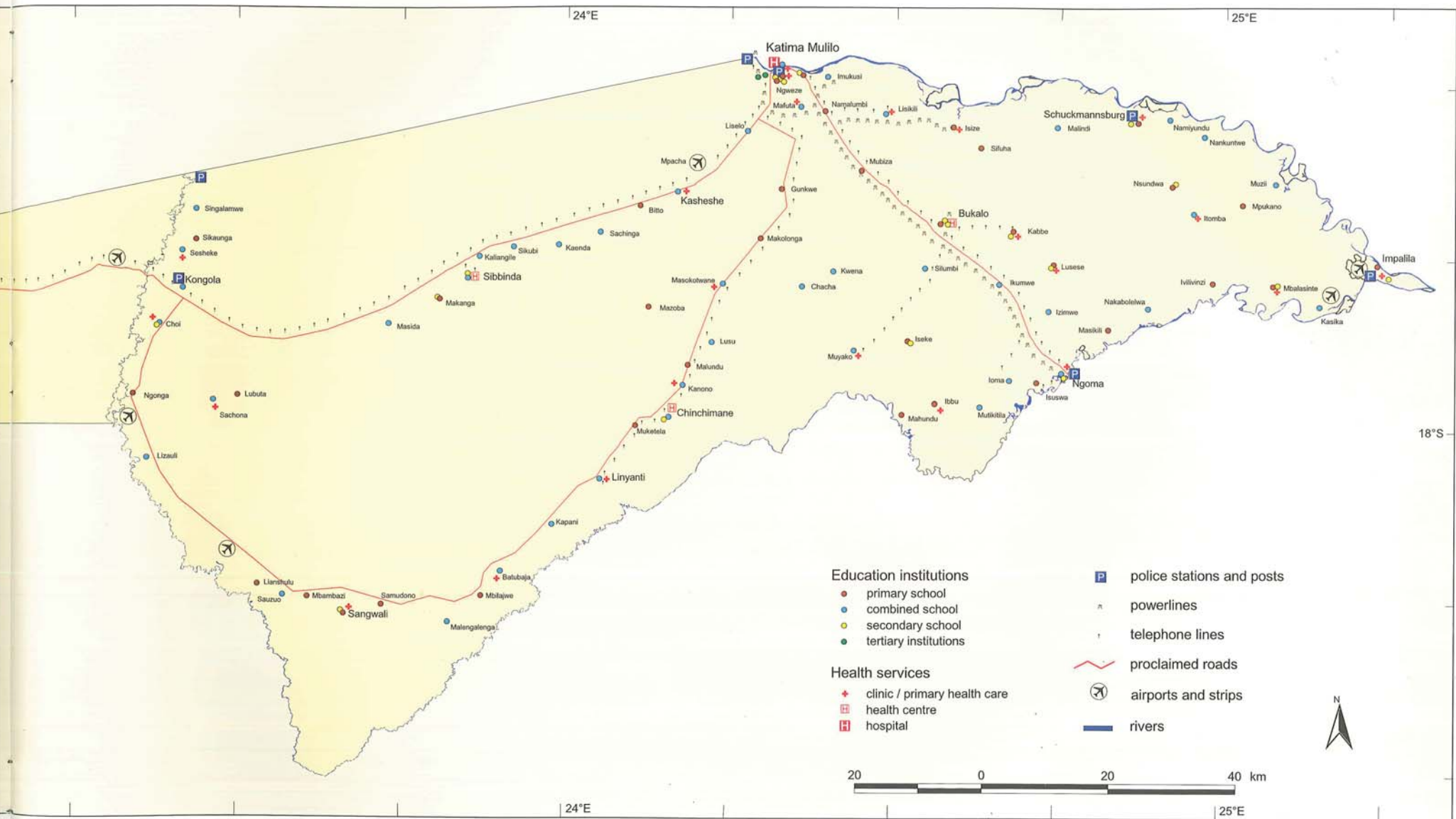
Education facilities

There is a considerable network of schools in the region — 70 primary schools, 22 secondary schools, and 52 combined schools which offer some primary and some secondary grades. Not all primary schools offer Grades 1–7 and not all secondary schools offer Grades 8–12. In addition, there is a vocational college and a teachers' training college in Katima Mulilo. About 37 000 students (over one third of Caprivi's population) attended these institutions in 1996, where they were served by about 1 500 teachers.

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Infrastructure and services



Communication and electricity

Only a small area of the region has access to telephone and electricity supply services, and very few households there are connected to them. Expansions to these services are constrained both by the availability of distribution lines and the ability of households to pay usage fees. There are now about 1000 telephone subscribers in the region and only 5% of all households had an electricity supply in 1991.

Telephone services to the Mukwe area and Caprivi strip are through the exchange in Rundu, while eastern Caprivi is served by an exchange in Katima Mulilo. Electricity to the Mukwe area comes off the Namibian grid system, while most power to eastern Caprivi is imported from Zambia. A generator in Katima Mulilo provides some additional electricity.

The main roads through Caprivi, from Ngoma to Katima Mulilo and from Katima eastwards through to Kavango are currently being upgraded and tarred. This route will form the Trans-Caprivi Highway and will be an important trade link between Namibia and the other southern African countries. Cargo traffic will increase and the area will also become more accessible to tourists, especially those travelling in sedan cars. In addition, there are some gravel-surfaced roads and a large number of small roads and tracks. There are no rail links serving Caprivi.

The only regular, commercial air service to Caprivi lands at Mpacha Airport outside Katima Mulilo. There are a number of other airstrips throughout Caprivi which vary in size and quality.

Police, customs and immigration services

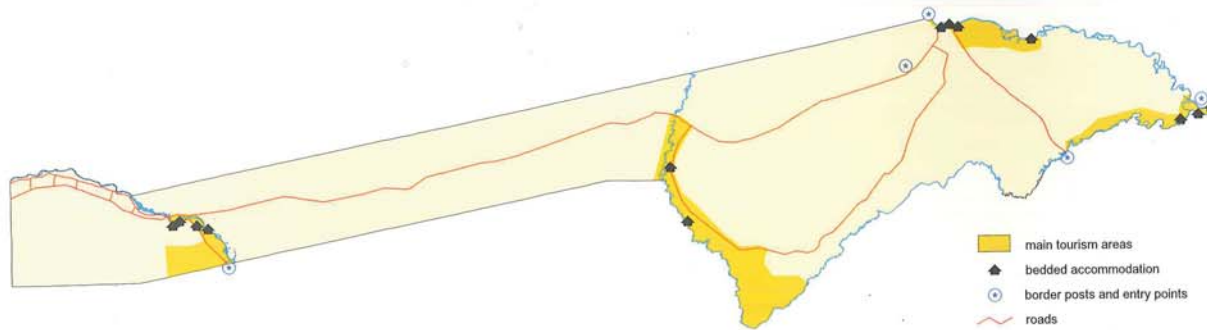
Immigration services are available at Mpacha Airport, on the Botswana border at Ngoma and Mohembo and on the Zambian border at Katima Mulilo. Elsewhere, there are police stations or posts at Impalila, Schuckmannsburg, Singalamwe, Kongola, Divundu, Omega and Mukwe.



The market in Katima Mulilo. Katima Mulilo is the only commercial centre in Caprivi.

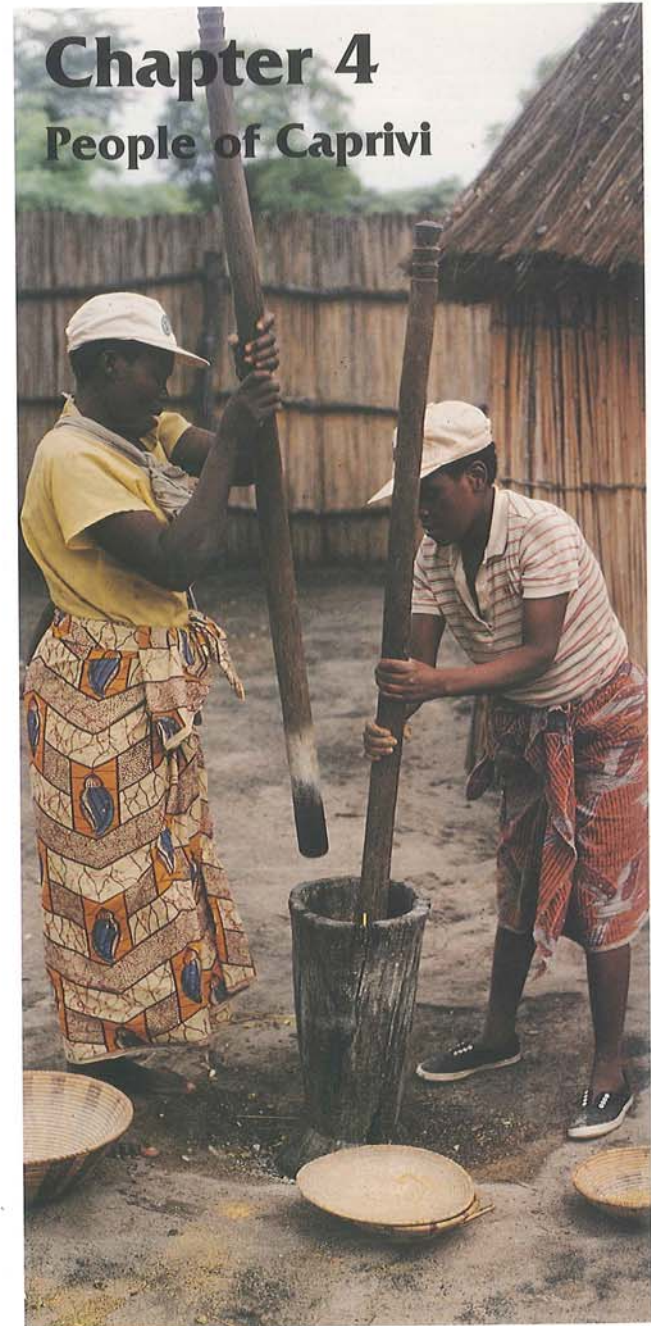
Tourism

Caprivi is a popular destination for visitors, and provides links to attractions in Botswana, Zambia and Zimbabwe. On average, each tourist spends three nights in Caprivi and is usually on a trip that includes more than one destination. Tourism to Caprivi generates substantial earnings for Namibia. An estimated 30 to 35 thousand tourists visited the region in 1996, this being about 9% of all visitors to Namibia². The numbers of tourists have grown at a substantial rate (over 20%) during the past three years, which is faster than the growth rate of tourism to Namibia as a whole.



▲ Accommodation and the main areas visited by tourists

In 1996 there were 12 facilities offering accommodation, between them having 127 rooms and 295 beds. Almost all tourism is centred on the southern sections of the Okavango and Kwando rivers, Impalila Island, and Katima Mulilo eastwards along the Zambezi River.



Chapter 4 People of Caprivi

Population size and distribution

The total population in 1991 amounted to 90 422 people, as reported in the 1991 Population and Housing Census. The most recent estimate from the 1996 Demographic Survey puts the population at about 107 900 people, while our estimates from aerial counts of households suggests a total population of about 110 700 in 1996.

To obtain information on the distribution of people in Caprivi, households were counted and mapped using aerial photographs¹. The number of people was estimated by multiplying the number of households by the average household size in each area.

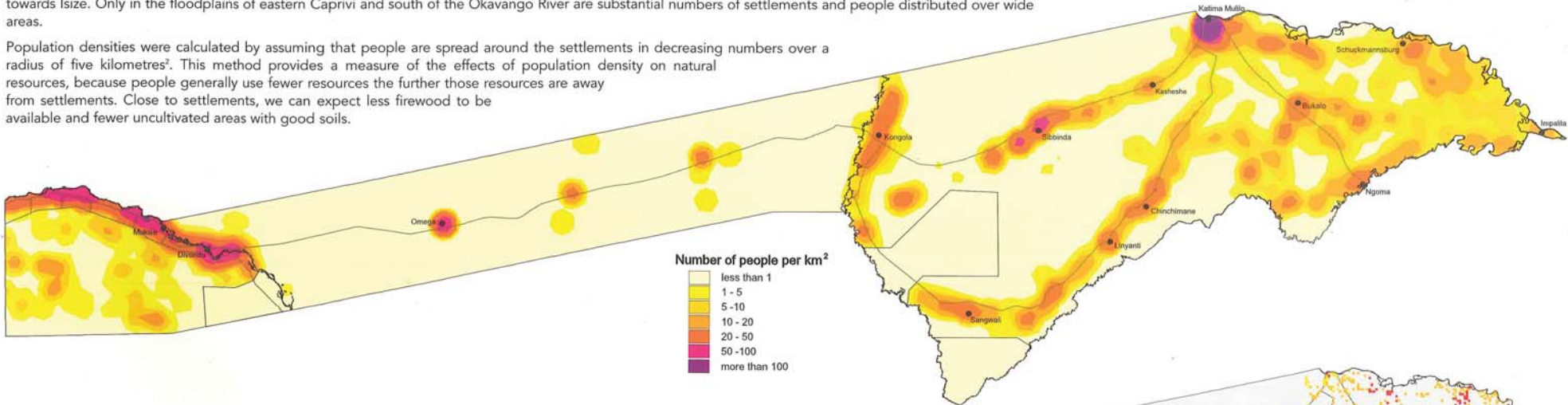


Aerial view of a typical village on the eastern floodplains

Population densities ▼

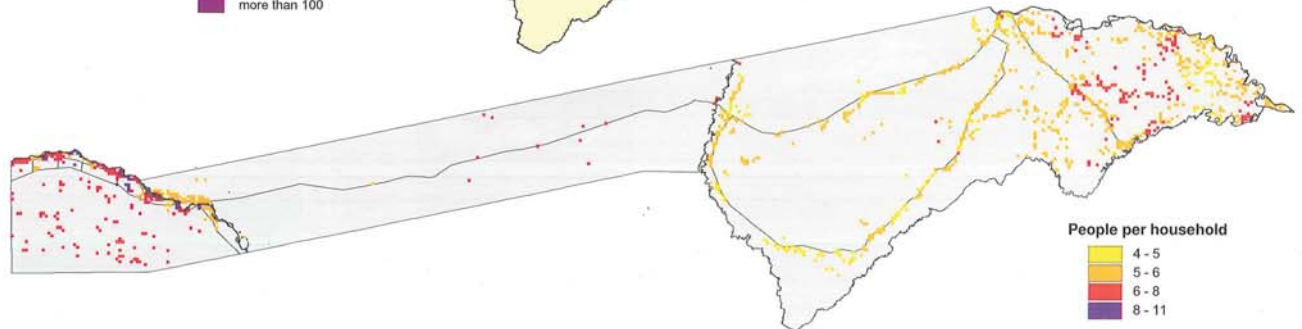
The average population density in 1996 was 5.5 people/km². However, most of the region is sparsely populated, with about 61% of the total area having a density of less than one person per square kilometre. Other than Katima Mulilo, the highest densities are along the Okavango River, north of Kongola along the eastern edge of the Kwando River, along the major roads around the villages of Sibbinda, Sangwali, Linyanti, Chinchimane, Bukalo and Ngoma, and east of Katima Mulilo towards Isize.

Population densities were calculated by assuming that people are spread around the settlements in decreasing numbers over a radius of five kilometres². This method provides a measure of the effects of population density on natural resources, because people generally use fewer resources the further those resources are away from settlements. Close to settlements, we can expect less firewood to be available and fewer uncultivated areas with good soils.



Average numbers of people per household ►

Household sizes vary from area to area, being largest along and south of the Okavango River and in certain areas on the eastern floodplains³. Average household sizes were reported to be 4.8 people per household in the 1991 Population and Housing Census³. However, the 1993/94 Income and Expenditure Survey reported a figure of 5.4 people per household⁴ which is considered more representative, and the 1994/95 Agricultural Census gave a figure of 6.1 people for farming households in rural areas⁵.



Area	Households	Estimated population
Eastern Caprivi	13 993	73 982
Caprivi strip	1 336	6 548
Mukwe area	4 287	30 174
Constituency		
Kabe	3 023	16 991
Katima Mulilo	5 313	28 163
Kongola	638	3 198
Linyanti	3 024	15 039
Mukwe	5 623	36 722
Sibinda	1 995	10 591
Total	19 616	110 704

Estimated population of Caprivi (1996)¹ ▲

About 67% of the population lives in eastern Caprivi, 27% in the Mukwe area and 6% in the Caprivi strip. The Mukwe and Katima Mulilo constituencies have the largest populations, and Sibinda and Kongola have the smallest. A total of 2 655 households was counted in the town of Katima Mulilo, with an estimated population of 13 448.

Population structure and human development

Results from the 1991 Population and Housing Census³ showed that there were only slightly fewer males than females in Caprivi. This proportion of females (51.2%) is similar to that recorded for the whole of Namibia, and indicates that most men remain in the Caprivi, rather than moving away as migrant labourers. The 1991 census also showed that:

- Of the total population, 13 377 or 15% then lived in the region's only urban area — Katima Mulilo — while the remaining 85% lived in rural areas.
- Namibians made up 94% of the population, the remaining 6% being nationals of other countries.
- The main languages spoken there were Caprivian languages (the mother tongue of 70% of people), Rukavango languages (24%, mainly Thimbukushu), and Bushman languages (4%, primarily Kxoe).

Sixty-one percent of households are headed by men, while 39% have women as household-heads. Those headed by men are generally wealthier, average yearly consumption levels in 1993/94 being about 20% higher (N\$5 893 vs N\$4 917) than in homes where women are heads⁴.

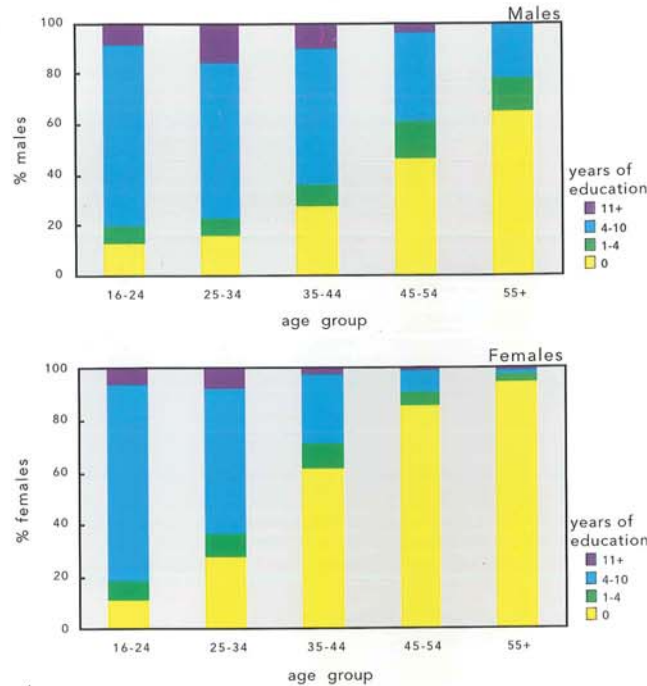
The Caprivi is particularly poor in terms of general human development. The Human Development Index (HDI) provides an index of human development by measuring the combined effects of life expectancy, literacy, enrolment rates at school and income. Comparing Caprivi with the other 13 regions in Namibia, Caprivi rates only slightly higher than the Ohangwena Region which has the worst HDI value in Namibia^{7,8}.

A low life expectancy in Caprivi is the most important factor contributing to Caprivi's poor Human Development Index. The life expectancy of men in 1991 was 51.4 years and that of women was 54.5 years (compared with the highest expected life spans of 69 years for women in the Khomas region). Child mortality rates are high, with 106 infant deaths per 1 000 infants born, and 132 per 1 000 of children under the age of five years⁷. The population of the region is dominated by young people with the average number of children born to a woman in Caprivi being 6.7¹.

Low life spans are largely due to the high rates of disease which affect Caprivians from birth. The infant and early childhood mortality rates are 50% higher than the national average. Diarrhoea and measles cause a high proportion of infant deaths, while 55% of school children suffer from goitre and 42% are physically stunted. Among older people, malaria, tuberculosis and HIV take an increasing toll. About one out of every four pregnant women attending clinics has been found to be HIV positive⁸.

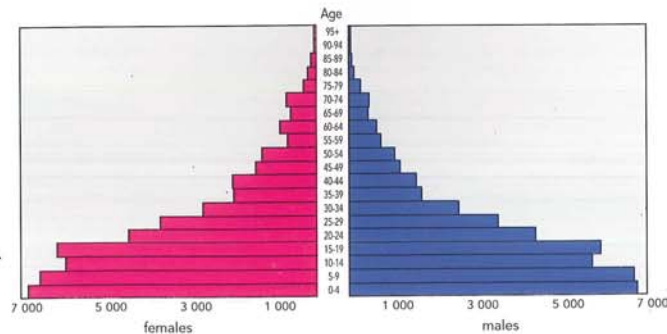
Age pyramid

The population of Caprivi is dominated by young people — characteristic of a fast growing population. Those younger than 15 years make up 43% of the total number of people.



▲ Proportions of males and females of different age groups having completed various levels of education (from the 1991 Population and Housing Census)

Literacy rates among adults in Caprivi are relatively high at an estimated 75%, largely as a result of increased school attendance in recent years. An estimated 95% of 7-18 year-olds are at school, the total number of learners at school in 1996 being about 37 000. While levels of education among adults have improved over the years, many people aged 55 and above, especially women, have had little schooling. Rates of school attendance by men were higher than by women up until about ten years ago.

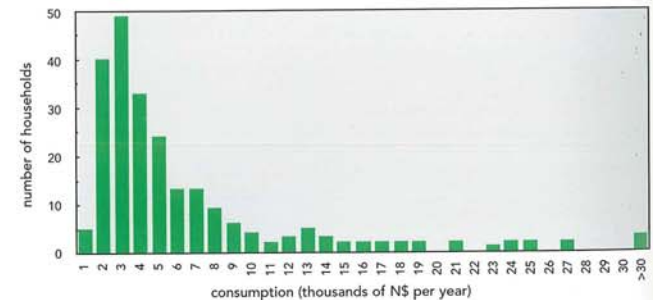


Income and expenditure

Caprivi's economy and that of most households is predominantly rural and subsistence in nature. Most people are thus directly dependent on natural resources, especially those occurring around their homes.

A survey of agricultural practices conducted in 1994/95 showed that 59% of all households in rural areas depend on subsistence farming to provide their main source of income⁵. Other rural households obtain most of their income from salaries (17%), pensions (16%), businesses (5%) or cash remittances (2% of all rural households). These households with other sources of income may also obtain additional income from subsistence farming.

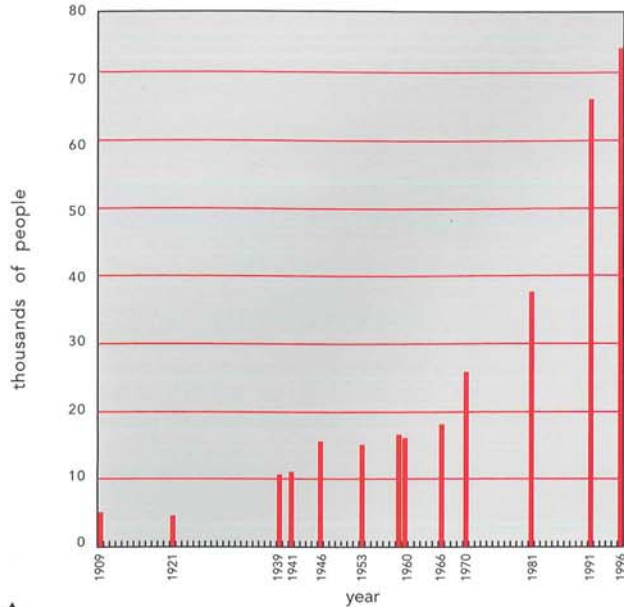
The 1993/94 Income and Expenditure Survey estimated that there were about 49 500 people aged 15 and older in Caprivi. Of this total, 18 000 were not economically active and therefore were not considered to be part of the labour force — most of these people were students (61%), homemakers (29%) or retired (11%). The economically-active part of the population, or labour force, consisted of about 28 300 people who were employed or self-employed and about 3 200 people who were unemployed. About 90% of the labour force was therefore employed while 10% remained unemployed⁴.



Numbers of households with different rates of annual consumption

From the 1993/94 survey of income and expenditure, total income for all private households in the region was estimated to be N\$122 million per year. The survey also studied consumption levels, which provide an indication of wealth, since richer households spend and consume more than poorer ones. Average total consumption or expenditure per household was N\$5 844 each year. This figure includes consumption of "in-kind" goods, such as food harvested from fields. As an average it hides the great degree of variation between households, as shown above — the majority of households have consumption levels of between N\$1 500 and N\$4 000 per year. Just a small number of households spend more than N\$10 000 per year.

Population growth

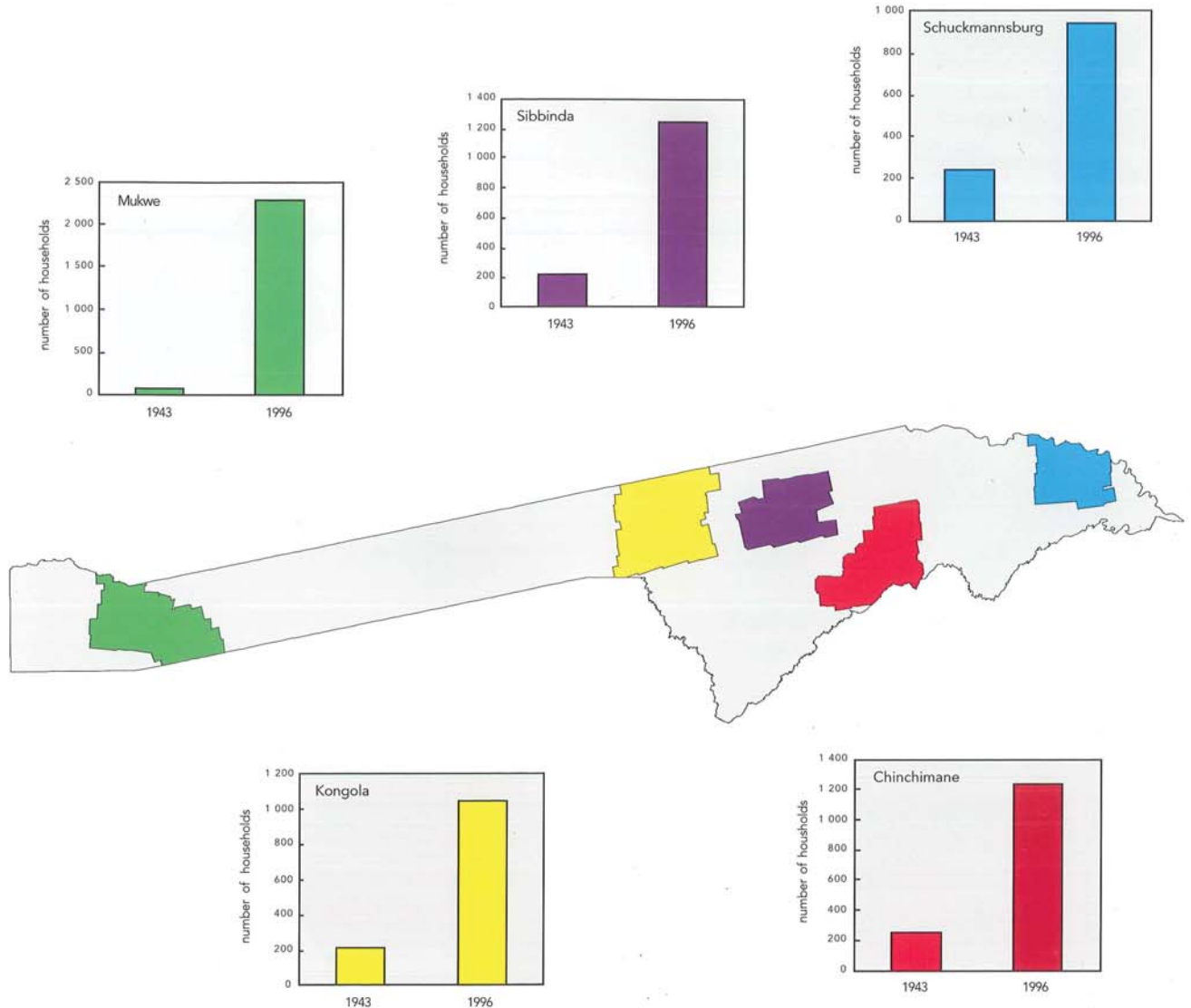


▲ Numbers of people in eastern Caprivi, as reported in various censuses between 1909 and 1996*

Populations in Caprivi have grown rapidly over the past few decades as shown by the results of various population censuses and estimates for the eastern Caprivi — similar information is not available for the rest of the region. Starting with the earliest estimate of a total population of about 5 000 people in 1909, estimates from aerial photograph counts in 1996 put the total population in the eastern Caprivi at about 74 000, giving an overall growth rate of about 3.3% over 90 years. However, population growth rates have been higher in recent years. Taking population figures over the past three decades only, growth rates have been over 4%.



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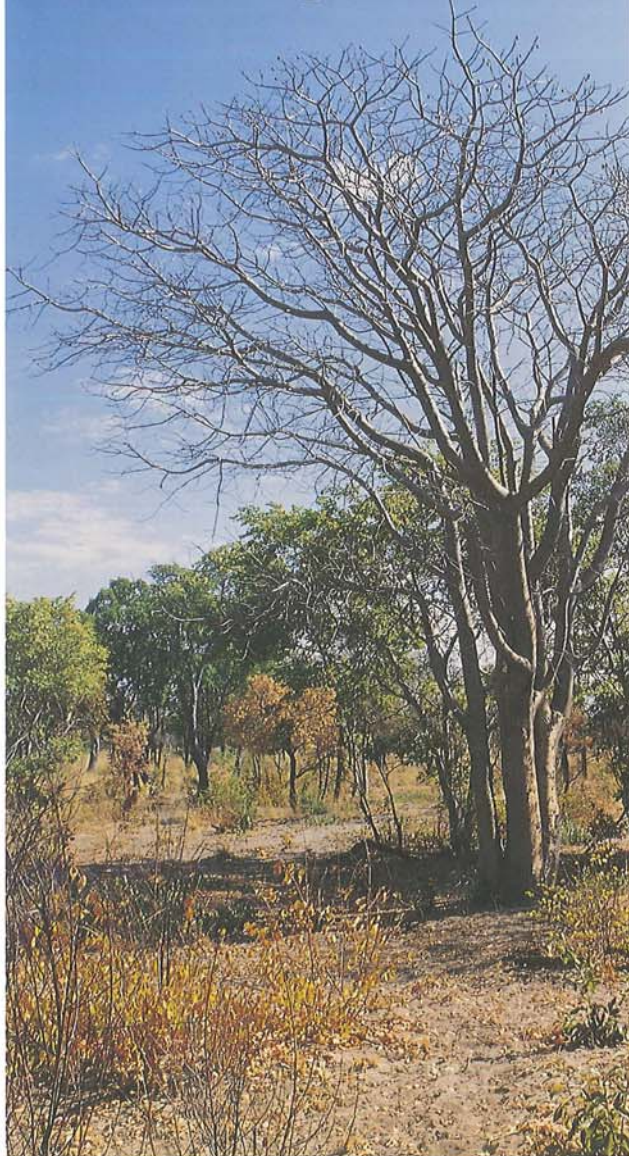


▲ The numbers of households in five areas in Caprivi in 1943 and 1996*

Another estimate of population growth is available by comparing counts of households in aerial photographs in five areas taken in 1943 with those counted in 1996. In total there were 986 households visible in the five areas in 1943, and this number increased almost seven times to a total of 6 782 in 1996. The rate of increase over these 53 years is about 3.7%, and was fastest in the Mukwe area and slowest on the eastern floodplains.

Chapter 5

Soils and vegetation



Vegetation in Caprivi is influenced by three main factors: soils, flooding and fire. Soil texture, depth, nutrient content, the concentrations of salts, and the ability to hold water affect the kinds of plants found, their vigour and size. The Kalahari sands have distinct communities characterized by *Baikiaea plurijuga* (teak), *Burkea africana*, *Pterocarpus angolensis* (kiaat), *Ricinodendron rautanenii* (mangetti) and *Guibourtia coleosperma* (false mopane). *Acacia erioloba* (camelthorn), *Combretum imberbe* (leadwood) and *Acacia nigrescens* (knob-thorn) trees are common in areas with light clay soils, while *Colophospermum mopane* (mopane) dominates heavy and poorly drained clay soils. Water drains through sand easily, washing nutrients away and leaving both the sands and many grasses low in nutrients. Floods restrict the growth of most woody plants because they cannot withstand having their roots inundated. For this reason, areas subject to flooding are dominated by grasslands, with different species growing in areas subject to different frequencies of flooding. Reeds and sedges predominate in the wettest areas, while coarse grasses grow on leached sands. The effects of fire may be dramatic. Frequent hot fires can kill large trees, prevent the growth of young trees, and often lead to the development of uniform thickets of a few fire-resistant species.

Soils

Caprivi is part of the Kalahari Basin, a vast inland depression that formed some 130–180 million years ago. Much of the Kalahari consists of sand shaped by wind into dunes. Heavier soils have formed where water has washed down finer particles which accumulate in depressions and between the dunes. Elsewhere, rivers have carved their way through the sands, depositing heavier soils washed down from their catchments. Thus, soils in the valleys of rivers in the Caprivi have largely been carried down from drainage areas in Angola and Zambia. These or different rivers also flowed through other areas in the Caprivi, thousands or hundreds of thousands of years ago, leaving behind fossil drainage lines that can still be seen today. Many of these old drainage lines (known as *omuramba* (singular) or *omurimba* (plural)) are in the form of characteristic meanders and contain soils that are typically deposited by river systems.

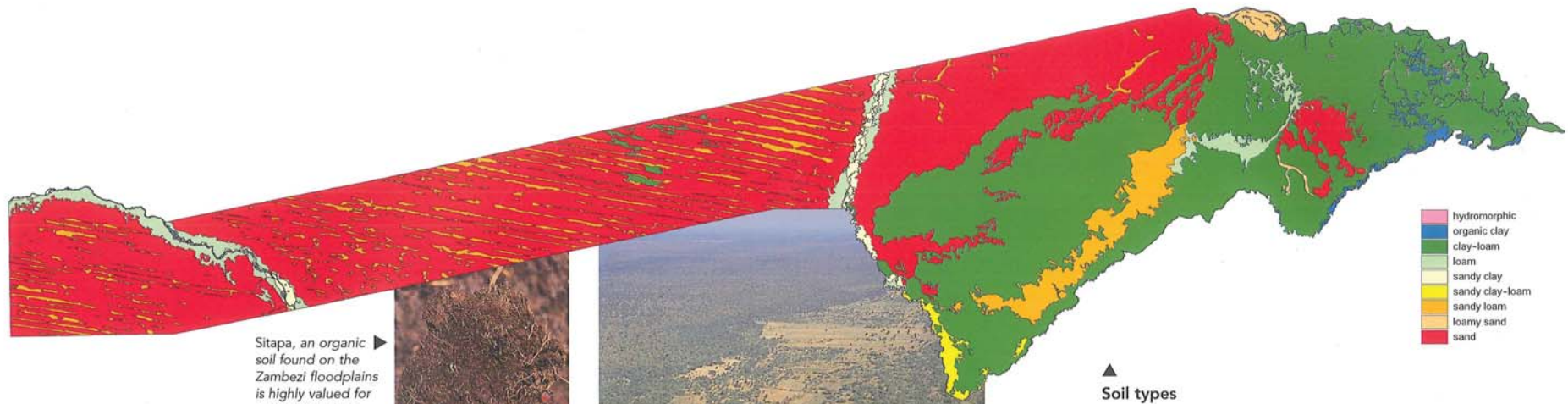
Soil types in the Caprivi were classified largely on the basis of their textures, with soils consisting of varying amounts of sand and clay having different textures. At one end of the spectrum are the heaviest soils with a high content of clay in areas which are regularly flooded, i.e. the

hydromorphic and organic clay soils. Water does not penetrate or drain away easily because the clay is so dense. Areas flooded most frequently hold water for the longest periods, and often have a high content of organic material derived from decomposed reeds, sedges and other plants that grow in the water. In some areas, such as the Linyanti Swamps and around Lake Liambezi, these soils have developed into large deposits of peat. Depressions that are flooded infrequently often have clays with high concentrations of salts which are left behind as the water evaporates. On the other end of the spectrum are the pure sands. These deep soils do not hold moisture for long, so plants with shallow roots grow only once good rains have fallen. Large trees that grow on sands overcome this problem generally by having deep roots that extend into moist soils far below.

Between these two extremes is a range of intermediate soils (loams, clay-loams, sandy clays, etc.) consisting of varying proportions of sand, clay and organic material. The proportions of these components depend on the degree to which the clays and sands have been mixed and re-worked by the action of water and wind over the years, and the decomposition of plant material into nutrients held in the soil. Such intermediate soils also offer the best opportunities for cultivating crops because they retain water to some degree and have fairly high levels of nutrients. On the eastern floodplains, old drainage meanders within the large zone of clay-loam provide rich soils, known as *sitapa*, on which much of the maize in Caprivi is grown.

Soil type	Area (km ²)
Hydromorphic	166
Organic clay	137
Clay-loam	6 939
Loam	647
Sandy clay	182
Sandy clay-loam	121
Sandy loam	1 735
Loamy sand	107
Sand	9 975
Potential for crops	
Best	3 137
Moderate	2 851
Poor	14 021

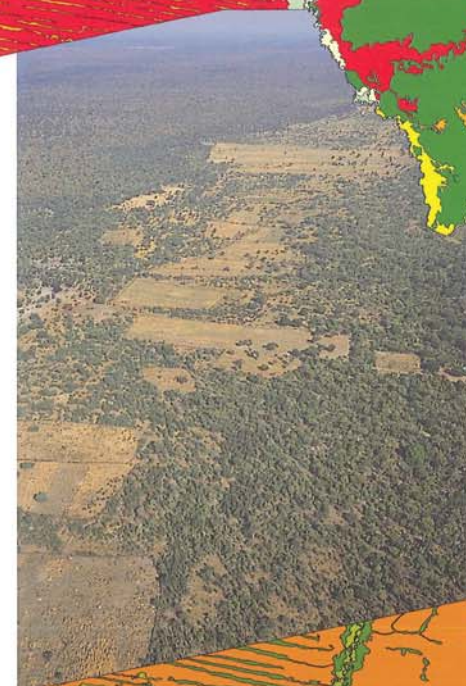
Different soil types and potentials for crops, and the areas they cover



▶ Sitapa, an organic soil found on the Zambezi floodplains is highly valued for cultivating maize (CH)



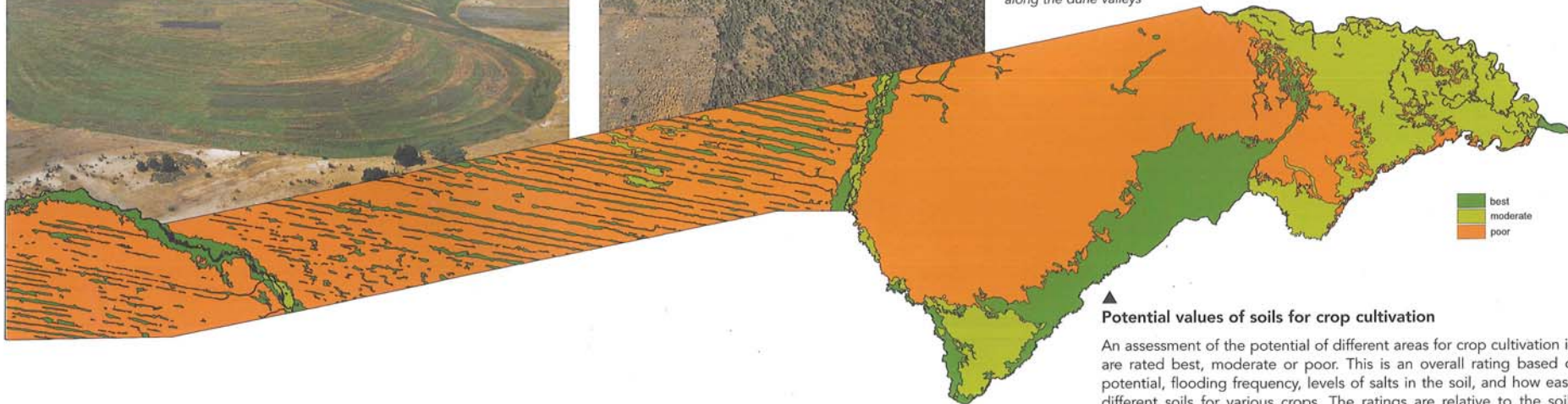
▼ Aerial view of crops planted in dry oxbows on the floodplain



◀ Local farmers take advantage of the relatively good soils found along the dune valleys

▲ Soil types

The map of soils provides a general picture of where different soils are distributed. There is a great deal of small scale or local variation, especially in the large zone of clay-loam in eastern Caprivi where there are many old or fossil drainage lines and depressions. Caprivi as a whole is dominated by clay-loam soils (about 35% of the area) and sand (about 50%).



▲ Potential values of soils for crop cultivation

An assessment of the potential of different areas for crop cultivation is given. Areas are rated best, moderate or poor. This is an overall rating based on production potential, flooding frequency, levels of salts in the soil, and how easy it is to work different soils for various crops. The ratings are relative to the soils available in Caprivi. It provides a general indication of the suitability of soils for cultivation, but does not take into account the fact that different crops respond in various ways to particular types of soils.

Vegetation

The six land types in Caprivi form six broad vegetation communities (see Chapter 2): open water, floodplains, riverine woodlands, mopane woodlands, Kalahari woodlands and Impalila woodlands. While all of Caprivi could have been described in terms of the six land types, there is considerable variation within these categories, such that certain plants are abundant and provide important resources in some areas but are absent in others. Also, the same trees may be tall and well grown in one area, but small and shrubby in another. All of these and more variables could be recorded and described, but the amount of detail would make it hard to use. The particular balance between broad and detailed vegetation units shown here, is an attempt to achieve two goals. The first, to describe and map units which other people will recognize as real and relevant in the region. The second, to have units which reflect patterns and differences in the availability of important plant resources.

A total of 36 different units are described and mapped from satellite imagery, and aerial and ground surveys to provide an overview of the dominant plant species and communities¹. In addition to the information presented here, more is available in the databases described on page 2. Descriptions of characteristic plants and other features are given below, those in each land type being treated together. More detailed descriptive information is provided in the Appendix. Unfortunately, many units have to be described using their scientific Latin names which are obscure for most people. However, common or colloquial names are used for species where they cannot be confused: mopane (*Colophospermum mopane*), teak (*Baikiaea plurijuga*), camelthorn (*Acacia erioloba*), leadwood (*Combretum imberbe*), knob-thorn (*Acacia nigrescens*), *Burkea* (*Burkea africana*), kaaat (*Pterocarpus angolensis*), false mopane (*Guibourtia coleosperma*) and mangetti (*Ricinodendron rautanenii*).



Some of the few remaining riverine woodlands along the Okavango are found on the islands near Andara

Vegetation units in the Caprivi

The table lists each vegetation unit and provides an assessment of their potential values (+ = lowest; ++ = medium; +++ = highest) for crop cultivation, livestock farming, conservation, and other non-agricultural subsistence values of plant resources. The soil type of each unit, the area covered, and the percentage that has been cleared for crops is also given.

Vegetation unit	Potential value for:				Soil type	Total area covered (km ²)	% of area cleared
	cultivation	livestock	other resources	conservation			
Open water	+	+	++	+++	hydromorphic	166	4.8
Floodplains							
Bukalo-Liambezi grassland	+++	++	+	++	loam	223	32.6
Chobe grassland-hummock mosaic	++	++	+	+	clay-loam	295	32.7
Chobe Swamp grassland	++	++	+	+	clay-loam	177	37.1
Chobe wetland	+	+	++	++	organic clay	73	50.4
Dry Mamil grassland	++	++	+	++	clay-loam	339	10.9
Kwando-Linyanti grassland	+++	+++	+	++	sandy clay-loam	121	1.8
Liambezi-Linyanti grassland	+++	++	+	++	clay-loam	617	32.4
Okavango-Kwando grassland	++	+++	+++	+++	sandy clay	182	3.6
Wet Mamil grassland	++	++	+	++	clay-loam	95	0
Zambezi floodplain channels	+	+	++	++	organic clay	64	22.4
Zambezi floodplain grassland	++	++	+	+	clay-loam	1 168	9.5
Zambezi transition grassland	++	++	+	+	clay-loam	308	8.4
Zambezi woodland	++	+	+++	+++	clay-loam	100	6.0
Riverine woodlands							
Maningimanzi woodland and channels	++	++	++	+++	loamy sand	88	7.2
Okavango-Kwando valley woodland	+++	+++	+++	+++	loam	236	20.5
Okavango valley fields and shrubland	+++	++	+	+	loam	187	87.2
Mopane woodlands							
Gunkwe mulapos	+	++	+	++	clay-loam	148	10.3
Linyanti woodland	+++	+++	+++	+++	sandy loam	623	31.8
Mopane-Aristida woodland	+	++	+++	+	clay-loam	2 374	7.5
Mopane-Burkea woodland	+	++	+++	++	clay-loam	845	0.5
Mopane-Terminalia woodland	+	++	+++	+	clay-loam	375	7.2
Mudumu Mulapo woodland	+	+	+	+	sand	229	5.4
Salambala camelthorn woodland	++	+++	+++	+++	loamy sand	20	6.7
Kalahari woodlands							
Burkea-Combretum woodland	+	++	++	++	sand	2 717	2.3
Burkea-kaaat-false mopane woodland	+	++	++	++	sand	1 143	7.4
Burkea shrubland	+	+	+	+	sand	393	2.4
Burkea-teak woodland	+	++	+++	++	sand	1 038	0.1
Burkea-Terminalia woodland	+	++	++	+	sand	242	8.2
Omuramba fringe woodland	+++	++	++	+++	sandy loam	258	1.4
Omuramba grassland	+++	+++	+	++	sandy loam	855	10.6
Open camelthorn woodland	++	+++	++	++	clay-loam	80	0
Teak savanna	+	+	+	++	sand	945	0.2
Teak shrubland	+	+	+	+	sand	1 530	4.7
Teak woodland	+	+	+++	++	sand	1 741	2.1
Impalila woodlands	+++	++	+++	+++	clay-loam	18	22.4

Vegetation units in the Caprivi

Open water

Apart from the obvious rivers, the unit also covers permanent water channels on the Zambezi, Chobe, Kwando and Okavango floodplains. Plants on the edges of these waters are *Phragmites australis*, *Cyperus papyrus*, *Salvinia molesta*, *Nymphaea* spp., *Polygonum* spp. and many sedge species. The unit varies in size, as flood waters rise and fall.



Floodplains

Bukalo-Liambezi grassland is an extensive network of drainage lines running off the Zambezi floodplain, down the Bukalo Channel and into the upper areas of Lake Liambezi. Wetter soils are dominated by extensive *Cynodon dactylon* lawns, and drier slopes are generally sandy with coarse, unpalatable species such as *Hyperthelia dissoluta*, *Hypparrhenia hirta*, *Trachypogon spicatus* and *Eragrostis* spp. Soils are heavily cultivated, particularly in the lower Bukalo Channel and in Liambezi.



Chobe grassland-hummock mosaic is a series of sandy plains and hummocks along the Chobe River, where higher areas and hummocks are well wooded by tall camelthorns, *Lonchocarpus capassa*, *Kigelia africana* and *Diospyros mespiliformis*. Grasslands are dominated by coarse perennials such as *Hypparrhenia hirta*, *Loudetia simplex*, *Aristida stipitata* and *Hyperthelia dissoluta*.



Chobe Swamp grassland is the unit of tall grasslands in the Chobe Swamps east of Lake Liambezi. *Hyperthelia dissoluta*, *Hypparrhenia hirta*, *Setaria sphaecolata* and *Loudetia simplex* are all characteristic. Woody species are rare, except for widely distributed, small dense hummocks of *Diospyros lycioides*.



Chobe wetland is a unit along the banks of the Chobe River from Ngoma towards Impalila Island. Various aquatic grasses and reeds dominate the vegetation, with *Cyperus papyrus* forming large floating rafts. Woody species are rare and normally only found along well developed banks.



Dry Mamili grassland is the unit of tall grasslands in the northern section of the Mamili National Park on soils that are seldom flooded. Wooded hummocks are largely absent and trees are limited mostly to short, isolated leadwoods and *Terminalia sericea*. The area is predominantly a mosaic of coarse tall grasses such as *Hypparrhenia hirta*, *Cymbopogon excavatus*, *Andropogon schirensis* and *Setaria sphaecolata*, with extensive lawns of *Cynodon dactylon*.



Kwando-Linyanti grassland is the unit of tall, flooded grasslands on the seasonally inundated margins of the Kwando River



where it enters the Linyanti swamps. Generally, *Miscanthus junceus* forms dense stands together with *Vetiveria nigritana*. *Echinochloa stagnina* forms floating mats in areas of extended flooding, and there are dense *Phragmites australis* reed beds.

Liambezi-Linyanti grassland forms the extensive grasslands of the Liambezi basin and the fringe of grasslands north of the Linyanti River. Soils are organic forms, rich in peat, or loamy clays, and most are heavily used for cultivation. Principal grass species include *Eragrostis cf. lappula*, *Imperata cylindrica*, *Loudetia simplex*, *Hemarthria altissima* and extensive lawns of *Cynodon dactylon*.



Okavango-Kwando grassland is the unit of tall open grasslands and wetlands along the margins of the Okavango and Kwando rivers. The area is seasonally flooded and an important grazing resource for wildlife and livestock. There are few woody species. *Echinochloa stagnina*, *E. pyramidalis* and *Vossia cuspidata* form extensive mats, and there are lawns of *Cynodon dactylon*. The wettest areas are often covered by reeds.



Wet Mamili grassland in the southern section of the Mamili National Park is periodically subjected to extended periods of flooding. The clay loams or peat-rich organic deposits remain wet long after flooding has receded. Grasses are predominantly water tolerant species, such as *Imperata cylindrica* and *Hemarthria altissima*, and channels are dominated by a variety of sedges and reeds. Small hummocks form islands of large trees.



Zambezi floodplain channels are similar to open water habitats and rivers except that trees and shrubs are often present. These wetlands are characterized by often tall and dense marsh vegetation, with shorter grass species on the "drier" margins. The wetlands dry out regularly and the highly organic soils (*sitapa*) are cultivated for maize production.



Zambezi floodplain grassland is a mosaic of wet and dry habitats on the eastern floodplains. Much of the area is grassland with small islands of woody species. Wettest areas are dominated by sedges. Moist slopes to the channels are dominated by several grasses, most importantly by *Cynodon dactylon* lawns, which are a valuable grazing resource. The large, dry sandy areas are dominated by *Eragrostis pallens*, *Tristachya superba* and *Hypparrhenia* spp., which are poor for grazing. Maize is grown on organic soils deposits (*sitapa*) in the channels.



Zambezi transition grassland is tall and open grassland between the eastern floodplain and higher, Kalahari sands to the West. Proportions of different grass species vary, depending on soils, frequency of flooding and soil drainage conditions. Characteristic species are *Vetiveria nigritana*, *Hyperthelia dissoluta*, *Tristachya superba*, *Aristida stipitata*, *Loudetia simplex*, *Andropogon schirensis*, *Setaria sphaecolata*, *Eragrostis rotifer*, *Imperata cylindrica* and *Cynodon dactylon*. The grasslands are generally of poor quality and are not heavily used by local stock owners.



Zambezi woodland consists of wooded "islands" in an area of transitional grasslands between the western uplands and the eastern floodplains. Tall trees consist largely of *Parinari curatellifolia*, *Kigelia africana*, *Diospyros mespiliformis*, *Trichilia emetica*, *Acacia sieberana*, *Lonchocarpus capassa* and *Azelia quanzenis*. Soils are generally heavier clay-rich loams, and local farmers value the grazing resources. These "islands" have considerable conservation value as centres of high diversity.



Riverine woodlands

The **Maningimanzi woodland and channels** east of Katima Mulilo, is a broad sandy plain of old river sandbars and deep river channels. This broken landscape floods regularly and vegetation consists of two distinct units. Sandy areas are covered predominantly by high *Terminalia sericea* woodlands, while the river channels have margins of reeds and dense stands of *Syzygium guineense*, *Rhus quartiniiana*, *Trichilia emetica*, *Garcinia livingstonei* and *Kigelia africana* up on the drier margins.



Okavango-Kwando valley woodland consists of high, open woodlands along the Okavango and Kwando Rivers, perhaps showing what much of the next unit used to be like. Trees along the rivers are tall and diverse in species composition. The loamy soils represent some of the best potential for growing crops, while the area supports the greatest diversity of animals and plants in Caprivi. The wetlands are heavily utilized by wildlife and livestock and are probably one of the most threatened habitats in the region.



The **Okavango valley fields and shrubland** unit maps the heavily exploited valley of the Okavango River, where it is now difficult to assess the original vegetation types. Old fields are rapidly encroached by *Dichrostachys cinerea*, *Maytenus heterophylla* and a variety of weeds and pioneer species. Annual grasses, such as *Urochloa brachyura* and *Dactyloctenium giganteum*, often occur in dense stands.



Mopane woodlands

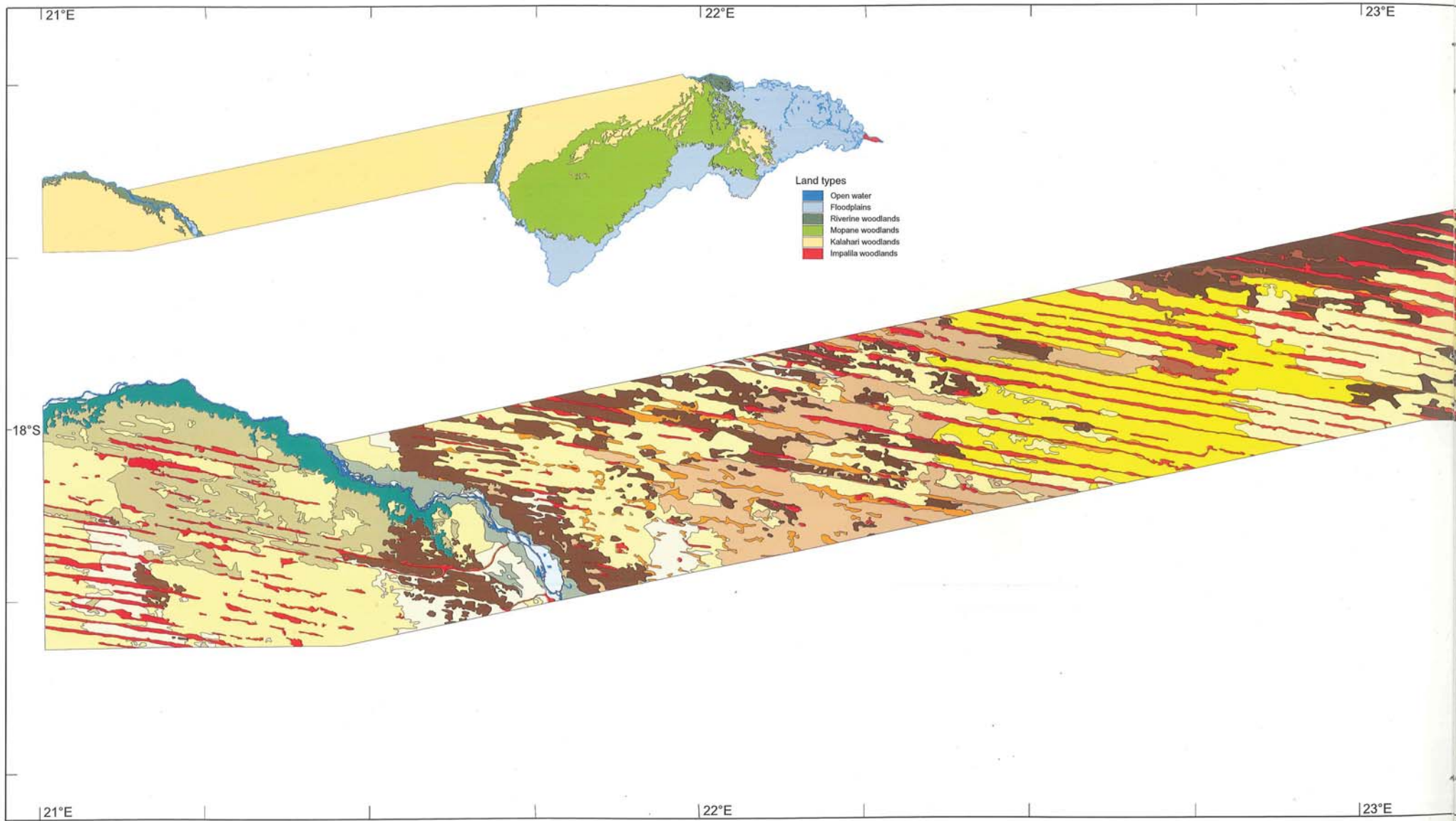
Gunkwe mulapos are grasslands in the braided system of drainage lines (*mulapos*) running through Kalahari sands south-west from Katima Mulilo. The loamy clays are poorly drained, with some areas flooded for long periods in the wet season. Other than *Cynodon dactylon* lawns these grasslands are generally poor and the soils are not suitable for arable agriculture.



Linyanti woodland is a broad belt of woodlands between the Linyanti Swamps and the extensive mopane area in the central eastern Caprivi. The area is heavily settled and much of the land has been cleared. Soils are predominantly sandy loams. Camelthorn and *Lonchocarpus capassa* form a distinctive layer of tall trees. *Terminalia sericea* occurs throughout the area, usually as a large tree. Perennial grasses are

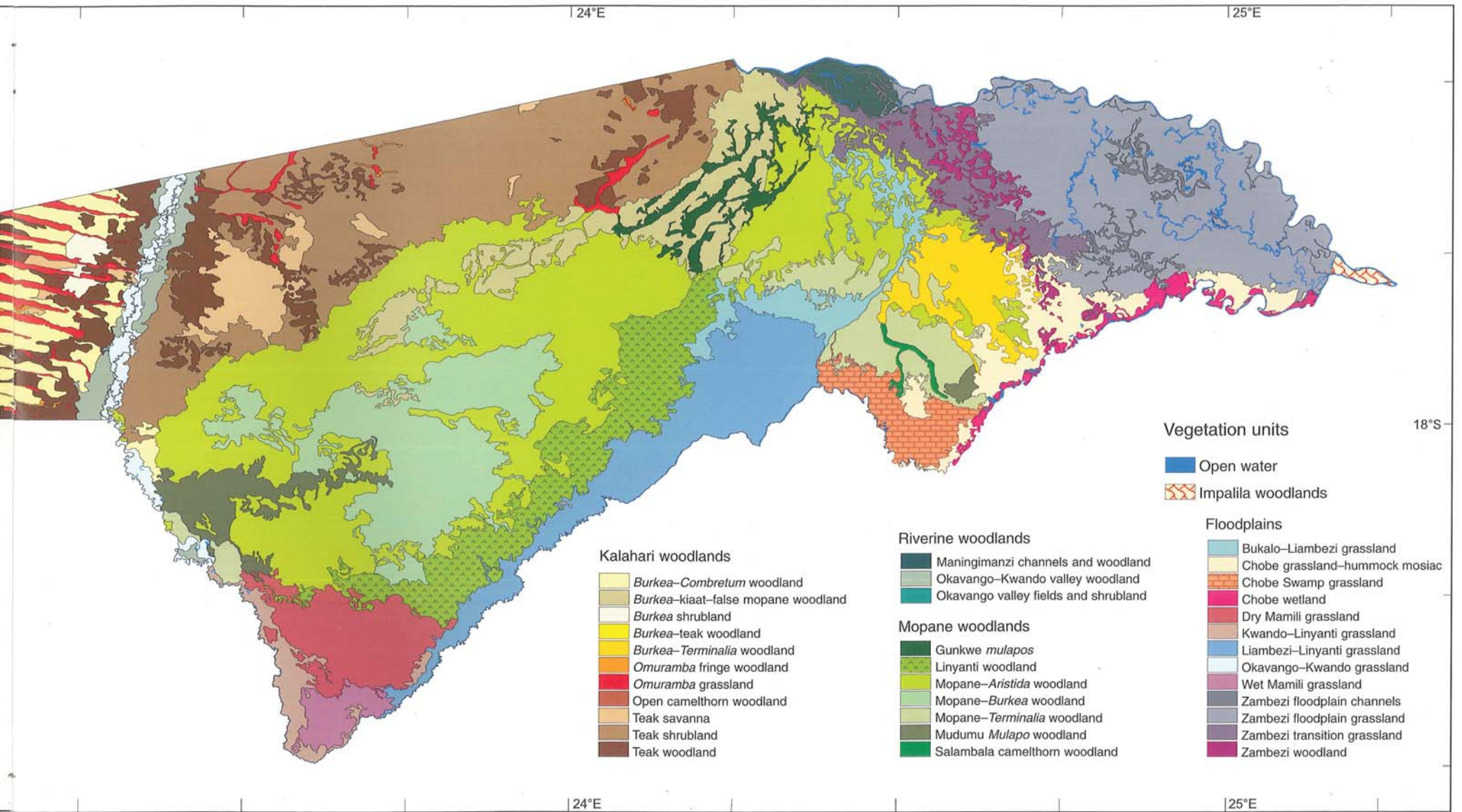


continued on page 22



Vegetation units in Caprivi

Descriptions of these units are given on pages 19 and 22



characteristic, although in many areas they have been overgrazed.

Mopane–*Aristida* woodland is a large unit of generally heavy clay loams which are often unsuitable for cultivation because of the accumulation of salts. Grazing quality is poor. Mopane is often the only large tree. Camelthorn, knob-thorn and *Albizia harveyi* may be found where soils are better drained. Shrubs are usually found on termite mounds. Grasses are dominated by coarse, unpalatable annuals. *Terminalia sericea* may occur sparsely on small pockets of reworked alluvial sands.



Mopane–*Burkea* woodland is a mosaic of heavy clay loam soils and pockets of deep sands, giving a mix of plants not normally found together. Mopane shrubs dominate the landscape but develop into trees around small pans. Kalahari sand species, such as *Burkea*, *Erythrophleum africanum* and *Combretum collinum* are characteristic on pockets of sands. Grasses are of variable quality, species varying according to soil type.



Mopane–*Terminalia* woodland is another mosaic of Kalahari sands and heavier clays, with the highly leached, white sands (dominated by *Terminalia sericea*) are interrupted by patches of clay loams (where mopane dominates). Grass cover is sparse and consists generally of unpalatable species.



Mudumu *Mulapo* woodland is found in the Mudumu *Mulapo*, east of the Kwando River, as well as in a smaller area west of Ngoma, near Ioma. The Kalahari sands have been reworked by water, resulting in highly leached sands, and isolated small pockets of clay loams. Vegetation on sands is dominated by large *Terminalia sericea*. Grasses are dominated by coarse species. Pockets of heavier soils carry short mopane. The unit has very low values for agriculture, conservation and biodiversity.



Salambala camelthorn woodland is a fossil drainage system in the Salambala area where tall camelthorn trees are abundant. Other large trees include *Lonchocarpus capassa*, *Azelia quanzenis*, *Combretum collinum*, *Berchemia discolor* and knob-thorns. Soils are fine grained sands and sandy loams which are well drained. Although most grasses are annuals it is an important grazing resource for cattle.



Kalahari woodlands

***Burkea*–*Combretum* woodland** is a unit typically dominated by high *Burkea* at varying densities, with kиаat, false mopane and mangetti occurring less frequently. The structure is more open than *Burkea*–kиаat–false mopane woodland. *Terminalia sericea* dominates the low tree layer, and the shrub layer is quite open with *Baphia massaiensis*, *Bauhinia petersiana* and *Grewia retinervis* giving most of the cover. *Diospyros chamaethamnus*, a mat-forming woody species is common in areas burnt often. Grass cover is generally low. Soils are deep sands on dune slopes and sandy plains, with little value for crop farming.



***Burkea*–kиаat–false mopane woodland** occurs in two widely separated areas. West of the Okavango River it is widespread, mostly on undulating sandy plains. There is also a broad band west and south of Katima Mulilo where it occurs on sands which have been extensively reworked by flooding. *Burkea* dominates the tall (13–15 m) tree layer which, with false mopane, kиаat and mangetti trees, provides a dense woodland. Grasses are predominantly perennials with species such as *Schmidia pappophoroides*, *Stipagrostis uniplumis*, *Aristida stipitata* and *Digitaria eriantha* characteristic at low cover.



***Burkea* shrubland** has little agricultural value, either as an arable resource or for grazing purposes. Trees over four metres high are rare. The shrub layer is generally characterized by *Terminalia sericea*, *Lonchocarpus nelsii*, *Bauhinia petersiana*, *Baphia massaiensis*, *Burkea* and *Grewia retinervis*. The shrub layer can cover as much as 50% in areas badly damaged by fires.



***Burkea*–teak woodland** is a unit on well developed dunes in the central Caprivi strip. There is a tall tree layer made up largely of *Burkea*, teak, false mopane, kиаat and mangetti. A second layer of trees, six to eight metres high, is present. The shrub cover is low, and grasses are predominantly annuals.



***Burkea*–*Terminalia* woodland** occurs on a large sandy ridge running south and east of Bukalo towards Ngoma which has been extensively reworked by the flow of water. There is a resulting mosaic of large sand deposits and heavy clays on which mopane grows. Transition areas between the sands and heavy clays are favoured for cultivation. *Terminalia sericea* occurs commonly in the low tree layer. Most grasses are annuals and of poor quality, and the perennials are generally woody and unpalatable.



The **Omuramba fringe woodland** unit forms a distinct fringe along the slopes of dunes and omuramba margins in the Caprivi strip. Camelthorn, leadwood and knob-thorn trees form a distinct layer 10–15 m high covering a substantial area. The vegetation is characteristic of both heavy soils and Kalahari sands. The unit provides important grazing habitat for wildlife, and has potential for arable agriculture.



Omuramba grassland is found in the omuramba valleys throughout the Kalahari sand areas. The grass *Imperata cylindrica* dominates the wetter areas while a variety of palatable species grow in the drier areas, such as *Schmidia pappophoroides*, *Brachiaria nigropedata*, *Digitaria eriantha* and *Antheophora pubescens*. These are some of the best grazing resources in the Kalahari sand areas, and the sandy loam soils are extensively cultivated in the Mukwe area and at Omega.



Open camelthorn woodland is limited to a small area in the eastern half of the Caprivi strip on clay loam soils.



Camelthorns are well distributed and tall (15 m), and there is a distinct understory of low trees. Perennial grasses are well represented, so this area is presumed to have high value as a grazing resource.

Teak savanna is widely distributed in the Caprivi strip and in eastern Caprivi. It occurs in areas of deflated dunes where the landscape consists of gently rolling sandy plains. Tall teak trees are prominent but occur at moderate densities, giving the landscape a savanna-like appearance. The layer of shrubs is fairly sparse, with a relatively high proportion of perennial grasses.



Teak shrubland is badly degraded teak woodland, where forests have been extensively logged in the past, and the logging probably also opened up the woodlands to allow fire to have a major effect on the structure of the woodland. A few large teak and camelthorn trees are present together with a distinct, dense layer of shrubs and small trees. The relatively sparse cover of grasses consists largely of annual species.



Teak woodland is tall, often fairly dense and widely distributed on deep, well drained sandy plains and dunes. A very dense layer of shrubs may be present. Their potential for grazing and cultivation is poor, but they have high value as a timber resource. Teak habitats have been badly damaged by commercial timber exploitation and fire.



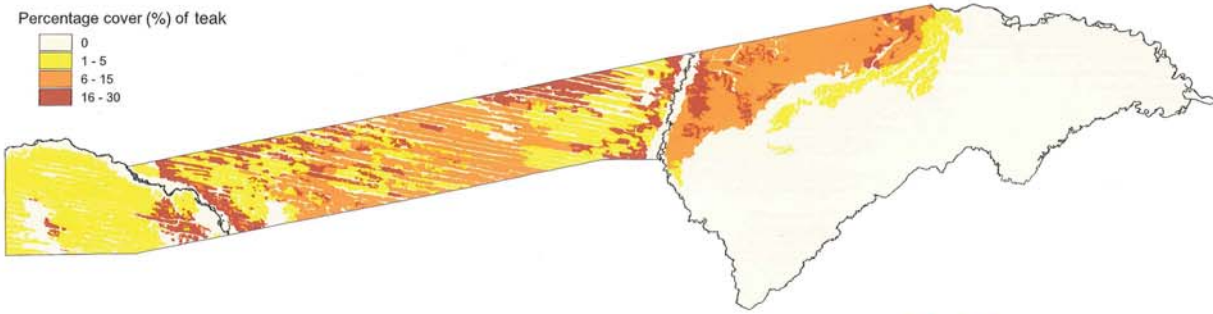
Impallia woodlands

Rich soils, surface basalt rocks and a mosaic of wetland and dryland habitats contributes to a diverse vegetation. Many plant species found here occur nowhere else in Namibia. Drier areas are dominated by mopane, but with many other species present. Margins of the island have species typical of river levees, such as *Diospyros mespiliformis*, *Lonchocarpus capassa*, *Ficus sycomorus*, *Cassine transvaalensis*, *Kigelia africana* and *Syzygium guineense*. Because cattle numbers are high the grass layer is denuded and extensive patches of unpalatable species are common.

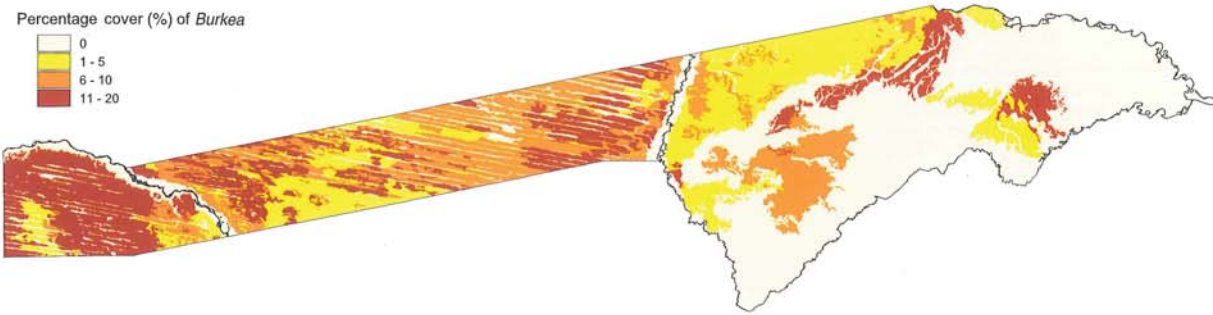


Fields in the Okavango valley — only trees valued for their resources have not been removed (CH)

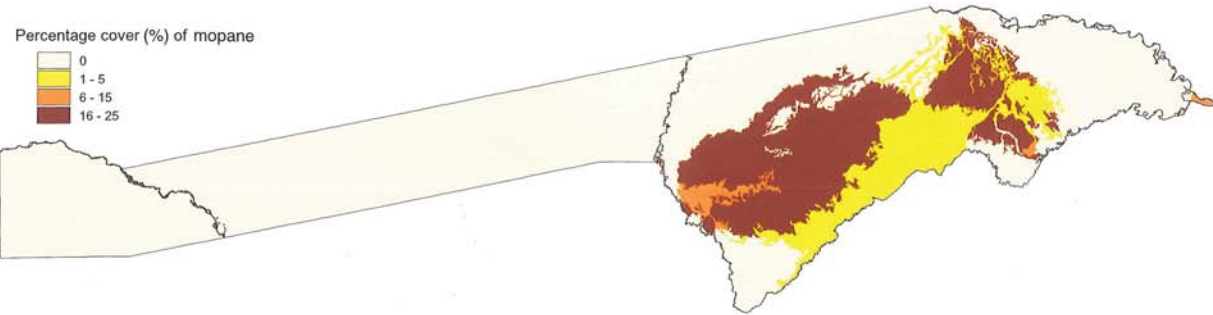
Percentage cover (%) of teak



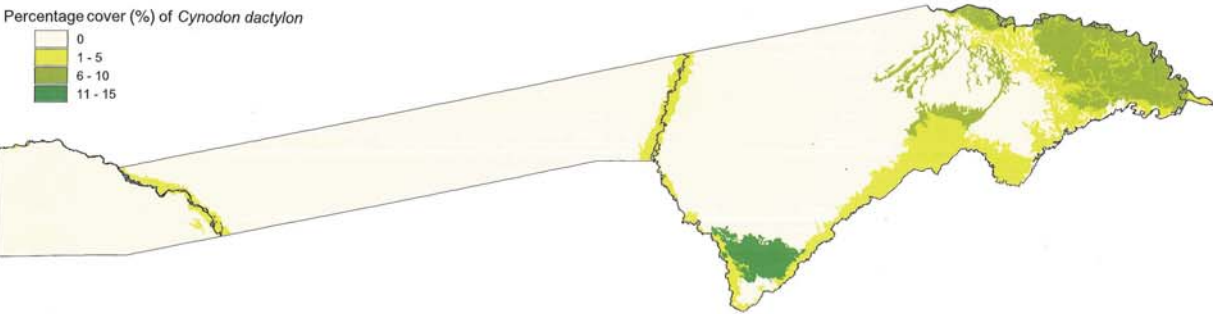
Percentage cover (%) of *Burkea*



Percentage cover (%) of mopane



Percentage cover (%) of *Cynodon dactylon*



Collecting grass for thatching (CH)



Terminalia sericea, resistant to wood-borers and light in weight, makes a suitable roofing structure

◀ Four important plant species — distribution and percentage cover

In compiling maps of different vegetation types, information was collected on the main species in each unit and the relative area covered by those species. These measures of cover provide an index of abundance, so the higher the cover provided by a species the more abundant it is. Maps for four species are presented here. Teak is a valuable timber species, although most large trees have already been cut and those remaining are often unsuitable for timber production. Pockets of denser, taller teak are scattered throughout the Kalahari sands. *Burkea* is a very common tree on Kalahari sands, varying in abundance and height in different vegetation units. In many areas it is the dominant tree. Mopane is a highly valued source of construction poles for the building of houses, especially in areas where the tree trunks are long and straight. The grass, *Cynodon dactylon*, is a valuable grazing resource and occurs as extensive lawns, mainly on wetter soils in floodplain areas.

Uses of vegetation resources

Caprivi's natural vegetation provides people with many resources. Agricultural uses are considered in Chapter 6, but many other resources are of value. Some are substantial and vital since they are used by the majority of households. For example, 88% of all homes are constructed from wood, 78% of homes are thatched with grasses or reeds, and 96% of all households use firewood for cooking². Other resources are used less frequently or by smaller numbers of people, for example, many kinds of wild fruits, nuts (especially mangetti) and waterlily bulbs are used for food; a variety of plants are used for medicinal purposes; wood and palm leaves are used for making utensils and craft for sale; and thatching grass, construction poles and reeds are sold commercially in some places³.

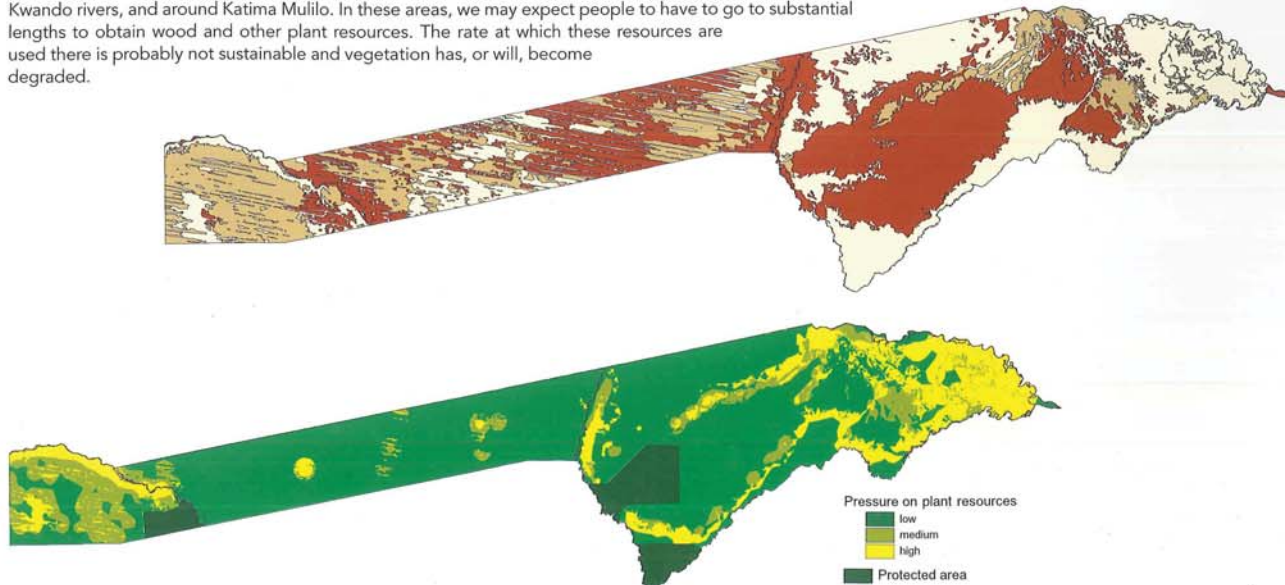
The degree to which these resources are used depends on their supply or availability and the demands put on them. For example, people living near tall mopane woodlands have little difficulty obtaining suitable

construction poles because mopane provides the best timber for construction, cut trees regenerate readily, and they are seldom damaged by fire. By contrast, people living out on the eastern floodplains must either pay large sums to buy and transport suitable construction poles, or must build their houses using inferior materials. The last option is the only one available to many poorer households not having surplus cash, so tremendous pressure is put on the relatively few trees that remain on the floodplains. Supplies and demands for firewood present similar kinds of problems, both for people and for natural vegetation. Where firewood is in short supply, living trees may be cut or other fuels such as cattle dung are used. The efforts people make to collect fuel wood may be substantial, women spending long periods (up to half a day every few days) collecting wood, or men using oxen to cart wood from long distances to those households fortunate to have access to oxen³.

The value of vegetation in providing resources and an assessment of the degree of pressure exerted on them⁴ ▼

The top map gives a broad assessment of the values of vegetation in providing people with subsistence needs for construction and fuel wood, thatching grass, and plants used for food and medicinal purposes. The values exclude agricultural uses for crop cultivation and grazing. Amongst the most valuable areas are those with high numbers of tall mopane, those with lots of mangetti trees, and those with a high diversity of fruit bearing plants. Areas with low values are those with little timber or fuel wood.

Comparing the distribution of these values with population densities shows those areas where vegetation is under varying degrees of pressure⁴. The ratings are based on the assumption that in areas with few useful plants (lowest resources) there will be significant pressure put on the few trees if there are reasonable numbers of people, and that pressures will increase as population densities become greater. It is also assumed that people exert little direct pressure on vegetation in the three protected areas. Areas showing probable high pressures on vegetation are largely in the eastern floodplains and other areas where there are few remaining trees, and also in areas where population densities of people are high: along the major roads, along the Okavango and Kwando rivers, and around Katima Mulilo. In these areas, we may expect people to have to go to substantial lengths to obtain wood and other plant resources. The rate at which these resources are used there is probably not sustainable and vegetation has, or will, become degraded.



Fire

"Caprivi's burning" "All of Caprivi burnt last year"

Such statements are heard often, and carry with them a good deal of truth. Fires have always been an important and natural process, and many people argue that they have important benefits to plant communities. However, what has changed in recent years is that the number of fires set each year has increased as human populations have grown, so areas get burnt much more frequently. Man-made fires also often burn at times of the year when they have damaging effects. The only natural burns in Caprivi occur from October to December when lightning may cause fires, and these are often closely followed by rain.

People set fires for many reasons: to stimulate the growth of fresh grass for cattle and to attract game, to flush out game that can then be hunted, to clear out vegetation around waterholes, and to clear land for cultivation. Many fires are also started accidentally. What is true for almost all fires is that they can spread, uncontrolled wherever the wind blows them and where there is enough dry material left to burn. The few rivers, wide channels and roads are the only barriers to fires, and the network of firebreaks previously cut to control and manage fires is no longer maintained.

Damage caused by fires occurs in a number of ways, but it is the frequency of burning that probably leads to most damage. Young trees are killed and, with repeated fires, it is now impossible to find young teak, kiaat and other valued plants in many areas. Large trees are also killed by frequent burning, the fires eating away at the base, year by year, and also burning into and up the trunks. Many areas of dense woodland have thus been converted to open grasslands and shrublands, the older large trees killed and no young trees to replace them. In fact, large areas of Caprivi are now bush-encroached. Dense thickets of *Terminalia sericea*, *Combretum* spp., *Dichrostachys cinerea* and other shrubs cover the ground, leaving little or no space for grass growth. The large areas of *Burkea* shrubland, teak shrubland and teak savanna were probably formed as a result of repeated burning.

People in Caprivi often complain because timber resources for the construction of houses have been burnt away by repeated fires. Similarly, large areas of grazing pastures are lost every year, forcing farmers to move their herds to other areas. Cattle may be killed and houses burnt in occasional accidents. One hundred and seventy buffalo were trapped and killed in a fire near Malengalenga in 1996. The same fire burnt away large areas of peat, as often happens in other peat areas. Fires also contribute to the loss of nutrients, both in smoke and as fine particles of material blown away once layers of grass protecting the soil surface have burnt away. Finally, and on a more global scale, the high rate of burning of African woodlands and grasslands adds significantly to the concentration of carbon dioxide and dust in the atmosphere, contributing to global warming and other climate changes.

(CH)

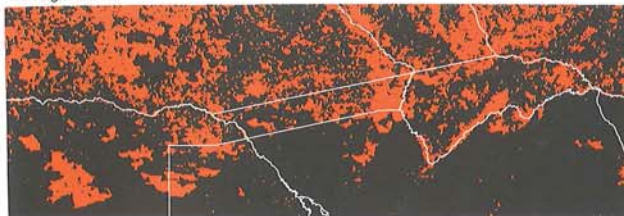


Dense growths of shrubs form after repeated burning (CH)

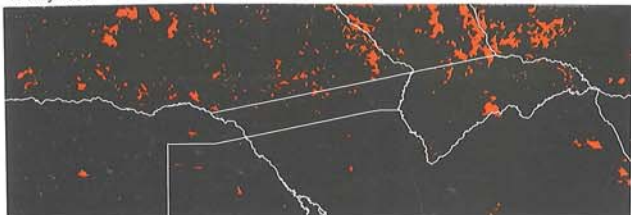
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23 August 1996



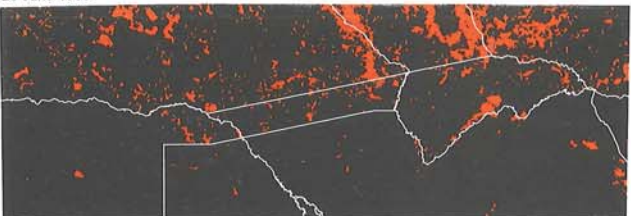
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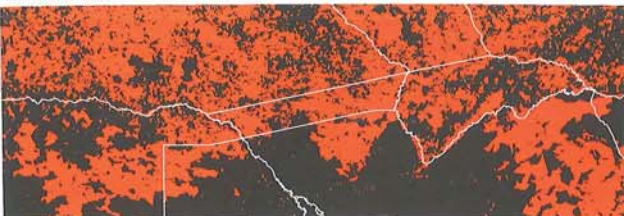
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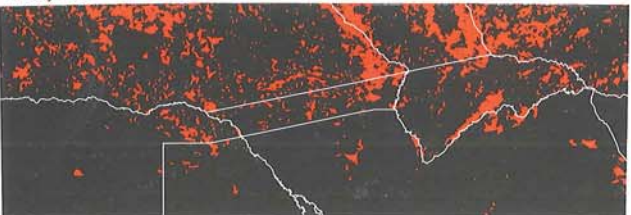
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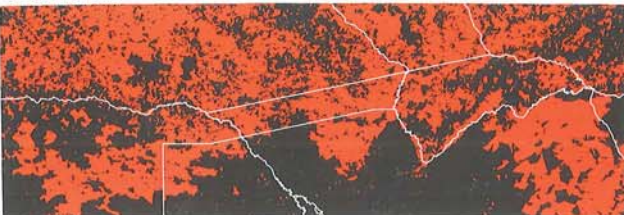
19 October 1996



27 July 1996



6 December 1996



The progressive accumulation of fire scars during the 1996 fire season in the Caprivi and surrounding areas

The series of images below provides a dramatic picture of the progression of burning during the 1996 fire season. Satellite images were analysed to produce pictures which show, month by month, areas that were detected as burn scars⁵. In April, there were just a few small fires in the eastern floodplains. Part of the Linyanti-Liambezi area had burnt by mid-May and there had been a few fires in the woodlands along the Zambian border. By the end of July, the whole Liambezi area had burnt and a number of large fires had burnt just west of the Kwando River. From then on, fires burnt throughout the region so that little appeared not to have been burnt by the end of October. Adding up all the burnt areas showed that a total of 60% of the vegetation in Caprivi burnt in 1996.

The number of individual fires that were set in 1996 was also impressive. There were few large fires in Caprivi, and none of the massive burns visible in the Chobe area of Botswana and in the Kavango Region. Rather, large numbers of fires were set throughout the year. As an absolute minimum, there were 905 individual fires in Caprivi in 1996, and the actual total could be higher than 3 000 individual fires. Many people, with lots of matches, clearly have interests in starting fires!

The chart below shows that the cumulative area of fire scars, and thus rate of burning increased substantially from early August onwards. The percentage of vegetation burnt was probably lower than in most other years because rainfall and grass growth in the 1995/96 season was poorer than normal, and less plant material was therefore available for burning. These pictures present the first attempt made to track and evaluate the extent of burning in Caprivi. Similar work needs to be done in other years, especially when burning is more extensive. Those studies will also show how often the same areas are burnt.

