FOREST POLICY

FOR SUSTAINABLE UTILISATION

OF THE WOODLANDS AND SAVANNAS OF NAMIBIA

A STUDY ON CONSUMPTION PATTERNS OF
MAJOR WOOD AND WOOD PRODUCTS IN NAMIBIA

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EXECUTIVE SUMMARY

The savannas and woodlands of Namibia provide a range of benefits every year. They produce wood and non-wood products, they are important for tourism and they are essential in watershed- and soil protection. The values of the goods and services that the savannas and woodlands hand over to the Namibian society every year are very high and the Government, through the Directorate of Forestry, is therefore searching for ways to keep these resources intact so they can continue to yield its benefits to society.

To provide input to a new forest policy for Namibia, this study has been looking at six wood based forest products; firewood, charcoal, construction and fencing poles in the North, carvings, timber and mopane roots. The main purpose of the study has been to estimate the present consumption of these products, to estimate the consumption 10 years from now, to evaluate if there are social costs attached to this consumption and finally, to make proposals that can encourage or enforce a more sustainable exploitation of the resources.

Firewood

As a result of growth in population and urbanisation the household firewood demand in Namibia will increase from 635.000 tons in 1996 to 870.000 tons in 2006. A large part of this increased demand will take place in regions that already experience shortage of firewood and the pressure will increase on the remaining resources if the present development continues unchecked. Proposals are made to influence the commercial firewood market through increased taxation and to promote sale of firewood and charcoal from the bush encroached farms in the Northern parts of the Central regions. The Government cannot influence the subsistence consumer through prices or taxes, but they can be influenced through subsidies. The case of subsidies is discussed.

Charcoal

The charcoal production is estimated to increase from 7.000 tons in 1996 to 40.000 tons in 2006. For this optimistic development to take place, the industry has to increase its share of the South African and European markets and other markets overseas. A larger domestic market is also required. The charcoal production is based on bush from farmland in the Central regions. This is a wood resource with a negative social value and one cannot see any negative environmental side effects of this industry. The only proposal made is a general one to support this industry because of its potential contribution to the Namibian economy in the form of employment, export income and taxes.

Construction and fencing poles

The demand for construction and fencing poles in the four regions in former Ovamboland will increase from 347.000 tons in 1996 to 394.000 tons in 2006. However, these figures represent the annual tonnage that need to be replaced, not the actual replacement. Due to shortage, the replacement in the form of wooden poles will be much less; other materials will be used and fences will be allowed to deteriorate. The total standing volume of construction and fencing poles is estimated to decrease from 3,3 mill tons to 3,15 mill tons between 1996 and 2006, an annual decrease of 0,5%. The proposals made for firewood are also applicable to poles.

Timber

The domestic production of timber will be very low in 1996, about 125 tons. It is assumed that there will be no production based on local hardwood in 2006. It is possible however, that the sawmills in Namibia can continue production based on raw material from neighbouring countries. This is being looked into. No inventory has been made of the resources in Kavango and Caprivi, but the indications are that one should take a careful approach and await inventories before the exploitation

increases, particularly for kiaat, but also for some other species. It is proposed that tariffs are increased substantially if concessions are given. The imported timber, softwood and hardwood, will amount to about 27.000 cum. in 1996 and increase with 5% yearly to about 43.000 cum. in 2006.

Carvings

To give an accurate estimate of the carvers' consumption of wood is very difficult and the figures given in the main text are very uncertain. The volume is estimated to 440 tons in 1996 and about 700 tons in 2006. The carvers are relying on the same species as the local sawmills and the raw material situation is therefore the same. Proposals are made to keep the tariffs at the present, official level, and to increase collections by following up harvesting permits, or the lack of them, in the main carving markets.

Mopane roots

According to official statistics about 625 tons of dead mopane roots will be exported in 1996 and this quantity will increase to 1.250 tons in 2006. The Directorate of Forestry has recently made an inventory of mopane roots and has set a harvesting limit of 1.250 tons. The resource situation seem to be under control so no proposals are made to influence the harvested quantity. However, Namibia has a natural monopoly on dead mopane roots and in this situation it should be possible for the country to secure more of the value added in processing and marketing. Proposals are made to stop the export of unprocessed mopane roots.

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1 INTRODUCTION

This study has been commissioned by the Ministry of Environment and Tourism in Namibia, Directorate of Forestry, with the support of Norad.

1.1 TERMS OF REFERENCE

The overall objective of the study is to provide input to the formulation of a new forest policy for Namibia. More specifically, the study should collect information on consumption levels and prices for six specified wood based products and estimate the same 10 years from now. The social costs and benefits of the products should be evaluated and finally the study should make proposals that can promote a more sustainable exploitation of the wood resources utilised for the six products. The products are firewood, charcoal, poles for construction and fencing in the North, timber, carvings and mopane roots.

The Terms of Reference is specified in detail in appendix I.

1.2 METHODOLOGY

One of the main objectives of the study was to collect data on volumes and prices for the six wood based products specified in the Terms of Reference, and to estimate the demand for these products today and 10 years from now.

The following is a description of the methods used to obtain the required data for each of the products.

1.2.1 Firewood

Several approaches were used to collect the data on firewood. Questionnaires were used to collect data from firewood buyers and from random samples of the general public and firewood dealers were observed and their sales noted. Firewood was weighed in the five towns specified in the ToR.

Questionnaire 1

All questions and a summary of all answers are presented in appendix II.

The purpose with this questionnaire was to find the percentage of the population in the five towns that use firewood as their main source of energy for cooking food at home. Such a percentage would allow a grouping of the population into main users and occasional users. The intention with the follow up question to the occasional users was to check if there were any non-users among them. Finally everybody was asked to indicate how much they spent on firewood in a month.

People were requested to give only one answer to question number 1 (What is your main source of cooking food at home?), but if they were unable to do that, they were allowed to give more than one answer. If they answered firewood together with another source, they were grouped as "mix" in the statistics and treated as main firewood users.

For this questionnaire people were picked at random, but they were only interviewed if they confirmed that they lived in the area/town being surveyed. The Supervisor of the enumerators selected the spots where the enumerators should stand and do their interviews. The criteria for selecting a spot was that it should not be close to a firewood market and that one would expect all kinds of people to pass the spot. The enumerators counted the persons passing and requested

person number 10 to stop. When the interview was over, the enumerator again counted to 10.

Questionnaire 2

All questions and a summary of all answers are presented in appendix II.

The purpose with this questionnaire was to find out how much firewood buyers, main and occasional, spend on firewood. Immediately after the respondents had bought firewood they were asked how much they just spent and how much they spend on firewood in a week. It is reasonable that these answers are more accurate than the answers to the same question in questionnaire 1. The rest of the questions in this questionnaire are there to help in the analysis of the answers.

Only proven firewood buyers were interviewed. The enumerators observed who was buying firewood and approached the buyers after they had paid for the firewood.

Task 1

A summary of all observations is presented in appendix II.

The task of the enumerators was to stay with the dealers/resellers of firewood and record their sales. The intention was to get data on how much buyers spent on firewood from another angle than in questionnaire 1 and 2.

The enumerators approached the dealers, explained the situation and were allowed to observe the dealers' sales some hours in the morning and in the afternoon. Each sale was noted in forms made for this purpose.

Task 2

A summary of the weighings is presented in appendix II .

This task consisted of weighing firewood bundles in the firewood market. Firewood is not sold by weight, but in bundles of approximate same size for each price group. The intention with this exercise was to find the price per kilo of firewood in the different markets.

The Supervisor agreed with the dealers that he could weigh the firewood. In each market, 10 bundles in each of the price groups were weighed and the result noted.

1.2.2 Charcoal

There is not much information available on the charcoal production in Namibia. The data presented in this report have been collected through interviews with some of the major producers and exporters, some small producers and with Directorate of Forestry employees.

1.2.3 Timber

Data on imports of timber have been estimated previously. This report is based on these findings, but updated through interviews with some of the major importers.

1.2.4 Construction and fencing poles in the North

To collect data on fencing poles a combined questionnaire/task was used.

Task 3

All questions and a summary of all answers are presented in appendix II.

The task consisted of visiting homesteads in the North and to count and measure poles. In addition the enumerators asked question to help in the analysis of the data.

A total of 45 homesteads were visited; 15 in each of the districts Oshana, Oshikoto and Ohangwena. All poles in palisades around the homestead, inside palisades and huts were counted. If the poles in the hut were covered with mud they were not counted. Roof poles in the huts, poles in the kraal and poles in the fences around the fields, were not counted.

Every 10th pole was measured. The diameter was measured at breast height for long poles or at tip for shorter poles. The length above ground was also measured.

1.2.5 Carvings

No accurate information exist for volumes and prices in this very informal activity. Since the carvers themselves and their organisations do not have any accurate information, it is even difficult to find a method of gathering information. It was decided to combine a questionnaire with the task of weighing carvings in an effort to establish some facts about sales prices, weights and work put into the carvings.

Task 4

A summary is presented in appendix II.

The purpose of this task and the questions asked was to establish a starting point in the evaluation of prices and volumes.

80 carvings were weighed in the Okahandja market. Their weight and price was noted as well as the number of days worked for each of the carvings and the species used. The enumerators concentrated on the large carvings because the weighing equipment used was not sensitive below 100 grams.

1.2.6 Mopane

All the data presented is based on interviews and other reports.

1.3 PROJECTION 1996 - 2006

The basis for the projections from 1996 to 2006 is presented together with the data for each of the products.

1.4 DATA ANALYSIS

Some of the data analysis is included in the main text of the report. All the analysis performed are presented in appendix III.

The main reason for collecting the data was to find average prices and consumption rates that could be used to calculate total volume and value of consumption of the specified products. For this reason the data has been analysed using descriptive data analysis. Mean and median have been calculated

and for each of the calculations, the standard deviation is calculated in order to reach a value for the confidence interval for the mean at the 95% confidence level. The detailed calculation is based on the standard procedure for finding the confidence interval for a mean when the variance is unknown. This procedure is explained in detail in textbooks on statistics.

Most of the data analysed are lopsided with the mean being higher than the median, reflecting some very high answers. The median, being the number in the middle of the sample, has been used in these cases .

1.4.1 Uncertainty

A few general points ought to be mentioned about analysis of data collected through questionnaires. It is difficult to formulate precise questions and ensure that each question has one, unique meaning. And if the question is precise there is still no guarantee that the respondent understands the question the way it is intended. Thirdly, we do not know the motives of the respondent when he/she is answering the questionnaire. This point is worth mentioning for a survey on firewood carried out by forestry employees. Would the respondents have answered differently if the questions were put to them by somebody else?

All the firewood data analysed is collected in Windhoek, Ondangwa, Oshakati, Ongwediwa and Rundu and the analysis is therefore representative for these towns. However, another part of the study was to estimate the total consumption of firewood in Namibia and the data has been used as basis for this estimate. There is no way of knowing how representative the data for the five towns are for the rest of urban Namibia or for rural Namibia.

The data was collected in June 1996. In the 3 towns in former Ovamboland the data was collected between 19.6 and 24.6, in Rundu between 18.6 and 21.6 and in Windhoek between 30.5 and 9.6. The amount people spend on firewood depends not only on their need, but also on their cash situation. If we measure their spending one day after pay-day or one day before will probably influence the result we get. Since the exercise was not done in the same period of the month in all the towns, this may influence the totals the figures for each town and the comparison between them.

The June results have been used to calculate the volumes and prices for the full year. How representative the figures are for a full year depends on how representative June is for one twelfth of a year.

1.5 REPORT ORGANISATION

After the introduction, the data for each of the 6 wood based products is presented in sections 2 to 7. Each of these sections contain information of commercial practises, estimated volumes and prices in 1996 and an estimate of the same in 2006. Section 8 deals with social costs and benefits for the products. Some of them are grouped together. All proposals are presented in section 9. The Terms of Reference, all questionnaires used and all answers and the specifics from the data analysis are presented in appendices I, II an III.

2 FIREWOOD

2.1 OVERVIEW

Firewood is being used by the entire Namibian population. Out of a total of 973 people contacted, all except one person were firewood users. Most people use firewood daily as their main source of energy, others use it occasionally for cooking, warming the house, heating water and braai.

Traditionally people have collected firewood from nearby sources without much effort and in parts of the country the situation has not changed much. In other parts, the pressure on the wood resources from a growing population has contributed to deforestation and increased pressure on the remaining resources. As a result of shortage of available firewood in these parts of the country and the in the towns, firewood consumption is increasingly being commercialised. People are choosing to pay for the firewood instead of using the time required to collect it. Those that cannot afford to pay cash for firewood, are paying in the form of more time spent on collecting it. With continued growth in population and continued urbanisation, this trend is likely to continue and be reinforced.

If we look at Namibia as a whole, the country has more than enough firewood. In the Central regions it is a problem that the productivity of the farmland is reduced due to invader bush; i.e. potential firewood.

In the following sections of the report an effort has been made to quantify the volumes and the prices for the commercialised firewood consumption. Based on the data gathered for the commercial consumption, estimates have been made for the total consumption in urban and rural Namibia. There is also an estimate of the consumption 10 years from now, in 2006.

2.2 COMMERCIAL PRACTISES

When one looks at the commercial practises in the firewood trade one has to distinguish between firewood from communal land and firewood from private land.

2.2.1 Firewood from communal land

Subsistence consumption

Most of the firewood being harvested in Namibia is subsistence cutting on communal land. On communal land, which formally is owned by the state, people are allowed to collect firewood for their own use free of charge. If they cut wood for commercial reasons they should ideally apply to the local District Forestry Officer for a harvesting permit, a transport permit and a marketing permit and of course pay the stipulated tariff for commercial firewood collection.

In parts of Namibia, like Kavango and Caprivi, people are in general able to cover their daily need for firewood from resources nearby. They can collect what they need in a relatively short time. In other regions of the country, like parts of former Ovamboland, firewood is difficult to find and people have to walk long distances with their headloads to cover their daily requirement. And increasingly it is necessary to organise the collection of firewood due to the long distances. A group of people will work together to cut the firewood and organise transport in order to cover their needs for some weeks. Since most of these people do not have access to transport they have to pay for it and we can therefore see a commercialisation of the subsistence cutting.

One source of firewood for the four regions in former Ovamboland is often being overlooked. When construction and fencing poles are replaced there will still be some part of the poles that can be used as firewood. In chapter 3 of this report a tentative estimate of this volume is presented.

Commercial consumption
The commercial cutting of firewood in communal areas is done by people who see this as an opportunity to earn an income. The unemployment is in general high and the alternatives accordingly few. To cut firewood and bring it to the markets where people pay cash for it requires people to organise, cut, transport and sell. To some degree it is the same people doing several of these jobs. The initiative is coming from the towns where the organisers see there is a market. They either buy the firewood from local cutters or they send their own harvesting teams to the forest to do the cutting. When the quantity is big enough, they arrange for transport and bring the firewood directly to the firewood markets in the towns. They may then sell it themselves or employ somebody to do the selling in the market. In Oshakati and Ondangwa we found that the people selling were mostly from Angola, which is probably explained by Angolans demanding less in wages than Namibians.

The firewood markets in the towns are well organised. The dealers have enough firewood and it is sorted in different price classes, depending on the size of the bundle. The sorting is done visually, not by weighing, but the bundles look to be of the same size. In Windhoek the bundles were sorted in price classes from N$ 1 to N$ 6 and in Oshakati and Ondangwa from N$ 1 to N$ 2,50. In Rundu all bundles had the same price, N$ 1. In all markets the dealers had large stocks of firewood waiting to be split in smaller pieces. In the main firewood market in Oshakati it was estimated that approximately 100 cum. was stacked this way.

The study found no evidence that any of these dealers were large operators. It is more likely that the dealers are running a relatively modest activity and that the main purpose is to earn an income and to secure enough capital to finance the continuation of the activity. If any bigger players stand behind these dealers again, their part in the business is likely to be on the financial side; to pay for the costs incurred prior to sales, like paying for cutting firewood and transport.

2.2.2 Firewood from private land

By private land in connection with firewood, is meant the commercial farms in the Central regions of Namibia. On these farms, bush (firewood) is being removed for commercial, agricultural reasons, bush is harvested to be used as firewood in several commercial activities and bush is harvested for own consumption on the farm.

In general the commercial farmers want to control the cutting of firewood on their farms. They are reluctant to outside harvesting teams operating on their farm because they are afraid that outsiders will not behave according to the rules on the farm. In particular, they are afraid of their cattle getting measles from human excrement.

The regulations regarding permits for harvesting, transport and marketing that apply to firewood from communal land, is also applicable to firewood on private land. The difference is that commercial farmers do not have to pay any tariffs when they harvest firewood for sale. In addition to the permits mentioned, an export permit is required for all exporters of firewood.

Farm consumption
Firewood is harvested to be used by the farmer and the employees on the farm. Firewood for the workers on the farm can be regarded as a commercial activity in the sense that it is payment in kind to the workers and therefore a part of their wages. It can also be looked upon as subsistence cutting by people who has access to firewood, which on a bush encroached farm does not have any value.

Firewood for sale
Firewood from the farms are sold in many ways.

It is being sold at roadside on the farms to dealers from towns. The buyers arrange and pay for transport to the firewood markets in town. Particularly the Windhoek dealers are buying their firewood this way and most of the firewood sold in Windhoek is acquired this way.

The farmers also harvest and pack firewood in bags of varying sizes and sell it to petrol stations and shops in the towns. The customers for this packed firewood are people with a higher income than average and that do not buy firewood in the larger firewood markets.

In some cases the farmers tender for deliveries to Government buildings, like schools. In some of these building firewood is used for heating water.

Finally there is some export from the farms to the firewood markets in various towns in South Africa. The farmers make individual agreements with the traders in RSA

Firewood for charcoal production

Firewood is increasingly being harvested for charcoal production as more and more farmers realise that to convert firewood into charcoal is the most economical way of clearing bush. With an efficient charcoal operation the farmer can clear bush and earn income by doing so. Some farmers deliver the firewood to charcoal producers, but the most common practice seem to be that each farmer have their own kilns and burn the charcoal at their farm and deliver it to the larger producers and marketing organisations.

2.3 VOLUMES AND PRICES

The data presented in this section was collected in June 1996. Employees from the Directorate of Forestry and enumerators engaged for the occasion visited Windhoek, Rundu, Ondangwa, Ongwediwa and Oshakati to gather the information. They used pre-defined questionnaires to obtain the required data from random samples of the population and from firewood buyers. Specified tasks were performed to get data on prices of firewood in the various markets. The data collected has been analysed with Kwikstat 4.1, a statistical software program. All questions and a summary of answers are presented in appendix II. The results of the analysis of the data and indications of variance are presented in appendix III together with the assumptions made to arrive at the data presented in this section. Only data and assumptions that are not specified in the appendices, will be specified in this section.

2.3.1 Commercial consumption per person

The starting point for an estimate of firewood consumption in the 5 towns, the subsistence cutting and the national consumption is the monetised consumption in the 5 towns. Ondangwa, Ongwediwa and Oshakati are grouped together under the heading 'Ovambo' .

Table 1: Commercial consumption in kg per person per day in the 5 towns.

Type of user	Town/city	Consumption in N$ per day per person	Price in N$ per kg	Daily Consumption in kg per person
Main firewood users	Windhoek Katutura	0,40	0,48	0,83
	Ovambo	0,27	0,39	0,69
	Rundu	0,14	0,13	1,08
Occasional firewood users	Windhoek Katutura	0,20	0,48	0,42
	Windhoek Main and Khomasdal	0,11	0,63	0,17
	Ovambo	0,16	0,39	0,41
	Rundu	0,08	0,13	0,62

2.3.2 Total commercial consumption in the 5 towns

The following estimates for the 1996 population of the towns are based on the 1995 Residents Survey Report by TRP Associates on behalf of the Municipality of Windhoek. The report covers Windhoek only and the population is estimated to have increased with 5,44% yearly from 1991 to 1995. The report also refers to expected urbanisation for countries in Namibia's situation and based on this information and the expected overall growth for Namibia of 3,1% yearly, it has been estimated that the 3 towns in Ovambo have grown with 5% yearly and that Rundu has grown with 4% between 1991 and 1996.

Looking at the population development in Windhoek 1991 - 1995 it is no longer correct to use the terms Windhoek Main, Khomasdal and Katutura because the city has been expanding beyond Katutura for many years. In the following calculations Windhoek is divided into two parts with part I including previously Windhoek Main and Khomasdal; developed areas where the increased population is a result of densification. Part II includes Katutura and all new areas that are being developed for the immigrants to the city.

Table 2: Total commercial consumption in Windhoek, Oshakati, Ondangwa, Ongwediwa and Rundu.

Town/city	Type of user	Estimated population	Consumption in kg per person per day	Total yearly consump-tion in tons	Price per ton of firewood	Total value of consump-tion in N$
Windhoek I	Occ. users	67.000	0,17	4.157	630	2.619.000
Windhoek II	Main users	78.000	0,83	23.630	480	11.392.000
Windhoek II	Occ. users	47.000	0,42	7.205	480	3.458.000
Windhoek	Total	**192.000**	**0,50**	**34.992**	**499**	**17.469.000**
Ovambo	Main users	40.500	0,69	10.200	390	3.978.000
Ovambo	Occ. users	5.500	0,41	823	390	321.000
Ovambo	Total	**46.000**	**0,66**	**11.023**	**390**	**4.299.000**
Rundu	Main users	17.800	1,08	7.017	130	912.000
Rundu	Occ. users	5.000	0,62	1.132	130	147.000
Rundu	Non-users	1.200	0,00	0		0
Rundu	Total	**24.000**	**0,93**	**8.149**	**130**	**1.059.000**
All Towns	Total	**262.000**	**0,55**	**54.164**		**22.827.000**

2.3.3 Total firewood consumption in the 5 towns

The commercialised consumption in the 5 towns does not cover peoples energy demand. In addition to the firewood they buy, people will be using gas, paraffin and electricity and there will be a certain subsistence consumption of firewood; i.e. people walking or driving to communal areas to collect sticks and twigs for firewood.

This subsistence consumption has not been captured in the data collected for this study and has to be estimated. The degree of subsistence consumption of firewood among the people that are categorised as main users will vary. For some people the alternative is electricity, gas or paraffin. Others will collect firewood irregularly and opportunistically, and some will base a large part of their firewood consumption on collected firewood. The subsistence consumption of firewood in Windhoek is probably lower than in Ovambo which again is lower than in Rundu.

The approach to estimate this consumption has been to exclude main users of firewood with low purchases of firewood per person per day, and calculate the average (median) for the remaining

main users. The logic is that main users of firewood with low purchases per person is using more collected firewood than a person with high purchases.

Table 3: Main users' consumption per day per person in N$ (median).

Grouping	WINDHOEK	OVAMBO	RUNDU
All main users included	0,40 (16)	0,27 (65)	0,14 (50)
The 20% with lowest consumption per person excluded	0,43 (13)	0,33 (53)	0,16 (40)
The 40% with lowest consumption per person excluded	0,67 (10)	0,37 (40)	0,20 (30)

The figures in parenthesis are the number of respondents filling the selection criteria; i.e. they are main users, they do not buy for others and they buy all the firewood for their household.

The consumption per person per day expressed in dollars, is not increasing very much as the lowest consumption rates are excluded. The Windhoek figure increase from N$ 0,43 to N$ 0,67 per person per day when the 40% lowest answers are excluded, but this figure is based on only 10 respondents and is uncertain. The Ovambo and Rundu figures are based on 40 and 30 respondents respectively and are more reliable.

To represent the average total firewood consumption per person per day in the 5 towns, N$ 0,43 has been chosen for Windhoek, N$ 0,37 for Ovambo and N$ 0,20 for Rundu. As mentioned above it has then been assumed that Windhoek will have relatively fewer people that base part of their energy consumption on collected firewood.

Compared to the commercial consumption per person per day, the total consumption of firewood per person per day is 7,5%, 37% and 43% higher for Windhoek, Ovambo and Rundu respectively. To estimate the subsistence consumption of occasional users, the same percentages increase have been used.

Table 4: Total consumption per person per day

Type of user	Town/city	Consumption in N$ per day per person	Price in N$ per kg	Daily Consumption in kg per person
Main firewood users	Windhoek II	0,43	0,48	0,90
	Ovambo	0,37	0,39	0,95
	Rundu	0,20	0,13	1,54
Occasional firewood users	Windhoek II	0,22	0,48	0,46
	Windhoek I	0,12	0,63	0,19
	Ovambo	0,22	0,39	0,56
	Rundu	0,11	0,13	0,89

These estimates have been used to calculate the total consumption of firewood in the 5 towns and the market value. The consumption for Rundu non-buyers is set to the same as the Rundu main users.

Table 5: Total consumption in Windhoek, Oshakati, Ondangwa, Ongwediwa and Rundu.

Town/city	Type of user	Estimated population	Consumption in kg per person per day	Total yearly consumption in tons	Price per ton of firewood	Market value of consumption N$
Windhoek I	Occ. users	67.000	0,19	4.646	630	2.927.000
Windhoek II	Main users	78.000	0,90	25.623	480	12.299.000
Windhoek II	Occ. users	47.000	0,46	7.891	480	3.788.000
Windhoek	Total	**192.000**	**0,54**	**38.160**		**19.014.000**
Ovambo	Main users	40.500	0,95	14.043	390	5.477.000
Ovambo	Occ. users	5.500	0,56	1.124	390	438.000
Ovambo	Total	**46.000**	**0,90**	**15.167**		**5.915.000**
Rundu	Main users	17.800	1,54	10.005	130	1.301.000
Rundu	Occ. users	5.000	0,89	1.624	130	211.000
Rundu	Not buying	1.200	1.54	675	130	88.000
Rundu	Total	**24.000**	**1.40**	**12.304**		**1.600.000**
All Towns	Grand total	**262.000**	**0,69**	**65.631**		**26.529.000**

2.3.4 Total urban commercialised firewood consumption

With an annual growth in the population of 3,1% and an expected urbanisation of 33% in 1996, the total urban population in Namibia is estimated to 550.000. By urban population is meant all people living in proclaimed municipalities with a population above 2.000 in 1991. Some of these towns are in areas with plenty of firewood, like Katima Mulilo, Otjiwarongo and Grootfontein, other are in areas with less firewood, like Swakopmund and the towns in the south. The prices for firewood will accordingly vary from about N$ 100 per ton in Katima to about N$ 200 in Otjiwarongo and probably higher in Swakopmund and in the south. There will also be variations in how much commercialised firewood is consumed per person per day. Following are the assumptions made:

- 288.000 people live in these towns
- 20% of the population are non-buyers of firewood.
- 20% of the remaining population, 46.000 people, are occasional users.
- Occasional users buy 0,50 kg per person per day.
- 80% of the remaining population, 184.000 people, are main users.
- Main users buy 0,80 kg per person per day.
- The price for one ton of firewood is N$ 180.

The estimate of the price is a weighted average of the known market prices in the bigger towns in the regions. For the southern regions the market price is set to N$ 250 per ton. The weighed average for the bigger towns is N$ 240. However, one can expect that the smaller towns, with a population between 2.000 and 10.000, the market price is below this, if they have a firewood market. The average price has therefore been reduced with 25%, to N$ 180 per ton.

Based on these assumptions the total commercialised consumption of firewood in these towns is about 62.000 tons with a value of about N$ 11 mill.

By combining this estimate with the estimate for the 5 towns in section 2.3.2, one has an estimate of the total commercialised firewood consumption in urban Namibia of about 116.000 tons with a sales value in the towns of N$ 34 mill.

2.3.5 Total urban firewood consumption

Based on the same definition of urban population as in section 2.3.4 and the same estimates for population growth and urbanisation, an estimate can be made of the total firewood consumption in urban Namibia. As in section 2.3.4 some additional assumptions must be made:

- 288.000 people live in these towns.
- 20% of the population are non-buyers of firewood, but use the same quantity per person per day as main users.
- 20% of the remaining population, 46.000 people, are occasional users.
- Occasional users consume 0,70 kg per person per day.
- 80% of the remaining population, 184.000 people, are main users.
- Main users consume 1,12 kg per person per day.

Based on these assumptions, the total firewood consumption in these towns is about 110.000 tons. With a price of N$ 180 per ton, the total value is about N$ 20 mill. If we combine this estimate with the one for the total consumption in the 5 towns, the total urban firewood consumption in Namibia is 175.000 tons with a value of about N$ 47 mill.

2.3.6 Total rural firewood consumption

In order to estimate the total firewood consumption in rural Namibia, the population figure has to be estimated since there are no exact data on this. Based on the expected urbanisation mentioned previously and an annual growth for the whole population of 3,1%, the rural population is estimated to increase from 953.000 in the census in 1991 to 1.095.000 in 1996. In the table below the population has been estimated regionally and the consumption per person per day is estimated. Based on this, the total consumption for rural Namibia is calculated.

Table 6: Total consumption of firewood in rural Namibia.

Regions	Estimated rural population	Estimated firewood consumption per person per day in kg	Total firewood consumption in tons
Kavango and Caprivi	195.000	1,50	107.000
Kunene, Erongo, Otjozondjupa, Omaheke and Khomas	210.000	1,30	100.000
Omusati, Ohangwena, Oshikoto and Oshana	625.000	1,00	228.000
Hardap and Karas	65.000	1,00	25.000
Total	**1.095.000**	**1,15**	**460.000**

To put a price on subsistence consumption of firewood is difficult. In this case the estimated price for urban Namibia, excluding the 5 towns, has been used and reduced further with on third. The argument is that subsistence consumers in rural Namibia will put a lower price on their time than the average town dweller. The price used for rural areas is N$ 120 per ton, which puts a value on the total rural consumption of N$ 55,2 mill.

The estimated consumption per person per day for Kavango/Caprivi is based on the figures for Rundu. In these regions firewood consumption is high because it is still available for the rural population and it can be collected in a short time. In the Central regions, the firewood is in general available in large quantities in the form of bush and it is therefore assumed that the consumption is relatively high. In parts of former Ovamboland, firewood is also available in large quantities, but in other parts it is not. The consumption has been set at 1 kg per person per day as an average. The same figure has been used for the southern regions with the same justification.

The consumption of firewood in the rural areas has been termed subsistence consumption in this study. This is a correct term in the sense that the firewood is not bought, but collected. But there are some signs of commercialisation. In former Ovamboland some people are starting to incur cash expenses when they organise their collection of firewood. Because of the long transport they have petrol expenses and expenses for hiring transport. It may not be very common yet, but these are the first sign of commercialisation.

The consumption on the farms is also considered to be subsistence consumption. If the workers' use of firewood from the farm is reflected in the wages, then this is in reality commercial consumption although no money is exchanged.

2.3.7 Export of firewood

There is some export of firewood, all of it to South Africa. Firewood from Okahandja, Windhoek, Otjiwarongo and Gobabis is exported to Cape Town, Johannesburg, Pretoria, Stellenbosch, Bloemfontein and other towns in RSA. There are also cases of exports from Otavi and Grootfontein. The main species are Camel Thorn, Black Thorn and Mopane.

Based on export statistics from mid-November 1995 to end of July 1996, the total volume will be about 700 tons in 1996. With an approximate price delivered in RSA of N$ 500 per ton, the total value of this export is N$ 350.000. Out of this a large part is transport. Transport to Cape Town can be as much as N$ 300-400 per ton, but if the farmer manage to hire trucks returning empty to RSA, the price will be half of that. The farmgate price is set to N$ 100 per ton.

On the whole, export of firewood from Namibia is not a big business, based on the official export statistics. However, it is possible that the official statistics do not reflect the true picture. When an exporter gets an export permit, the permit clearly states the quantity that the exporter is allowed to export, but as the firewood weight is never controlled, it is not verified on the border that the quantity is correct.

2.3.8 Other types of firewood consumption

Firewood is also used in some government buildings for heating water etc. These buildings are usually supplied through tender and the price per ton delivered should be maximum N$ 100.

Firewood is used for cooking and selling food in the markets in the bigger towns. This firewood is bought in the firewood markets at market prices.

This type of consumption has not been measured and no exact data exists. For the purpose of calculation, the total volume is set to 1.000 tons annually with an average price of N$ 270 per ton. This gives a total value of N$ 0,27 mill annually.

Firewood is also the raw material for charcoal and about 35.000 tons will be harvested for this purpose in 1996. The value of this firewood at the kilns on the farm is set to N$ 50 per ton; i.e. a total value of N$ 1,75 mill in 96.

2.3.9 Firewood consumption 1996 - summary

Table 7: Total firewood consumption in Namibia 1996

Firewood market	Commercial Estimated volume in tons	Subsistence Estimated volume in tons	Commercial Estimated value in N$	Subsistence Estimated value in N$
Windhoek	34.992	3.168	17.469.000	1.545.000
Ondangwa, Oshakati and Ongwediwa	11.023	4.144	4.299.000	1.616.000
Rundu	8.149	4.155	1.059.000	541.000
Other towns	62.000	48.000	11.000.000	9.000.000
Rural		460.000		55.200.000
Export	700		350.000	
Charcoal	35.000		1.750.000	
Other uses	1.000		270.000	
Total	**152.864**	**519.467**	**36.197.000**	**67.702.000**

The value of exports is the value delivered RSA.

2.3.10 Demand in 2006

An estimate of the demand for firewood 10 years from now must be based on estimates of the growth in population and an estimate of peoples consumption of firewood per capita.

The Namibian population is expected to grow with about 3,3% yearly for the next 5 years and 3,1% from 2001 to 2006 and reach 2,28 mill in 2006. By 2006, 42% of the population will live in urban areas according to the 1995 Residents Survey Report of Windhoek. This is the only information available and the population estimates below are based on this information.

There are several factors that will influence the consumption of firewood per capita through their influence on firewood prices relative to prices on the alternatives. Changes in disposable income is one (demand), availability of firewood and alternative energy sources is another (supply). One can speculate that consumption per capita should decrease as income increases in the bigger towns, where alternatives are available. However, the opposite could happen since the same towns are estimated to grow with more than 60% the next 10 years, mostly through immigration of poor people from the rural areas. These people are firewood users and will probably remain so for some years after they have moved to the towns.

It is possible that prices develop differently in the five towns that have been surveyed. In Windhoek prices will probably increase as a result of the increased demand, but there is enough firewood in the form of bush within reasonable distance from Windhoek. Rundu is in the same position; there is firewood in the communal areas although the transport distance probably will increase. The situation for the three towns in Oshana is different. Large areas are deforested already and the transport distance is long. As demand increases through a population increase of almost 90% the supply of firewood could be a limiting factor that will increase the pressure on prices. In parts of rural Ovambo, prices may reach prohibitive levels in the form of cash or the time it takes to collect firewood.

One safe assumption in this picture is that the commercialisation of the firewood consumption is going to continue. One reason is the urbanisation and another the increased prices due to shortage of firewood, particularly in former Ovamboland.

In the estimate of the consumption 10 years from now that follows, it has been assumed that all areas, urban and rural, have the same consumption per capita as today and that the percentage of main users, occasional users and non-users remain the same. The estimate is therefore based on growth in population only. A 10% change in consumption per capita for all firewood users would

change the total consumption with about 87.000 tons.

Table 8: Total consumption of firewood in Namibia in 2006.

Regions/Towns	2006 Estimated population	Estimated firewood consumption per person per day in kg	Total firewood consumption in tons
Windhoek I - occasional users	75.000	0,19	5.200
Windhoek II - main users	158.000	0,90	51.903
Windhoek II - occasional users	95.000	0,46	15.950
Ondangwa, Oshakati and Ongwediwa - main users	75.500	0,95	26.180
Ondangwa, Oshakati and Ongwediwa - occasional users	10.500	0,56	2.146
Rundu - main users	31.000	1,54	17.425
Rundu - occasional users	9.000	0,89	2.924
Rundu - non-buyers	2.000	1,54	1.124
Other towns - main users	320.000	1,12	131.634
Other towns - occasional users	80.000	0,70	20.440
Other towns - non-buyers	100.000	1,12	40.880
Total urban	**958.000**	**0,90**	**315.806**
Kavango and Caprivi	236.000	1,50	129.210
Kunene, Erongo, Otjozondjupa, Omaheke and Khomas	252.000	1,30	119.574
Omusati, Ohangwena, Oshikoto and Oshana	757.000	1,00	276.305
Hardap and Karas	77.000	1,00	28.105
Total rural	**1.322.000**	**1,15**	**553.194**
Export			2.000
Charcoal			200.000
Other uses			500
Total Namibia	**2.280.000**		**1.071.500**

The export market is set to 2000 tons just to include it in the table. The size of this market will depend on the same factors in South Africa as mentioned above for Namibia. The charcoal market is estimated separately in section 3. Firewood for other uses is reduced to 500 tons annually on the assumption that public buildings will increasingly be supplied by electricity.

Comparison 1996 - 2006

Table 9: Comparison of consumption in 1996 and 2006

	1996		2006	
Area	Volume in tons	Value in N$	Volume in tons	Value in N$
Urban	175.631	46.529.000	315.806	84.416.000
Rural	460.000	55.200.000	553.194	66.383.000
Other	36.700	2.370.000	202.500	11.200.000
Total	**672.331**	**104.099.000**	**1.071.500**	**161.999.000**

The overall household firewood consumption will increase from about 636.000 tons to 869.000 between 1996 and 2006. This increase of about 37% is the result of growth in population and also urbanisation. Urbanisation leads to lower consumption per capita. The urban areas will increase from 176.000 tons to 316.000 tons, almost 80%. The corresponding increase for the rural areas is

from 460.000 tons to 553.000 tons, about 20%.

The value of the household consumption will increase from about N$ 102 mill. to N$ 151 mill., about 48%. As the prices in towns are higher than in the rural areas, increased urbanisation leads to higher average prices.

3 CHARCOAL

3.1 OVERVIEW

There is not a tradition of using charcoal in Namibian households, as opposed to most other countries in the southern part of Africa. When Namibia still has been producing charcoal for some years, this is explained by the demand from the mining industry. Some years back the mining industry needed about 2.000 tons monthly, but the processes in this industry changed and the demand today is negligible. The increased production that takes place in the Namibian charcoal industry presently is no longer based on the home market, but the export markets in Europe and South Africa.

Charcoal is being produced in the bush encroached central regions of Namibia. For the farmers there are two main reasons for entering this business. Charcoal burning in itself can be profitable for the farmer and give the farm a positive cash flow. In addition, the farmer is clearing the land and increasing its productivity. Charcoal burning is the most economical way of clearing bush and as a result one can observe more and more farmers going into charcoal production.

Most Namibian producers and exporters are aiming for the barbecue (BBQ) markets in Europe and RSA. These markets are not very demanding on product quality; the basic requirements are that the sizes must be right and the charcoal must not be wet. The industrial quality market is much more demanding and requires higher investments by the producers. The prices in this market are 2 - 3 times the prices in the BBQ market. The new plant in Tsumeb, which may be the biggest charcoal plant in the world with a capacity of 18.000 tons of charcoal yearly, is aiming for this market.

Presently the Namibian charcoal industry has a problem with fines. Fines is the charcoal with sizes less than 25 mm and normally 40 - 50% of the production will be fines. Previously the mining industry would buy fines, but this is no longer the case and there is at present no market for the Namibian fines. There is a market in Europe for briquetted fines, but there is no briquetting capacity in Namibia. However, the producers/exporters are planning to go into briquetting.

3.2 COMMERCIAL PRACTISES

3.2.1 Production

The production of charcoal starts at the farms by cutting firewood. From this stage there are two different approaches being used.

One is to transport the firewood to centrally placed kilns and produce the charcoal there. The advantage of this approach is in the control of the production process.. By centralising the stocks of firewood, the producer is able to sort the firewood according to size and species and debark firewood as required for the quality being produced. And the production process can be monitored with advanced technical equipment. For a producer that wants to enter the industrial quality charcoal market and produce large quantities, this approach is probably the only feasible one. The disadvantage with this approach is that the cost of transporting all the firewood to the kilns is going to be high. This approach has been chosen for the new charcoal plant in Tsumeb.

Another, decentralised approach is to burn the charcoal at the farms in smaller kilns closer to the where the firewood is being harvested. The advantage of this approach is in the shorter transport distance for the firewood to the kilns. The buyers and exporters of charcoal produced this way are not in control of the production process, but since they are aiming for the less demanding BBQ market, this is not a major problem. When the buyers receive the charcoal they can check the moisture content and they sieve the charcoal themselves to ensure that only the right sizes are packed.

Charcoal producing farmers are also following two different approaches, one centralised and one decentralised. Some farmers have large kilns centrally placed on their farm and bring the firewood to the kilns. Others use smaller, mobile kilns that follow the harvester(s) as he is moving from one area to another. The reason for choosing this approach is to keep the transport of firewood at a minimum.

It seems that more and more farmers are choosing to use the smallest, movable kilns and to employ people as independent contractors. The farmer supplies the kiln and the tools needed, and allocate the contractor an area to be harvested. The contractor cuts the firewood, burns the charcoal and is paid according to the quantity produced.

3.2.2 Sales

Some farmers sell charcoal packed in 5 kg bags to local petrol stations and shops. But most of the charcoal produced in Namibia is sold to the exporters. At present there are two major exporters in Namibia; The Bush Association and Jumbo Charcoal ltd. These organisations buy charcoal from the farmers, sieve it according to size, pack it in bags as specified by the foreign buyers and transport it to the customers in the case of RSA or to the ports for shipping, in the case of Europe. The ports used are either Walvis Bay or Cape Town, depending on the transport rates that can be negotiated in each case.

The situation for the exporters is that they enter into contracts with the foreign buyers for specified quantities long before they have bought the firewood from the producers. In contracts with European buyers, the exporter is usually required to deliver large quantities over a very short period. This schedule is dictated by the short European BBQ-season. Such a short delivery period requires the exporter to receive charcoal over a long period from the producers and to store it, awaiting export. This drains the liquidity of the exporters and they incur high financial costs, but with the short season in Europe, there are no alternatives. There have been cases where Namibian exporters have not been able to deliver the quantities according to contracts.

The buyers/exporters are also buying the fines from the producers. They buy at a much lower price than the charcoal, but as they still do not have the possibility of briquetting, this is also a drain on liquidity.

3.3 VOLUMES AND PRICES

3.3.1 Domestic market

Nobody knows the domestic market's size. There is a domestic BBQ market in the towns and it supplied by individual farmers that pack and deliver the charcoal to petrol stations and shops in these towns. In Windhoek the retail price for charcoal packed in 5 kg bags is N$ 1.50 per kg, or N$ 1.500 per ton.

An estimate, probably on the high side, is that this market is 1.000 tons yearly with a retail value of N$ 1,5 mill.

3.3.2 Export markets

The export sales in 1996 is estimated to 6.000 tons, all of it for the European and South African BBQ markets. The farm value of this quantity is about N$ 2,4 mill, the value FOB Walvis Bay about N$ 6,6 mill and the value delivered in Europe about N$ 9 mill. The retail value in Europe will be more than N$ 20 mill.

3.3.3 Demand in 2006

There are no signs today of any marked increase in the domestic consumption of charcoal, not in the BBQ market and not for household cooking. However it is in the charcoal industry's interest to try to increase the domestic market. To convert the BBQ market from firewood to charcoal and to increase charcoal use for cooking. The increase in the cooking market will be helped by the scarcity of firewood in parts of the country and by the economics of transporting charcoal into these areas instead of firewood.

Based on the above reasoning, the domestic charcoal market in 2006 has been set to 10.000 tons, 3.000 tons in the BBQ market and 7.000 tons in the cooking market.

The Namibian charcoal industry has been expanding in the export markets for some time and is likely to continue to expand. More and more farmers are interested in starting up production and their buyers/exporters have been through a learning period and have now well established contacts in the export markets. One cannot see any limitations on the production side of this industry. The limiting factor is the marketing side and the industry's ability to finance its own expansion.

The size of the European market is uncertain. Estimates of European imports range from 115.000 to 215.000 tons yearly. Namibia has a very small portion of this market today, but with the potential production in Namibia there is a chance that this country alone can influence the prices in the market when the quantities start to increase. This would make a further expansion in this market less attractive and even unprofitable. There is nothing to indicate that Namibian exporters have lower unit costs than the competitors from other continents so the result of decreased prices may be that the Namibian industry is the loser. To counter this it is advisable to try to diversify sales to other markets.

Another advantage would of course be if the Namibian charcoal industry can prove that their production is more environmentally sustainable than the competitors'. Considering that the Namibian industry is built on a raw material source, invader bush, that has a negative value on cattle farms, this is feasible.

It looks like the profitability today may not be high enough to finance future expansion, particularly as long as there are no alternatives for the fines. The expansion on the production side is not the problem; the investments for the farmers are not high and as mentioned earlier more and more farmers see charcoal production as a way of clearing farm land and earn extra income at the same time. It is the buyers/exporters that may get problems financing their expansion. They are paying the farmers cash for the charcoal delivered, then storing the charcoal for long periods before they can ship and finally they are giving the buyers credit for some time after delivery has taken place. They are incurring high financial costs and are draining their liquidity.

The following estimate of the charcoal production 10 years from now is assuming the industry will mange to solve the problems mentioned above. They will continue their expansion in the present export markets and expand into other markets, they will start briquetting the fines and will be able to sell the briquettes, they will manage the financial side of the expansion. It is in other words a very optimistic estimate. Based on this, the expansion in the export market is set to 40% the first year, 30% the following two years, 20% the following 3 years and 5% thereafter. This brings the total export quantity to 30.000 tons in 2006. In today's prices the farm value will be N$ 12 mill and the FOB value in the exporting port N$ 33 mill.

4 POLES FOR CONSTRUCTION AND FENCING IN THE NORTH

4.1 OVERVIEW

The Ovambo traditional building method for their homesteads is very demanding on the wood resources. Wooden poles are used in the construction of huts, inside corridors and outside walls, kraals for animals and storage facilities. Ideally all walls should be completely closed. In addition most of the homesteads will have fences around their fields to protect the crops against animals. These fences are not always completely closed; some use big poles with wire in between them and small sticks hanging in the wires.

To get enough wood for the homesteads has been a problem for many years. With the increase in population the resources close to the homesteads have not been adequate to support this wood intensive construction method. One can see the result of the scarcity of poles in the form of neglected maintenance of the fences and increased use of other materials. Bricks and cement are used in the huts, millet stalks, branches and bundles of sticks are used in the palisades and corridors. Iron sheets and live plants can also be observed.

4.2 COMMERCIAL PRACTISES

Most of the poles for the homesteads are still being collected by the family. One can see the odd truck loaded with poles, but this is the exception. Considering the number of poles required for an average homestead, buying them is not an option for most people.

4.3 VOLUMES AND PRICES

4.3.1 Consumption of poles

To estimate the volume of wood in the homesteads, 45 homesteads were visited and surveyed. A summary of the result can be seen in appendices II and III.

The teams surveying the homesteads selected them by going into the administrative region they wanted to survey, Oshana, Oshikoto and Ohangwena. They were entering the region from Ongwediwa and would stop as soon as they saw homesteads in the region. They would then visit the senior headman in the area and explain the situation to him. Together with a junior headman the homesteads to be counted were picked. The team leader would ensure that small, medium sized and big homesteads were included.

Although the homesteads can be said to be picked at random, it is clear that this method does not ensure that the sample picked is representative for calculations of the total use of poles in former Ovamboland. By surveying homesteads close to the three major towns in Ovamboland, in areas that have experienced deforestation for many years, there is a chance that the sample of 45 homesteads represent an average of homesteads in decline. In other parts of Ovambo the situation may be better.

All poles in the homesteads were not counted. Huts that were covered with mud were not counted and poles in the roofs were not counted. Kraals and fences around the fields were not included.

The calculations in table 10 below are based on the data in appendices II and III. 0,5 meters have been added to the average heights of the poles to include the underground part of the pole.

Table 10: Average sizes of poles in 45 homesteads

Size of homestead	Number of homesteads	Average no.of poles	Average diam. in cm	Average height in m.	Cum. in homestead
< 1000 poles	20	682	7,80	1,87	7,72
1000 - 2000 poles	13	1.446	8,55	1,84	19,42
> 1000 poles	12	2.672	7,33	1,71	24,91
All homesteads	45	1.434	7,70	1,78	15,22

In the estimate it has been assumed that 0,5 meters of the pole is underground

Compared to other surveys of the same subject, the quantities above are small, also considering that not all poles have been counted. If we compare the quantity for middle sized homesteads, about 20 cum. with the quantity estimated in another recent study ((Round Wood Use at Homestead Level in Northcentral Namibia - Ovambo, with special references to Outapi Constituency, J.S.Hailwa), the comparable quantity is 36 cum, 90% higher. The comparison indicates that the 45 homesteads surveyed are smaller than average and that the areas surveyed are amongst the worst affected in former Ovamboland , where other material on the average are used more often than elsewhere.

Another point must be mentioned. The sample contain small, medium sized and big homesteads, but there is no way of knowing if the ratio between the three groups is representative for all homesteads in the regions. 20 of the homesteads in the sample, representing about 45%, are homesteads with less than 1000 poles counted. For this reason the average for all homesteads has not been used in the following calculations, but the average for the middle sized homesteads. In the study referred to above (J.S.Hailwa),the kraal, roofing poles and field fences are estimated to 44 cum. This estimate of the areas not covered in the survey has been used, bringing the total consumption to about 65 cum.

No official figure has been found for the number of homesteads in former Ovamboland. The median number of people in each homestead in the 45 homesteads surveyed was 12, as opposed to an average household size for the rural population in the 1991 census of 5,4. The following assumptions are based the Namibia Household Energy Assessment (NISER, 1992). This assessment covered 200 households in former Ovamboland, whereof 8% in urban areas.

- The average number of people in each household is 8,13
- 67,5% of the population live in traditional homesteads
- 24% live in a mixed dwelling type; i.e. a combination of modern and traditional material
- 5% live in modern houses; typically with brick walls and iron sheets
- 3,5% live in houses composed of a mixture of non-traditional materials.

It is assumed by this study that of the 24% mixed dwellings, 50% of the material is traditional poles and that these dwellings have the same size as other homesteads.

The estimated 1996 population in the four regions, Omusati, Oshana, Ohangwena and Oshikoto, is 724.000, up from 633.000 in 1991. Out of these about 99.000 people live in urban areas and 625.000 in rural areas, but the above assumptions are applied to the whole population. With an estimated volume in each traditional homestead of 65 cum., the total for the four regions is as specified in table 11 below.

Table 11: Standing volume of wood in homesteads

Type of homestead	Population by homestead type	Number of homesteads	Consumption of wood in cum.
Traditional homestead	489.000	60.100	3.906.500
Mixed modern/traditional	174.000	21.400	695.500
Modern house	36.000	4.400	0
Mixed non-traditional	25.000	3.100	0
Total	**724.000**	**89.000**	**4.602.000**

4,6 mill cum. corresponds to about 3,3 mill tons. The rural average firewood price for the country has been set to N$ 120 per ton. The prices in former Ovamboland is on the average higher than for the country so a price of N$ 150 per ton has been used to estimate the value to N$ 495 mill.

The median number of years it takes before poles are replaced is 9,5 years. In this figure there are 7 homesteads more than 15 years old that has not had any poles replaced, 3 of them more than 50 years. Based on this replacement rate, the annual quantity needed for replacement is 484.000 cum, or 347.000 tons. The annual cost of replacement using N$ 150 per ton is N$ 52 mill.

Because mopane poles are increasingly difficult to find, other poles with lower resistance are being used. If we based on this, assume that the replacement rate in the future will go down, e.g. to 8 years, the total annual quantity needed increase to 575.000 cum., or 413.000 tons.

One point must be mentioned regarding the replacement of poles and the supply of firewood. Poles are usually replaced because the underground part is rotten and it breaks. A broken pole can be used again on the same spot or on another spot. However, when the height gets to a certain minimum it can no longer meet its function as a pole and it is then used as firewood. In the survey 6.396 poles were measured, most of them were above 1 meter in length, but 63 (1%) were below 1 meter. The lowest pole found was 0,6 meters. If we assume that poles below 0,6 meters are used as firewood, this represents 34% of the average pole. 34% of the annual required replacement of 347.000 tons is 118.000 tons. This represents almost 52% of the estimated 1996 consumption of firewood in rural areas of former Ovamboland.

How much firewood that is collected this way is of course uncertain and the calorific value of this firewood has probably decreased, but the point of the calculation above is to indicate that the palisades and fences in these regions are also a major supply of firewood. The standing volume of poles can be looked upon as a large stock of firewood.

4.3.2 Demand in 2006

As for firewood the demand the next 10 years will depend on the growth in population and the relative prices of poles compared to the alternative materials.

The population in the four regions is estimated to grow to 934.000 in 2006, with 86.000 people living in Ondangwa, Oshakati and Ongwediwa and 91.000 people living in other towns. A total of 757.000 will live in the rural areas.

There is reason to believe that the price for poles, in the form of cash or in the form of time it takes to collect, is going to increase compared to alternative materials. This study has not checked prices for alternative materials, but references made in other studies, indicate that these materials already are relatively cheaper than poles. It is mainly cultural reasons that explain the continued demand for poles compared to these materials. With this in mind the assumptions made for the 1996 estimate are modified as follows:

- The average number of people in each household is 8,13
- 40% of the population live in traditional homesteads
- 47% live in a mixed dwelling type; i.e. a combination of modern and traditional material
- 8% live in modern houses; typically with brick walls and iron sheets
- 5% live in houses composed of a mixture of non-traditional materials.

It is assumed in this study that of the 37% mixed dwellings, 40% of the material is traditional poles and that these dwellings have the same size as other homesteads.

Table 12: Standing volume of wood in homesteads in 2006

Type of homestead	Population by homestead type	Number of homesteads	Consumption of wood in cum.
Traditional homestead	374.000	46.000	2.990.000
Mixed modern/traditional	439.000	54.000	1.404.000
Modern house	75.000	9.200	0
Mixed non-traditional	46.000	5.700	0
Total	**934.000**	**114.900**	**4.394.000**

4,39 mill cum. corresponds to about 3,15 mill tons. The total decrease in standing volume of 208.000 cum. from 1996 to 2006 corresponds to an annualised decrease of 0,5%. Considering that the number of households increase with 29% in this period, this represents a substantial decrease in pole consumption per household.

Assuming an annual replacement rate of 8 years in 2006, about 550.000 cum. of the above volume corresponding to 394.000 tons needs to be replaced in 2006.

5 TIMBER

5.1 OVERVIEW

The timber production in Namibia is very small. There are two larger sawmills in the country, Katima sawmill with a capacity of 20.000 cum. per year and Rundu Sawmill, also with a capacity of 20.000 cum. A small sawmill in Bushmanland has a capacity of 600 cum. and DBC has a portable sawmill with a capacity of 500 cum. The Katima and Rundu Sawmill have been out of operation since 1993 and 1994 respectively. The Bushmanland sawmill was out of operation in the beginning of 1996, but started operation again in September 1996 on a 6 months concession of 250 cum. The portable sawmill is presently out of operation.

The large sawmills are owned by the Government of Namibia, but were until they stopped operated by private companies on contract. In their last years of operation, the sawmills had concession far below their capacities, about 6000 cum. Even if they had larger concession, it is doubtful that they would be able to fill them without major investments to upgrade the mills. The Government does not see it as its business to run sawmills and is accordingly looking for alternatives to owning the mills. At present there is a possibility that DBC may take over the Rundu sawmill and run it on a concession of 3.000 cum.

The concessions given to the sawmills are not based on an inventory of the forest where they are collecting the logs. An inventory is underway in Bushmanland so one can hope that future concession for the small sawmill there will be build on a realistic picture of the resource situation.

The timber produced from the Namibian sawmills at present is not for the building industry, but is used in the furniture production in Windhoek. A small portion is being sold in the country. These

furniture producers are importing most of the hardwood they need.

The main timber consuming sector in Namibia, the building industry gets all its timber from local importers and wholesalers that in turn imports it from RSA. The timber comes from sawmills in RSA that are based on harvesting from local pine and eucalyptus plantations.

5.2 COMMERCIAL PRACTISES

There is not much to be said about these practises for the timber produced in Namibia. One producer in Bushmanland has a concession of 250 cum. The DFO in Bushmanland decides where the logs can be harvested and the sawmill are only allowed to harvest logs with a diameter dbh of 45 cm or above. They are harvesting kiaat only. The sawmill has a truck and is harvesting and transporting the logs back to the sawmill themselves. There the logs are measured by the DFO and this is the basis for the settlement. When the timber has been produced almost all of it is transported to Windhoek where the same company is using it in its own furniture plant. Some of it is sold to other furniture plants in Windhoek.

The imports of softwood and hardwoods is also a fairly uncomplicated business. The wholesalers and importers in Namibia are in direct contact with the sawmills in RSA and are covering their requirements directly from them. The sales in Namibia is through their outlets spread out over the country. A large builder can probably contact the same sawmills directly and import to larger projects.

Some hardwood timber is being imported, again for the furniture industry mostly. The species is dolf, which is the South African name for kiaat.

5.3 VOLUMES AND PRICES

5.3.1 Consumption of timber

The only producer of Namibian timber for the time being, is paying N$ 100-200 per cum. for the kiaat logs they are sawing. The selling price for the timber produced is N$ 2.800 per cum. in Windhoek for grade A, the best quality. Imports of Dolf to Namibia is paid by N$ 6.000 per cum. The difference to the locally produced kiaat timber is that the imported timber is kiln-dried as opposed to the local timber that is air-dried. The large price difference may also be explained by quality differences.

Another type of timber imported is Mirante at a cost of about N$ 3.200 per cum. delivered Windhoek. The total imports of hardwoods are estimated to about 1.700 cum; i.e. it has grown with 5% yearly since 1990 (Siyambanga).

The softwood imports in 1996 will be approximately 25.000 cum with an approximate retail value of N$ 25 mill. The prices for rough timber vary from N$ 800 - 1.000 per cum. For planed and profiled timber the price can reach several thousand per cum, but the quantity is small.

5.3.2 Demand in 2006

The future demand for hardwoods will depend on the development in the furniture/joinery business. This business will in general depend on the general economic development for the people that can afford to buy this kind of furniture. For this analysis we have assumed that the growth will depend on population growth and urbanisation rate in the towns . The expected growth in imports of hardwoods is 5%.

The imports of softwood have grown with 5% yearly since 1990. It is expected that this growth will continue. The softwood used in small houses is very little, in medium houses a bit more and even

more in big houses. With the continued urbanisation that is expected in Namibia it is assumed that the growth is going to follow the growth of population in the towns; i.e. about 5%.

Import	softwoods	40.000 cum.
import	hardwoods	2.700 cum.

If Namibia has a local production in 2006 it is likely to be based on imported raw materials. It is assumed that production based on local raw material will be nil.

6 CARVINGS

6.1 OVERVIEW

Much of the information in this overview is from "A Survey of Natural Resource Based Craft Production and Marketing in Namibia, M.E:Terry, F.J.Lee, K. le Roux". This is a comprehensive report on crafts production in Namibia. Most of the Namibian made wood carvings originate in Kavango region where there is a wood carving tradition. This activity may not be very important on a national level, but for the region and the people involved, it is important. The kiaat is the favoured species to carve, because it is easier to work than some the other hard and attractive species. For most of the carvers this is seasonal work. In the planting season many of them will be working on their land.

There are carvers in Caprivi and former Ovamboland too, but not as many as in Kavango and the products from these regions are mostly sold locally.

In addition to the locally made carvings, a substantial quantity of imported carvings from Zambia, Zimbabwe, Malawi and other countries are sold, particularly in Windhoek.

Some of the NGO's are involved in the carving sector. Their emphasis is on the organisational side and they try to increase the value added by the carvers, by looking at purchases of raw materials and the marketing side.

The quality of the products is also in focus and everybody agrees that it can be improved, both in design and in craftsmanship. Some carvers seem to lack the ability or the will to make high quality products and some even use wet wood. This study found that people in general believe the Namibian carvings are of low quality and cannot compete with imported carvings.

There is not much co-operation between the carvers, but one marketing organisation has been established, Mbangura Carvers, with 180 members. A carver can be accepted as a member if the products he is producing is suitable for the organisation and of high enough quality. Membership costs N$ 20 per year and sales through Mbangura is charged with 20% of the sales value.

6.2 COMMERCIAL PRACTISES

The carvers usually make the carvings at their homes in Kavango. Some carvers may share a place of work, but they are still operating independently. When they have enough carvings they bring them to the market and there are several outlets.

If the carver is a member, he can try to sell the products through Mbangura Carvers. This marketing organisation can sell carvings on commission. They have arranged trips to RSA with mixed results; they managed to sell products, but it took too long.

The retailers in Windhoek may visit Kavango and buy directly from the carvers.

A large portion of the carvings are sent to Okahandja where there are two important markets. The main buyers are tourists that pass. But again some of the retailers in Windhoek may visit and buy for their shops. There are also some street markets in Windhoek that are selling carvings from Okahandja/Kavango in addition to imported carvings. Some of the shops in Windhoek sell only imported carvings to avoid competition with the street hawkers.

The raw material for the carvings is collected locally on communal land. When wood is collected for a commercial activity like this, the regulation is that the carver should pay a tariff of N$ 400 per cum. to the District Forestry Officer. This is probably not done by everybody.

The collection of raw material from the forest varies. For those that need a few small pieces, there are no problems to find them and they can carry them home. Others need large stems to be cut into planks and brought back to their place of work. This will involve finding a large enough tree, cutting it down, pitsawing and transport. The carver cannot do it alone and have to pay up to four people to help him, he has to feed them while they are in the forest and pay for transport of the planks. It is only the carvers that are doing well that is able to go through with an operation like this. When the sawmill in Rundu was in operation, these carvers did not buy much of their raw material there, they preferred the method described above. Undoubtedly because of the prices involved.

6.3 VOLUMES AND PRICES

6.3.1 Consumption of wood

The carving sector is a very informal sector in Namibia. The carvers themselves do not keep records of what they produce and sell, and neither do the marketing organisation. This study was not able to find anybody with any accurate information on volumes and prices. Following are some examples of the information the study has been able to collect:

- A carver needs about 10 trees yearly according to Mbangura Carvers. The same estimate from others vary between 2 and 20.
- In A Survey of Natural Resource Based Craft Production and Marketing in Namibia (M.E:Terry, F.J.Lee, K. le Roux), it is referred to a study where the yearly income of 500 wood carvers in Kavango is estimated to N$ 1.000 - N$ 2.000 yearly.
- In the same study a production model for a wood carver estimates the total value of the production to N$ 1.840 and net income per day worked (144 per year) to N$ 8,64.
- According to Mbangura Carvers, a carver specialised in furniture can produce 10 tables with chairs yearly, with a total retail value of N$ 27.000.
- In our own survey of the Okahandja market we found that the median asking price per kg was N$ 40 and median asking price per day worked on the carving, N$ 18,33.

This information is conflicting. One explanation may be that the persons giving the answers have different segments of the wood carving activity in mind when they answer. Another explanation is probably that people do not know much about the volumes involved and they are guessing.

The figure of 10 trees per carver per year seem to be on the high side as an average. The figure was given by a maker of tables and chairs who will need more trees in a year than the average carver. If this figure is correct it means that each carver use 4,3 cum. (diam=45 cm, height=2,7 m) per year and that he sells 1,5 tons of carvings every year if we assume a recovery rate of 50%.

If we base an estimate on the Okahandja figures, the average weight for the items sold was 2,6 kg and the average number of days worked was 5. Assuming the carver work for 200 days in a year, this gives a total quantity sold of 104 kg yearly. This is less than 7% of the estimate based on 10 trees yearly.

If we assume further that a carver working 200 days yearly earn N$ 2.550, the income per kg in the two estimates is N$ 24,50 and N$ 0,91 respectively for the Okahandja estimate and the estimate based on 10 trees yearly.

These two estimates may be closer than it appears as we do not know how big trees the Mbangura Carvers' estimate was based on. The Okahandja figures are probably representative for one segment of the carvings market only; the travelling tourists. Most of the tourists visiting Okahandja will buy smaller items for practical reasons, their flight being one of them. This market will also have higher prices than the other segments of the market like utensils. A mortar of about 5 kg was offered to the study team in Kavango and the price was N$ 17. For these reasons it is therefore reasonable to assume that the asking price in Okahandja per kg of carvings is higher than the average.
The estimate of the total consumption of wood for carvings is based on the following assumptions:

- There are 1.100 carvers
- The carvers work 200 days yearly
- The average weight of a carving is 5 kg
- The average time it takes to make a carving is 5 days
- The recovery rate is 50%; i.e. out of 1.000 kg of wood, the carver gets 500 kg of marketable product
- Average sales price per kg at the carvers place of work in Kavango is N$ 8.

This gives a yearly consumption of wood of 400 kg per carver and a total wood consumption of 440 tons. The value in Kavango is N$ 3,52 mill.

This estimate is uncertain. The number of carvers and the number of working days is not known. As explained above the average weight and the number of days worked is also uncertain, as well as the average price per kg of carvings.

It should also be mentioned that if the carvers need 440 tons yearly, the actual quantity of standing volume in the forests that is removed may not be the same. This depends on their harvesting methods.

6.3.2 Demand in 2006

It is assumed that the increase in tourism will be about 5% yearly and the general increase in the population will be 3,1% yearly. If we assume the annual growth in this market to be 5%, the quantity will be about 700 tons in 2006.

7 MOPANE ROOTS

7.1 OVERVIEW

In the South-East of Kunene region, mopane grows as a shrub with underground stems. Due to the harsh conditions in this region, the mopane shrub often dies from stress. When the shrub dies, the underground stems, referred to as mopane roots, are harvested and processed into ornamental wood.

The mopane grows in neighbouring countries as well, but the dead roots from these countries cannot be processed like the mopane from Kunene, and is not sought after. The difference in climate and soils may explain the difference in workability and characteristics. As a result of this difference, Namibia has a natural monopoly on dead mopane roots.

According to a farm survey done by the Directorate of Forestry in the Outjo district, there are about

530 kg of dead mopane roots per hectare in this district and the annual sustainable harvesting quantity is about 1.700 tons. The Directorate has set the allowable quantity to be harvested to 1.250 tons.

Another root being exported, but in a very small quantity, is Vaalbos.

7.2 COMMERCIAL PRACTISES

There has for some time been only two buyers of mopane roots, one in Namibia and one in RSA. A third may be on his way into the market. These buyers are the only alternatives for the farmers when they want to sell their roots. The usual procedure is that the farmer contacts the buyer when he has harvested a certain quantity. The buyer sends a truck to collect it and bring it back to his processing plant.

There is only one processing plant in Namibia. There used to be one more, in Outjo, but this plant was closed recently and the only remaining plant is the one in Okahandja. The roots are sandblasted, graded, weighed and packed for export in the processing plants.

After processing, the roots from the Namibian exporter is transported to Walvis Bay, from there to Cape Town where they are reloaded and shipped to Europe, Asia or North America. The processed mopane roots are mainly used in fish tanks and in floral arrangements.

The unprocessed mopane roots are transported directly from the farms to the processing plant in RSA.

7.3 VOLUMES AND PRICES

7.3.1 Present demand

The mopane roots are mentioned in several other studies and the estimated exported quantity is usually given as 1.200 tons or a little more. The estimated quantity harvested given to this study is approximately 900 tons in 9 months; i.e. a quantity that is consistent with the studies mentioned. However, according to the official export statistics, the total quantity exported from 16/11/95 to 31/7/96 is 444 tons, indicating a yearly level of about 625 tons. There is a discrepancy between these figures. As for export of firewood, the roots are not weighed at the border to RSA and there is accordingly no confirmation that the quantity on the export permit is the quantity actually leaving the country.

Based on the export statistics the quantities and income for 1996 is shown below.

Table 13: Estimated quantity and value of 1996 exports

Export product	Quantity in kg	Value in N$
Processed roots rest of the world - FOB value	275.000	1.100.000
Processed roots for RSA - FOB value	40.000	80.000
Unprocessed roots RSA - FOB value farm	310.000	62.000
Total export	625.000	1.242.000

Some Vaalbos is included in the above quantity. Vaalbos demand a higher price than mopane, due to the supply situation.

7.3.2 Demand in 2006

If the mopane roots are not overexploited, and the latest survey by the Directorate of Forestry is meant to avoid that, the harvesting of mopane roots will continue and it is reasonable to assume that the harvested volume in the future will be the total allowable quantity, 1.250 tons.

8 SOCIAL COSTS AND BENEFITS

In the preceding chapters, the 1996 volumes and prices have been estimated for the six wood based products covered in this study. To value these wood based products the market prices have been used when these are available. If they were not available, they were estimated.

In this section the main issue is if these six wood based products have social costs or benefits attached to the use of them. We will say that this is the case if there are differences between the estimated market value of these products and their real, social value. If the social value of the product is higher than the market value there are social costs involved; i.e. the market value does not reflect the real value of the product. The opposite is the case if the social value is less than the market value.

In the case of wood based forest products the real social value is closely connected to the level of exploitation of the wood resources. If the wood resources are exploited in a sustainable manner one can accept the market price as the correct social value of the resource; the quantities taken out of the forest are not more than the annual growth and the other values connected to species or the forest as a whole, are not diminished. If however, the resources are overexploited and the total volume decreases or areas are deforested, there is reason to assume that the market price paid by the users does not reflect the full social value of the products.

Since the deciding factor in evaluating the social costs and benefits connected to the wood based products is the ongoing exploitation of the resources, it would have been an advantage to have up to date inventories of the resources and data on annual growth. As this information is not yet available, the viewpoints on the exploitation are based on observations and other studies made.

8.1 TOTAL ECONOMIC VALUE

An estimate of the total economic value of the savannas and woodlands of Namibia would involve a valuation of the direct and the indirect use values of theses resources. The direct use value of forests are associated with the consumptive value of marketed and non-marketed products like firewood, poles, timber, fruits, fodder, medicines, animals etc. The non-consumptive value of recreation, tourism and science are also direct use values of these resources. In addition the savannas and woodlands of Namibia have indirect values as watershed protection, soil protection, protection of biodiversity etc. Finally they have an existence value and people may value the option of using the resources some time in the future.

To value the wood resources of Namibia in this perspective has not been possible for this study, but an effort to value some of these uses has been made and the results can be seen in "The Most Important Functions of the Forestry Sector in the Namibian Economy, A.Marsh, Directorate of Forestry, Windhoek. March 1996". This study has made use of the findings in the report, but amended some of the results to be consistent with the previous sections relating to volumes and prices. Refer to appendix IV for the original values and the amended ones.

In the report the total economic value of forest products in Namibia is estimated to about N$ 1 billion yearly. The highest values, about 90% of the total, are connected to construction poles, tourism, crop production, firewood, medicines and kraals. Indirect use values and option/existence values are

not included. After amending the volumes and prices for the six forest products that are focused in this study, the comparable total yearly economic value is N$ 680 mill.

Out of this N$ 680 mill., it is estimated that about 70 mill is the total economic value derived from the bush encroached Central regions in the form of firewood (as firewood and firewood for charcoal) and mopane roots.
Out of the remaining N$ 600 mill, about N$ 220 mill is estimated as the savannas and woodlands contribution to wildlife based tourism. It is assumed that N$ 100 mill of this stems from former Ovamboland, Kavango and Caprivi. The total economic value of the wood resources in these regions is accordingly N$ 490 mill yearly. This is the figure used in the following sections to compare to the market prices paid and evaluate the social costs and benefits.

When one looks at the social costs connected to wood based products in Namibia, one has to make some distinctions based on the resource situation. This situation is varying between the regions in Namibia. In Kavango, Caprivi, Omusati, Oshikoto, Ohangwena and Oshana the commercial and subsistence consumption of firewood and poles comes from communal land. In Windhoek and the Central regions most of the firewood comes from private land, but also some from communal land. The social costs connected to the products surveyed in this study, will be looked at regionally.

8.2 FORMER OVAMBOLAND, KAVANGO AND CAPRIVI

8.2.1 Firewood, poles for construction and fencing in the North.

Firewood, construction poles and fencing poles are basically the same thing. Poles are straighter and longer and may demand a higher price because they take longer to find, but they are basically the same as firewood. One can say that firewood is a pole cut into smaller pieces. For this reason they are grouped together. Following are the estimated quantities and values of firewood and poles consumed in these regions.

Table 14: Consumption of firewood and poles valued at market prices

Region	Product	Quantity in tons	Value in N$
Ondangwa, Ongwediwa, Oshakati	Firewood	15.167	5.915.000
Other towns in former Ovamboland	Firewood	20.243	3.681.000
Rural former Ovamboland	Firewood	263.000	31.500.000
Rural former Ovamboland	Poles *	347.000	52.050.000
Rundu	Firewood	12.304	1.600.000
Other towns in Kavango/Caprivi	Firewood	8.785	1.600.000
Rural Kavango/Caprivi	Firewood	81.900	9.800.000
Total		748.399	106.146.000

* This quantity is the annual replacement needed. The poles actually replaced is likely to be lower.

According to this estimate, the people in these regions use 748.000 tons and pay N$ 106 mill for their firewood and poles, either in the form of cash or the use of time to collect the products. Judging by other studies and observations it is safe to say that this quantity is too high; parts of former Ovamboland are deforested already or reduced to shrubland and the pressure is increasing on the remaining woodlands. In Kavango and Caprivi the situation is very different, but there is pressure on certain species and the fact that the price for firewood in Rundu, situated in a forested area, is N$ 130 per ton, indicates a growing scarcity.

If we assume that the harvested quantity is twice as high as the sustainable level, the forest resources are reduced with 374.000 tons yearly with a 1996 value of N$ 53 mill. If we further assume that the total yearly economic value of N$ 490 mill represent a 5% return on the resource base, the

overexploitation is going to reduce the resource base with about N$ 500 mill in 10 years, at which point the annual total economic value will be N$ 465 mill, or N$ 25 mill less than today.

The degree of overexploitation can only be answered through an inventory, but the conclusion is that there is overexploitation as a result of firewood and poles consumption and that the market prices paid does not reflect the full social value of the savannas and woodlands in these regions.

8.2.2 Timber, carvings

According to this study, the total quantity harvested by carvers and sawmills in 1996 will be about 700 tons. This is not very much, but most of it is one species only, kiaat. When the sawmills in Rundu and Katima Mulilo were in operation, they were also based on kiaat. This species has accordingly been sought after for many years and the indication is that this is beginning to show in the form of increased scarcity of trees of the right sizes; the Directorate of Forestry does not allow sawmills or carvers to use wet kiaat below 45 cm in diameter.

The carvers in Kavango say they have to go far into the forests to find the right sizes. The only sawmill in operation at present, in Bushmanland, has to harvest kiaat 20 - 30 km away from the sawmill to get the right sizes according to reports. A potential sawmiller in Rundu is considering other species because he believes the transport distance for kiaat will reduce his profitability. The final answer to whether the kiaat or other species are overexploited or not must come from an inventory, but lacking this it is assumed that individual species and the forest is overexploited.

Another indication that kiaat may be underpriced is the price per cum. of locally cut kiaat in Windhoek, compared to the price of dolf per cum. delivered in Windhoek from RSA. Dolf is the same species as kiaat. The local kiaat sells for N$ 2.800 per cum. compared to the dolf price of N$ 6.000 per cum. for the same grade, grade A. There may be some differences between the two, the dolf is kiln-dried and the kiaat air-dried, but not enough to explain a difference in price of more than 100%.

The official price that carvers are to pay for trees is N$ 400 per cum. However, when they pay the suspicion is that they are paying for much less than they actually harvest. What they really pay per cum. harvested is difficult to say. The sawmill in Bushmanland is at present paying between N$ 100 and N$ 200 per cum. of kiaat harvested.

These data lead to the conclusion that the kiaat and maybe some other species are overexploited and that the present prices do not reflect the full social value of these species.

8.3 THE CENTRAL REGIONS

8.3.1. Firewood, charcoal

These are grouped together as they are both fuelwoods and firewood is the raw material for charcoal.

The bush encroached Central regions are in another firewood situation than the Northern regions. There is no pressure on the resources, on the contrary there is too much of it. Firewood in the form of bush standing in the farmers' fields have a negative social value. The productivity of the cattleland is reduced and the farmers have reduced their cattle stocks. Income for the farmers is reduced and tax revenue to the Government is reduced.

In addition to creating jobs and in the case of charcoal, export income, these activities have the addition social advantage that they clear land and increase its productivity. Figures given to this study indicate that the land value will increase with between N$ 50 and N$ 100 after it has been cleared, depending on the degree of encroachment. If we use N$ 75 as an average increase in the

land value, this can be seen as the discounted value of the increased cash flow (increased productivity) as a result of bush clearing and it is a net social benefit.

8.3.2 Mopane roots

As for firewood and charcoal it is difficult to see any social costs connected with the trade and processing of dead mopane roots. The recent survey by the Directorate of Forestry has set the quantity that can be harvested and as long as this is adhered to, there should not be any overexploitation.

The interesting question in connection with mopane roots is if Namibia can increase the social benefits of this activity further, by processing more of the roots in the country instead of exporting them in unprocessed condition.

9 PROPOSALS

In the section on social costs and benefits the study has tried to compare the market value of the wood based products surveyed with their real social value. There will always be uncertainties attached to this type of comparison, but it is believed that the conclusion for each product, whether or not the product has a socially correct price, is correct. It follows from this that any proposals made must have as an aim to correct the discrepancies outlined in the previous section and to promote a sustainable utilisation of the savannas and woodlands of Namibia.

The Government has many ways of intervening in the market. It can administratively set the price for a product or stop its export or import and it can influence the price of a product through taxes and subsidies. The Government also has the moral authority to support or discourage activities within the forestry sector. All these options have been considered in making the proposals.

The proposals have not been seen in the light of trade agreements that Namibia has signed and is obliged to follow.

9.1 FIREWOOD

9.1.1 Firewood from communal land

PROPOSAL 1a

Increase the tariffs for commercially sold firewood harvested on communal land.

PROPOSAL 1b

Increase collections of tariffs. Investigate the possibility of collecting tariffs in the commercial firewood markets instead of on issue of harvesting permit. Somehow the payment of the tariffs have to be verified in the firewood market and relevant action taken if the dealer has not paid the tariffs. This is possible today based on harvesting permits and marketing permits, but is not being done.

PROPOSAL 1c

Collect tariffs on the basis of stacked cubic meters. Tons or solid cum. is much more difficult to verify.

Tariff level

It is possible to calculate a new tariff for firewood that brings the firewood price in the market up to a comparable level with alternatives like electricity, paraffin and gas. However, the present situation is that the tariff level does not matter because tariffs are not collected. The

first step should accordingly be to implement the measures proposed to increase collections. The second step should be to introduce tariffs that increase the price of firewood substantially. When a system of collecting the tariffs is in place, it is time to introduce a more sophisticated calculation of the tariff level.

A tariff of N$ 150 per ton would increase the price in Oshakati and Ondangwa with about 40%, from N$ 390 per ton to N$ 540.

Aim of proposal

The aim of this proposal is to increase the price of commercially sold firewood from communal land and thereby reduce its consumption.

Implications for consumers

This proposal will only influence the firewood consumers that buy firewood. Subsistence consumers are not influenced.

The effect on consumption from increased tariffs and increased collections will depend on the alternative energy sources available to the consumer, and their prices.

If no alternatives are available, or they are available at relatively higher prices than the new price for firewood, the consumer will have to pay the new, higher price or increase his/her own legal subsistence collection of firewood. In this case the proposal is not effective and a new increase in tariffs should be introduced.

However, alternatives are available in all the major markets where firewood from communal land is sold. If tariffs are increased, immediately or over a period of time, to a level that makes the cost of using firewood comparable to the cost of the alternatives, this will influence both the occasional and main users of firewood. The consumers will be influenced differently, depending on whether they can use the alternative energy sources or not; i.e. if they have the technical installations required to use electricity, paraffin or gas. If they have the installations required, their consumption of firewood will decrease as the prices relative to the alternatives increase. In the three towns in former Ovamboland and in Rundu, 22% and 26% respectively have this option today. Those that do not have this possibility today will either 1) have to acquire the installations or 2) continue to rely on firewood only and pay the higher prices or 3) increase their own collection of firewood. In the case of point 2) and 3), the proposal does not influence the firewood consumption, unless the consumers also decide to decrease the consumption per capita as a result of the price increases.

If we see this proposal in isolation it will decrease consumption of firewood by forcing people to choose alternative sources and to reduce consumption of firewood per capita. In addition the proposal will force many consumers from commercial firewood consumption over to subsistence consumption, which is not a desired effect as it does not decrease overall consumption. Because the prices increase they have to exercise their individual right to collect firewood from communal land instead of buying it from a dealer. In order to decrease overall consumption this proposal should be looked at in conjunction with proposal 5 below in regions were proposal 5 is relevant. In regions were proposal 5 is not relevant, the proposal should be considered in isolation.

Implications for Government

To increase the energy costs for users of commercial firewood from communal land will not be a popular measure. Firewood is a basic good that traditionally has been free of charge and there is probably not much understanding among the consumers for the viewpoint that the market prices are below the social value of the firewood. The issue is sensitive and there may be reactions when the Government increase tariffs and employees from the Directorate of Forestry and/or the Police start to check if dealers have paid the tariffs and have a marketing

permit.
The proposal will require that employees in the Directorate of Forestry take the initiative to control that tariffs are paid. This will be a demanding task, at least initially, and will again put the DoF staff in a policing role in the eyes of the public.

The intention of the proposal is not to increase income for the Government, but this will be a consequence. The commercial sales of firewood from communal land will decrease, but some consumers will continue to buy their firewood and pay the higher price.

The tariff issue is an important one, but it must be remembered that tariffs only influence a small part of the consumption. Improved collections and increased tariffs will have a positive influence, but will not change the overall situation. The proposal must also be seen as a statement from the Government of its intention to protect the wood resources.

There are no proposals in this report on how to influence all firewood consumption, commercial and subsistence. Such a proposal would have to consider the present land tenure systems in Namibia and this has not been the task of this study. However, it is clear that the basic problem is that everybody has access to the wood resources and the resources are not adequate for the population. Since everybody is free to collect firewood for themselves, one can even argue that the dealers in firewood are just exercising the individuals' rights on their behalf and getting paid for the work; it is just a normal specialisation of the workforce that takes place in all societies. In other words, there is no difference between commercial firewood and subsistence firewood. We believe there are initiatives underway to influence the overall situation through improved management of the resources, based on local participation and the introduction of privileges and duties.

PROPOSAL 2

Prohibit sales of firewood from communal areas in Ondangwa, Ongwediwa and Oshakati.

This proposal is an alternative to proposal 1, but will probably have more impact on consumption. It can be implemented on its own, but it is less drastic if it is implemented together with proposal 5.

Aim of proposal

The aim is to stop the commercialised trade in firewood from communal land. If the proposal is implemented together with proposal 5, the consumers will have an alternative firewood source.

Implications for consumers

As this is a variant of proposal 1, the implications are more or less the same.

Instead of switching to alternative energy sources because the prices increase, the consumers will switch as a result of the ban on firewood from communal areas. As for proposal 1, some consumers will not switch because the alternatives are outside their financial capabilities and they will revert to subsistence consumption. If a ban is implemented without proposal 5, it will have the effect of reducing/eliminating commercial firewood consumption.

If commercial firewood from communal land is prohibited as proposal 5 is introduced, and firewood start to move from the Central Region to the North, this forced change of firewood source could be more favourable to the consumers than proposal 1. The indications are that the prices can be kept at the same level and there should be no need for any tariffs for to protect the wood resources.

Implications for Government

Prohibition will also be an unpopular measure and will put the Directorate of Forestry in a policing/controlling role. This proposal will not increase income for the Government.

PROPOSAL 3

Subsidise subsistence consumption of firewood by bringing in firewood from bush encroached areas to the areas with shortage of firewood.

As the subsistence consumers are not influenced by measures directed towards the commercial firewood markets, subsidies may be the only way to influence their consumption.

Aim of proposal

To reduce firewood consumption from threatened wood resources.

Implications for consumers

Subsidised firewood would be an advantage for the subsistence consumers in the form of reduced time to collect the firewood.

The consumers will probably increase their consumption if the firewood is available without limitations.

Implications for Government

The argument for subsidies is that it makes sense economically to replace socially undervalued firewood with firewood that socially has a negative value; i.e. to reduce harvesting in vulnerable areas in the North and replace it with firewood from the bush encroached areas in the Central regions.

If the Government were to subsidise 100.000 tons yearly to be consumed in the worst affected areas of former Ovamboland, this firewood could be purchased and brought into these areas for about N$ 100 per ton; i.e. a total cost to the Government of N$ 10 mill. The firewood would be collected in the Southern part of Oshana and the Northern parts of Central region.

The N$ 10 mill in subsidies would employ about 550 people yearly, assuming they harvest 750 kg per day for 250 days. In addition about 15 trucks with a capacity of 30 tons will be needed yearly, assuming each truck makes one round trip daily for 250 days. In the areas that will be harvested, there is about 15 tons of firewood per hectare and 6.700 ha would be cleared increasing the value of the land with N$ 0,5 mill. In addition, the Government would of course avoid the social costs of harvesting 100.000 tons of firewood from the indigenous woodlands.

This alternative has its merits and should be considered, but there are some problems connected with subsidies. If the firewood is given to the consumers without restrictions, one immediate effect will be that they increase their consumption per capita. To avoid this effect, the Government will have to demand some form of payment which again will demand that the Government decides on prices, ways of paying and administration of the distribution. As one can see, this will make it a large project that demands a lot administratively from the Government. Alternatively, the Government can subsidise the purchase of the firewood, set up rules for the distribution and let the local administration at village levels handle the distribution.

Another problem with free or low priced firewood is that it cements the present consumption pattern. If the consumers have to pay something, it may be possible to avoid increased

consumption of firewood, but even this is doubtful since the main point is to keep prices low enough to stop the consumers from exercising their right to collect firewood. With free or low priced firewood there is not enough incentive for the consumers to try alternative energy sources, to reduce consumption per capita or even look at fuel efficient stoves.

It is worth looking further into this problem and to do so together with the agricultural sector. This study has not looked at arrangements that are in place to promote bush clearing or plans underway to do so, but the agricultural sector and the forestry sector may have common interest in clearing bush and making use of it as firewood.

PROPOSAL 4

Promote sales of charcoal.

Aim of proposal

To switch the commercial consumers from firewood to charcoal.

The charcoal is produced from firewood harvested on the bush farms in the Central region.

Implications for consumers

If the commercial consumers in former Ovamboland switch to charcoal, they will pay less to cover their energy requirements for cooking.

Implications for Government

This proposal is controversial. The Government and others are afraid that as people convert from firewood to charcoal this new market will be supplied, not only with charcoal from the bush encroached areas, but also with charcoal from communal areas, produced by a growing number of new producers. If this should happen it will have a negative impact on the environment because these producers at best will use 5 tons of firewood to produce 1 ton of charcoal. With primitive kilns made of earth, the recovery will be closer to 10%.

This is a risk that should be taken seriously and weighed against the advantage of supplying parts of the commercial market with sustainably produced charcoal from a growing Namibian charcoal industry. An alternative could be to combine promotion of sustainably produced charcoal with a ban on charcoal based on firewood harvested in communal areas.

Another point is that there is nothing to stop individual charcoal producers from marketing their charcoal in Namibia. In section 3 of this report it is pointed out that it would be an advantage for the charcoal industry to develop the domestic market and it is assumed that 10.000 tons will be sold in Namibia in 2006.

9.1.2 Firewood from private land

PROPOSAL 5

Investigate how the market can be made to work and get firewood to flow from the North of Central region to the commercial markets in Ondangwa, Ongwediwa and Oshakati.

Aim of proposal

To replace as much as possible of the commercial firewood from communal areas with firewood from the bush encroached areas.

Implications for consumers

It is difficult to see positive or negative implications for the consumers. The species may be different, but bush is excellent firewood and the prices should not be influenced. Compared to

proposal 1 with increased tariffs, the consumer is better of.

Implications for Government

It must be a paradox for the Government to look into that farmers in the Tsumeb/Grootfontein area are willing to deliver firewood to these three towns for less than N$ 100 per ton and the retail price is N$ 390 per ton, but no firewood is moving in that direction.

One explanation could be that the firewood dealers in these towns get their firewood cheaper from communal land, but these dealers are incurring costs for transport, tools, harvesting and finance and it would be surprising if their cost per ton is very much below N$ 100. It is likely that other factors influence the situation as well. Historic reasons may be one cause, lack of cash to buy a full truckload may be another.

It is recommended that the Government looks into this in detail and find the causes for the present situation and solutions that will promote sales of firewood from the bush encroached areas to the North.

If the Government can influence the market to overcome its difficulties, it may be possible to cover the commercial firewood market from a sustainable source in the three towns, without the introduction of increased tariffs. These three towns are only consuming about 11.000 tons commercially today, but with the increased urbanisation and the continued commercialisation of the firewood consumption, the importance of this initiative will grow.

An alternative is to help the market to function and introduce tariffs on commercial firewood from communal land, or prohibit sales from communal land, at the same time. This may speed up the process of moving firewood from the Central region to the North. But since the market does not work at present, with a price difference of about N$ 300 per ton, it is advisable to look at the reasons first and make sure that the market is able to work when tariffs are introduced.

In Kavango and Caprivi the firewood price is too low for the firewood from the Central region to be competitive. In these regions, tariffs or prohibition have to be used to make firewood from the Central region attractive.

9.2 FENCING POLES

As stated before, poles for fencing and palisades should be treated the same way as firewood since the two are basically the same. Proposals 1a to 1c and 2 are therefore valid for poles too.

The difference between poles and firewood is that there seem to be more competitive alternatives for poles than for firewood. Bricks, millet stalks, iron sheets and plants are alternatives. Millet stalks and plants are available even for people that do not have cash to spend. Because of this supply situation, the Government may want to increase tariffs for poles more than for firewood.

9.3 CHARCOAL

PROPOSAL 6

Support the charcoal industry.

Aim of proposal

The aim is to increase the use a wood resource that has a negative social value.

Implications for consumers

The consumers are mostly outside the country and the implications for them, as a result of increased supply from Namibia, have not been looked at. Implications for domestic consumers are mentioned under proposal 4.

Implications for Government

In addition to being the most economical way of clearing bush encroached land, production of charcoal has the potential to be an important job creator, tax payer and foreign exchange earner. This industry must prove its viability on its own and without any financial support from the Government, but general backing from the Government would be an advantage.

To finance this business may be easier if the Government gives it moral support. Although the situation has improved, there are still some banks that do not see the potential of charcoal burning and are not willing to finance this activity.

Another problem that is worth looking into is the environmental certification of the industry. The international customers are increasingly demanding environmental certificates from recognised organisations before they are willing to buy charcoal. This requirement causes problems today, but can be turned into a comparative advantage for Namibia, since the charcoal production in this country probably is more environmentally sound than in some other countries. However, the industry has not yet established any co-ordinating organisation that can deal with this process; the producers and exporters are operating on their own and if any of these takes the initiative to certify the organisation, the certificate will be valid for that organisation only. To let each organisation take care of its own certification is of course one solution, but it could be beneficial for Namibia to have a broader view of the certification process and check if there is a way to certify more than one producer/exporter at a time.

If the Government should decide that proposal 4, promotion of charcoal in the domestic market, is too environmentally risky, this is a viewpoint that can be dealt with in such a certification process.

9.4 TIMBER

PROPOSAL 7

Increase the tariffs for logs to sawmills.

Aim of proposal

To reduce or eliminate the sawmill consumption of threatened species, particularly kiaat.

Implications for customers

The raw material costs for the sawmill will increase. If a tariff of N$ 1.000 per cum. is introduced, this will increase the direct raw material cost to about N$ 2.000, assuming the recovery rate is 50%. If the sawmills cannot increase prices to recover the higher costs, they will have to close their operation.

The sawmills' customers will either have to pay a higher price, either to the local sawmills or for imported timbers. Most of the customers are already buying most of their timber from RSA, but one furniture factory in Windhoek is using most of the kiaat timber produced in Namibia at present and will be negatively influenced.

Implications for Government

Until an inventory has been carried out, it is questionable to give a concession to any of the sawmills. An alternative to the proposal above is to hold back all concessions until they can be based on up to date inventories.

The sawmill capacity in Namibia is much too high for the wood resources. If the Government wants to use this production capacity, it has to base the production on imported raw materials. According to information received, alternative raw material supplies from Angola and Zambia are being looked into.

9.5 CARVINGS

PROPOSAL 8a

Keep the tariffs at the present, official level.

PROPOSAL 8b

Look at the possibility of collecting tariffs for carvings in the main markets.

Aim of proposal

The point of these proposals is to make sure that the cost of the raw material is included in the price of the finished product. This may not always be the case today.

As for firewood, the level of the tariffs is not important unless collections are high.

Implications for carvers

Carvers that make high quality products should still be able to sell them. Those carvers that rely on lower quality and lower prices because they get the raw material for free, may have problems in getting higher prices and may eventually be forced out of the market.

Implications for Government

As for proposal 1 this proposal will require that employees in the Directorate of Forestry initiate controls of tariff payment in the markets. The improved collections will increase income for the Government.

The overall effect is likely to be decreased consumption of wood for carvings.

9.6 MOPANE ROOTS

PROPOSAL 9

Reconcile the quantities harvested with the quantities exported.

Aim of proposal

There are discrepancies between the quantities that are harvested according to the region and the quantities exported according to export permits. As a result it is uncertain how much unprocessed mopane roots are exported.

PROPOSAL 10

Stop the export of unprocessed mopane roots.

Aim of proposal

To increase the value added in Namibia.

Implications for buyers/exporters

The buyers of mopane roots will have to stop their export of unprocessed roots to South Africa and this may initially lead to a decrease in harvesting of roots. However, as long as processed mopane roots are attractive in the market it is expected that the present exporters will increase processing and also increase capacity, if this is necessary.

Implications for Government

This is not a measure to decrease any negative impact on the environment, but to increase the value added in Namibia. Namibia has a natural monopoly on the product, but is not getting all the benefits of having a monopoly. At least half of the mopane harvested leave the country unprocessed and the value added with it. Increased processing in Namibia will mean more jobs, increased tax revenue and higher foreign exchange income.

The problem with this proposal is that there is only one major producer in Namibia and this producer will in effect handle the monopoly. It looks like another Namibian company is trying to go into this business, but it is still not certain to succeed and nobody knows if it has the market contacts required. The Government may be able to avoid the situation of having only one producer by giving the producer in RSA a period to adjust and start production in Namibia, if he so chooses. The Government can also encourage others to go into this business.

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FOREST POLICY FOR SUSTAINABLE UTILISATION OF NAMIBIAN WOODLANDS AND SAVANNAS

Terms of Reference

1.0 SUMMARY BACKGROUND AND JUSTIFICATION

The woodlands and savannas of Namibia cover about 20 and 60% of the country's land surface respectively. From the point of view of the national economy, the nation's woodlands and savannas have very important ecological, economic and cultural functions. Currently, this natural resource is being exploited for :

a) commercial timber production for domestic and export markets,

b) fuelwood (firewood and charcoal) for selected domestic and export markets,

c) raw material (mopane roots) for export markets in ornamental wood and

d) raw material for domestic wood carving industry,

e) wood mainly for domestic fencing and construction in rural communities.

This exploitation, however, lacks a policy framework to ensure sustainable management of the woodlands and savannas. Moreover, no studies have been carried out on the social end economic value of forest products as well as their demand. There is now an urgent need for information on prices and estimates on the social profitability of utilisation of these forests for domestic and export markets. To guarantee the conservation of Namibian fragile ecosystem, the Directorate of Forestry has decided to evaluate current practises on the utilisation of forest products, and formulate an efficient and specific national policy in this regard.

2.0 OBJECTIVES OF THE ASSIGNMENT

The overall objective of the assignment is to formulate a national policy on environmentally sustainable utilisation of woodlands and savannas in Namibia. This will involve:

a) the evaluation of the existing markets and price structure for wood products,

b) estimating the degree of income that may be generated through efficient management of the woodlands and savannas and

c) examination of the impact of economy wide policies (both macroeconomic and sectoral) on the rate of depletion of woodland and savannas and the level of environmental degradation.

3.0 SCOPE OF THE ASSIGNMENT

The study will concentrate on firewood, charcoal, mopane roots, wood for carving, commercial timber and fencing of homesteads in the north. For each of these products the study will collect data from available sources and/or through questionnaires, analyse the data and estimate the social costs/benefits of this exploitation. This study shall also make proposals on how to influence the situation in the various markets in a sustainable direction and specifically on how the Government can influence the situation in a sustainable direction through an effective pricing policy and through taxation. This main tasks of the assignment will include:

1) Collect data on the forest products specified. This involves:

- Collect data on volumes and prices for both the domestic and the export market.

- Collect data on volumes of local subsistence cutting of firewood.

- Review and evaluate existing commercial practises for trade in wood products.

- Estimate revenues accruing to dealers involved in the wood and wood products trade in the major towns of Namibia; Windhoek, Oshakati, Ondangwa, Ongwediwa and Rundu.

- Estimate demand the next 10 years for the specified wood products.

2) Estimate the social costs/benefits of exploitation of woodlands and savannas.

An estimate of the benefits of domestic production should be included.

3) Prepare a report on the findings above and make proposals on how the Government can influence the situation in a sustainable direction in general, through prices and through taxes. The study will also make proposals on how the Government can generate revenue to be used in the management of the woodlands and savannas.

4.0 EXPECTED OUTPUTS

The key deliverables of the consultancy based on the tasks to be performed, would be a comprehensive final report which will serve as the basis of formulating a Policy Paper on sustainable management of woodlands and savannas by the Ministry of Environment and Tourism.

QUESTIONS AND SUMMARY OF ANSWERS

Questionnaire 1 - Firewood

		WIND HOEK	OVA MBO *	UNDU	KAT IMA
1) What is your main source of cooking food at home?	Firewood	64	104	84	79
	Firew+other	32	13		9
	Electricity	126	3	6	9
	Gas	14	13	21	3
	Paraffin	10		3	1
All towns	Total	246	133	114	101

* Ovambo represents Ongwediwa, Oshakati and Ondangwa.

		KAT	KHOM	PION	E-O-K
	Firewood	64			
	Firew+other	31			1
	Electricity	35	26	47	18
	Gas	12	2		
	Paraffin	10			
Windhoek	Total	152	28	47	19

KAT=Katutura, KHOM=Khomasdal/Windhoek W., PION=Pioneer Park/Academia, E-O-K=Eros/Olympia/Klein W.

		SOW	OKU	OLD
	Firewood	30	21	13
	Firew+other	2	22	7
	Electricity	10		25
	Gas	7	2	3
	Paraffin	4	4	2
Windhoek-Katutura	Total	53	49	50

SOW=Katutura Soweto, OKU=Katutura Okuriangawa, OLD=Old Katutura

		WIND HOEK	OVA MBO	UNDU	KAT IMA
2) Do you ever use firewood in your household? Only answered by respondents whose main source **is not** firewood.	% using firew.	100,00	93,75	100,00	100,00
2.1) Specify the purpose:	Braai	116	8	10	6
	Cooking	19		12	4
	Heating water	3	3	5	1
	Warm. house	5		2	
	Several purpos.	7	4		2
All towns	Total	150	15 *	29	13

* 1 respondent never use firewood.

		KAT	KHOM	PION	E-O-K
2.1) Specify the purpose:	Braai	27	25	47	17
	Cooking	17	2		
	Heating water	3			
	Warm. house	5			
	Several purpos.	5	1		1
Windhoek	Total	57	28	47	18

		SOW	OKU	OLD
	Braai	16	3	8
	Cooking	1		16
	Heating water		2	1
	Warm. house			5
	Several purpos.	4	2	
Windhoek-Katutura	Total	21	7	30

		WIND HOEK	OVA MBO	UNDU	KAT IMA
3) How much money do you spend on firewood in a month?	NA$ 0	0	1	5	23
	NA$ 1 - 9	54	7	13	5
	NA$ 10 - 19	46	3	3	8
	NA$ 20 - 29	29	2	28	13
	NA$ 30 - 39	20	3	5	8
	NA$ 40 - 49	7	1	6	10
	NA$ 50 - 59	6	4	23	5
	NA$ 60 - 69	27	21	8	9
	NA$ 70 - 79	8	12	1	2
	NA$ 80 - 89	3	2	5	8
	NA$ 90 - 99	9	3	1	2
	NA$100 - 149	19	31	12	5
	NA$150 - 199	9	24	2	3
	NA$150 -	9	19	2	
	Total	246	133	114	101

Questionnaire 2 - Firewood

		WIND HOEK	OVA MBO *	UNDU	KAT IMA
1) How much money did you spend for the firewood you just bought?	NA$ 0,50	1			
	NA$ 1,00	32	25	96	
	NA$ 1,20	2			
	NA$ 1,50	2	9		
	NA$ 2,00	35	9	10	8
	NA$ 2,50	15	18		
	NA$ 3,00	11	4	1	
	NA$ 4,00	11	5		
	NA$ 4,50	1			
	NA$ 5,00	17	20	3	1
	NA$ 6,00	6			1
	NA$ 7,00	1			
	NA$ 7,50		1		
	NA$ 8,00	2		1	
	NA$ 9,00	2			
	NA$ 10,00	3	6	1	3
	NA$ 11,00	2			
	NA$ 12,00	3			
	NA$ 14,00		1		
	NA$ 15,00		1		
	NA$ 20,00		2	1	2
	NA$ 25,00		1		
	NA$ 30,00		1		1
	NA$ 50,00			1	
	Total	146	103	114	16

* Ovambo represents Ongwediwa, Oshakati and Ondangwa.

		WIND HOEK	OVA MBO *	UNDU	KAT IMA
2) For how long time will this firewood last?	1 day	126	66	93	7
	2 days	18	25	17	1
	3 days	1	6	1	3
	4 days		3	1	1
	5 days				
	6 days				
	7 days	1	3		3
	12 days			1	
	14 days				1
	18 days			1	
	Total	146	103	114	16
3) How much do you spend on firewood in a week?	NA$ 0 - 5	13	8	12	1
	NA$ 6 - 10	24	27	58	4
	NA$ 11 - 15	27	21	23	5
	NA$ 16 - 20	22	14	6	4
	NA$ 21 - 30	17	9	9	
	NA$ 31 - 40	12	9	2	1
	NA$ 41 - 50	6	4	1	
	NA$ 51 - 100	21	6	2	1
	NA$ 101 - above	4	3	1	
	Total	146	101 *	114	16

* Two questionnaires without answer to this question.

		WIND HOEK	OVA MBO	UNDU	KAT IMA
4) Do you buy only to your own household?	Yes	77	96	108	13
	No	69	6	6	3
	Total	146	102 *	114	16

* One questionnaire without answer to this question.

	No. of people				
5) How many people are in your household?	1	1	1		
	2	7	3	6	
	3	10	6	10	2
	4	20	11	10	1
	5	24	11	14	3
	6	13	13	11	3
	7	14	14	13	1
	8	14	13	12	2
	9	6	5	11	
	10	4	6	12	1
	11	1		3	
	12	3	4	1	1
	13	1	3	2	
	14	3	1	1	
	15	3	6	5	
	17	1	1	1	
	18			1	
	19		1		
	20		1	1	
	More than 20	1	2		1
	Total	126 *	102 *	114	15

* 20 questionnaires in Windhoek, 1 in Ovambo and 1 in Katima without answer to the question.

6) Are you the only one buying for your household?

	WIND HOEK	OVA MBO	UNDU	KAT IMA
Yes	53	79	67	10
No	93	23	47	6
Total	146	102 *	114	16

* 1 questionnaire without answer to the question.

7) What is the main source of cooking food in your household?

Firewood	43	82	102	16
Firew+other	8	14		
Electricity	74	2	3	
Gas	10	4	6	
Parrafin	11	1	2	
Total	146	103	113 *	16

* 1 questionnaire without answer to the question.

Task 1 - Firewood

Income each sale in NA$	No of customer WIND HOEK	OVA MBO	UNDU
1,00	51	66	168
1,50	3	27	
2,00	51	24	6
2,50	29	49	
3,00	10	11	2
4,00	14	4	2
4,50	1	1	
5,00	18	23	1
5,50	1		
6,00	9		
7,00	1		
7,50	2	1	
8,00		1	
10,00	9	6	1
12,00	4		
14,50		1	
15,00	1	1	
16,00	1		
20,00		1	
25,00		4	
30,00	1	2	
36,00	1		
Number of sales	207	222	180

Task 2 - Firewood

Price classes in NAS	No. of bundles weighed WIND HOEK	OVA MBO	UNDU
1,00	20	10	20
1,50		30	
2,00	20	10	
2,50	10	20	
4,00	8		
5,00	10		
6,00	20		
Total number of bundles weighed	88	70	20

Task 3 - Fencing

1) What is the total number of your family?

No of people	OSHI KOTO	OSH ANA	OHA NGW ENA
3	1		
5	1	1	1
7		2	3
8			2
9	2		1
10	1		
11	4	2	1
12		3	2
13	1		
14		3	1
15	1		1
17		2	
18	1		1
20	2	1	
21	1		
22			1
23		1	
28			1
Total	15	15	15

2) What is the number of male children?

No of males			
1		1	
2	2	1	2
3	1	2	2
4		1	1
5	3	2	3
6	3	4	2
7	3	1	1
8		1	2
9	1		
10	1		
11	1		1
15		1	
16			1
17		1	
Total	15	15	15

3) How old is your homestead?

Age			
< 5	1		
5 - 10	1	1	2
11 - 15	1	1	1
16 - 20	2		1
21 - 25	2	1	1
26 - 30	2	4	1
31 - 35	3		1
36 - 40	2	3	2
41 - 45		1	3
46 - 50			1
> 50	1	4	2
Total	15	15	15

4) How many times in the past have you replaced the fencing posts in the homestead?

	OSHIKOTO	OSHANA	OHANGWENA
0	2	5	4
1	5	2	4
2		3	2
3	6	2	1
4	1	1	1
5	1		
6			1
7		2	2
Total	15	15	15

5) What species do you prefer for fencing posts in your homestead?

Preferred species			
Burkea africana		1	4
Combretum imberbe		1	
Colophospermum mopane	7	13	6
Diospyros mespiliformis		1	
Spirostachys africana		1	3
Terminelia sericea	12	2	7
Total *	19	19	20

* Some respondents gave more than one answer.

6) Total number of poles used in 15 homesteads in each of the 3 districts.

Homestead no			
1	2093	1947	1585
2	3286	541	3036
3	566	3276	1613
4	798	2228	2071
5	309	959	2251
6	3490	2071	1234
7	638	2411	948
8	191	641	3155
9	1018	383	909
10	548	656	2699
11	1510	902	1030
12	1450	1064	929
13	948	1630	1983
14	844	650	1513
15	744	1227	532
Total	18433	20586	25488

Task 4 - Carvings

80 carvings were weighed at Okahandja. The type of carving, price, weight and species were noted. The number of days worked on each carving was also noted.

DATA ANALYSIS

Questionnaire 1 - Firewood

1 What is your main source of cooking food at home?

			WIND-HOEK	OVA-MBO*	RUNDU	KAT-IMA
1.1	Firewood is the main source.	%	39,02	87,97	73,68	87,13
	Number of respondents included		246	133	114	101

* Ovambo represents Ongwediwa, Oshakati and Ondangwa

The percentage for Rundu is lower than expected compared to Katima and Ovambo. There is no obvious reason for this.
Respondents that answered firewood and another source, i.e. mixed users, have been classified as main firewood users.

			KAT	KHOM	PION	E-O-K
1.2	Firewood is the main source.	%	62,50	0,00	0,00	5,26
	Number of respondents included		152	28	47	19

KAT = Katutura, KHOM = Khomasdal/Windhoek West, PION = Pioneer Park/Academia
E-O-K = Eros, Olympia and Klein Windhoek.

Outside Katutura, all firewood users in Windhoek are occasional users.

			SOW	OKU	OLD
1.3	Firewood is the main source.	%	60,38	87,76	40,00
	Number of respondents included		53	49	50

SOW = Katutura Soweto, OLD = Old Katutura, OKU = Katutura Okuriangawa

2 Do you ever use firewood in your household? Only answered by respondents whose main source is not firewood.

			WIND-HOEK	OVA-MBO	RUNDU	KAT-IMA
2.1	Percentage occasional users.	%	100,00	93,75	100,00	100,00
	Number of respondents included		150	16	30	13

Firewood is used by everybody. Out of a total of 594 people, 1 respondent in Ovambo never used firewood.

3 How much money do you spend on firewood in a month?

3.1 Respondents whose main source is firewood. All answers are included except respondents that are users, but not buyers.

			WIND-HOEK	OVA-MBO	RUNDU	KAT-IMA
	Mean	N$	80,26	146,57	61,72	53,26
	Median	N$	60,00	120,00	56,00	44,00
95% conf. level:	between	N$	66,53	122,41	50,81	43,51
	and	N$	94,00	170,74	72,63	63,01
Standard deviation (n-1)		N$	68,66	133,37	49,16	40,41
Number of respondents included			96	117	78	66

Some people will know quite well how much they spend on firewood, others will not. Some of the answers, particularly in Ovambo, were very high and we suspect they reflect the respondents perception of firewood being expensive, more than actual monthly purchases.

Some of the respondents will be resellers. They buy firewood in the market and resell in the townships. These resellers buy more than the average person and will distort the figures if they are not excluded. It was pointless to ask the respondents if they were resellers because this is an illegal activity without a marketing permit and they were interviewed by DoF staff. In the analysis that follows the 10% highest answers have been excluded to eliminate these kind of buyers.

3.2 Respondents whose main source is firewood. The 10% highest answers are excluded.

			WIND-HOEK	OVA-MBO	RUNDU	KAT-IMA
	Mean	N$	52,12	110,00	46,63	41,67
	Median	N$	60,00	120,00	50,00	40,00
95% conf. level:	between	N$	45,42	100,37	40,66	35,54
	and	N$	58,82	119,63	52,59	47,79
Standard deviation (n-1)		N$	29,89	50,10	25,10	23,59
Number of respondents included			75	104	68	57

3.3 Respondents that are using firewood, but they are not buying.

		WIND HOEK	OVA MBO *	RUNDU	KAT IMA
Using, but not buying firewood.	%	0,00	0,75	4,39	22,77

3.4 Respondents whose main source is not firewood. The 10% highest answers are excluded.

			WIND HOEK	OVA MBO *	RUNDU	KAT IMA
	Mean	N$	22,94	28,56	30,40	22,50
	Median	N$	14,50	10,00	26,00	15,00
95% conf. level:	between	N$	18,95	6,34	20,42	11,74
	and	N$	26,92	50,78	40,38	33,26
Standard deviation (n-1)		N$	24,56	41,53	26,21	16,01
Number of respondents included			146	16	29	11

3.5 Respondents whose main source is not firewood. The 10% highest answers are excluded. Windhoek only.

			KATUTURA	REST OF WINDHOEK
	Mean	N$	24,02	22,29
	Median	N$	12,00	15,00
95% conf. level:	between	N$	17,05	17,45
	and	N$	30,99	27,12
Standard deviation (n-1)		N$	26,38	23,53
Number of respondents included			55	91

Questionnaire 2 - Firewood

4 How much money did you spend for the firewood you just bought? The 10% highest answers are excluded.

			WIND HOEK	OVA MBO	RUNDU
4.1 All respondents.	Mean	N$	2,56	2,81	1,07
	Median	N$	2,00	2,50	1,00
95% conf. level:	between	N$	2,31	2,42	1,02
	and	N$	2,81	3,19	1,12
Standard deviation (n-1)		N$	1,46	1,90	0,26
Number of respondents included			131	93	103

There were not enough answers in Katima Mulilo to do a meaningful analysis.

5 How much do you spend on firewood in a week? The 10% highest answers excluded.

5.1 Both main and occasional users included.

			WIND HOEK	OVA MBO	RUNDU
	Mean	N$	23,26	19,26	11,56
	Median	N$	17,50	14,00	7,00
95% conf. level:	between	N$	19,54	15,57	9,83
	and	N$	26,98	22,94	13,29
Standard deviation (n-1)		N$	21,73	18,13	8,95
Number of respondents included			131	93	103

5.2 Respondents whose main source is firewood, that buy all the firewood for the household and do not buy for others.

			WIND HOEK	OVA MBO	RUNDU
	Mean	N$	26,16	17,05	10,18
	Median	N$	20,00	14,00	7,00
95% conf. level:	between	N$	16,09	13,90	8,51
	and	N$	36,24	20,20	11,85
Standard deviation (n-1)		N$	20,26	13,06	6,03
Number of respondents included			18	66	50

5.3 Respondents whose main source is not firewood, that buy all the firewood for the household and do not buy for others.

			WIND HOEK	OVA MBO	RUNDU
	Mean	N$	12,09		
	Median	N$	10,00		
95% conf. level:	between	N$	7,22		
	and	N$	16,96		
Standard deviation (n-1)		N$	10,06		
Number of respondents included			19	4	4

Not enough respondents answering to the criteria in Ovambo and Rundu.

6 Purchase per person per day. Included are main users that buy all the firewood for the household and do not buy for others.

			WIND HOEK	OVA MBO	RUNDU
	Mean	N$	0,49	0,32	0,16
	Median	N$	0,40	0,27	0,14
95% conf. level:	between	N$	0,32	0,27	0,13
	and	N$	0,67	0,38	0,18
Standard deviation (n-1)		N$	0,32	0,23	0,09
Number of respondents included			16	65	50

In an evaluation of the Windhoek figures, one respondent has been excluded in addition to the 10% highest answers. The person was alone in the household and gave a figure of N$ 2,50 as daily consumption.

Task 1 - Firewood

7 Dealers income per sale.

7.1 All observations included.

			WIND HOEK	OVA MBO	RUNDU
	Mean	N$	3,51	2,15	4,33
	Median	N$	2,00	1,00	2,50
95% conf. level:	between	N$	2,96	1,53	3,35
	and	N$	4,06	2,77	5,31
Standard deviation (n-1)		N$	4,03	3,27	5,40

7.2 The 10% highest observations excluded.

			WIND HOEK	OVA MBO	RUNDU
	Mean	N$	2,49	1,43	2,79
	Median	N$	2,00	1,00	2,50
95% conf. level:	between	N$	2,27	1,29	2,53
	and	N$	2,70	1,56	3,04
Standard deviation (n-1)		N$	1,45	0,68	1,31

Task 2 - Firewood

8 Average price per kg of firewood.

			WIND HOEK	OVA MBO	RUNDU
	Mean	N$	0,50	0,39	0,13
	Median	N$	0,48	0,39	0,13
95% conf. level:	between	N$	0,47	0,37	0,12
	and	N$	0,53	0,42	0,14
Standard deviation (n-1)		N$	0,13	0,13	0,02

Summary - Firewood

Below is a summary of the figures relating to consumption of firewood. The ref.no. refers to the sections above where more details can be found. The standard deviations for the means are in general high and the **median** has therefore been used. The reason is that extreme values are reflected in the mean, but less so in the median.

Ref. no.	Brief description of samples. (more detailed text is found in the specifications above).	WIND HOEK	OVA MBO	RUNDU
3.2	Monthly cost. Main users only. People asked at random, not in buying situation.	60,00	120,00	50,00
3.4	Monthly cost. Occasional users only. People asked at random, not in buying situation.	14,50	10,00	26,00
4.1	Cost of one purchase. Main and occasional users. People asked in buying situation.	2,00	2,50	1,00
5.1	Weekly cost. Main and occasional users. People asked in buying situation.	17,50	14,00	7,00
5.2	Weekly cost. Main users only. People asked in buying situation.	20,00	14,00	7,00
5.3	Weekly cost. Occasional users only. People asked in buying situation.	10,00	NA	NA
6	Cost per person per day. Main users only. Based on 5.2 above.	0,40	0,27	0,14
7.2	Dealers income per sale (=cost of one purchase). Main and occasional users. Observed in selling situation.	2,00	1,00	2,50

In an effort to find the consumption of firewood, the question has been approached from several angles. People have been asked at random and not in a buying situation, people have been asked in a buying situation and dealers' sales have been observed. In all questionnaires it has been possible to group the respondents as main and occasional users. In questionnaire 2, an effort has been made to isolate people that buy for others (for reselling or other reasons) and households where more than one person purchases the firewood.
With this approach to the problem one cannot expect complete consistency in the answers from the different groups of people. This is reflected in the summary table. The Windhoek figures are consistent, but not the Ovambo and Rundu figures. Answers to 3.2 and 5.2 are not consistent and the same is the situation for 4.1 and 7.2.

In the calculations in the main text the results in 4.1, 5.1, 5.2, 5.3 and 6 have been used. These are all answers to questionnaire 2. In addition the Windhoek figure for question 3.4 has been used. The reason for this is that the answers to questionnaire 2 is given in a situation when the respondent has just bought firewood. We assume that the respondents then are able to compare more accurately what they just have bought to what they normally buy, and to estimate how much they spend in a week. The Windhoek figure in 3.4 is used in the main text as the monthly cost for occasional users outside Katutura. The reason is that in the answers in 5.3 these buyers are not included because they do not buy their firewood in the markets where questionnaire 2 was used, i.e. Katutura. For these occasional users we have assumed an average household size of 4,5 people compared to an average of 4,7 in urban areas in Namibia. Based on result 5.3 above, the occasional user in Katutura consumes 50% of the firewood a main user consumes. The consumption of an occasional user in Ovambo and Rundu is difficult to estimate as the number of respondents in questionnaire 2 were too few. Based on the Katutura percentage and assuming that occasional users outside Windhoek in general use more firewood than in Windhoek, we have assumed that the occasional user in Ovambo and Rundu uses 60% of the main users' consumption.

To summarize, the following figures have been used in the main text.

		WIND HOEK	OVA MBO	RUNDU
Firewood consumption per person per day for main users.	N$	0,40 *	0,27	0,14
Firewood consumption per person per day for occasional users.	N$	0,20 *	0,16	0,08
	N$	0,11 **		
Average price per kg of firewood (ref. specification 8 above).	N$/Kg	0,48 *	0,39	0,13
	N$/Kg	0,63 **		

* In Katutura ** Outside Katutura

The price per kg outside Katutura is the result of weighing about 15 bags of firewood at petrol stations and shops. The price per kg varied very little because the firewood was packed in bags of the same size.

Task 3 - Fencing

9 Average number of fencing poles in a homestead.

		OSHI KOTO	OSH ANA	OHA NGW ENA
	Mean	1228	1372	1699
	Median	844	1064	1585
95% conf. level:	between	672	902	1247
	and	1786	1843	2151
Standard deviation (n-1)		1003	848	814

10 Average height of fencing poles in a homestead.

			OSHI KOTO	OSH ANA	OHA NGW ENA
	Mean	m	1,98	1,74	1,68
	Median	m	1,97	1,70	1,65
95% conf. level:	between	m	1,96	1,72	1,66
	and	m	2,00	1,76	1,69
Standard deviation (n-1)		m	0,43	0,41	0,40

11 Average diameter of fencing poles in a homestead.

			OSHI KOTO	OSH ANA	OHA NGW ENA
	Mean	cm	6,6	8,78	7,83
	Median	cm	6	8,2	7,2
95% conf. level:	between	cm	6,47	8,62	7,68
	and	cm	6,73	8,94	7,98
Standard deviation (n-1)		cm	2,84	3,68	3,92

Task 4 - Carvings

12 Asking price per kilo and per day worked. The 10% highest and lowest values excluded. All weights below 1 kg and above 8 kg excluded.

			Asking price per kg	Asking price per day worked
	Mean	N$	42,44	23,65
	Median	N$	40,00	18,33
95% conf. level:	between	N$	36,30	18,82
	and	N$	48,57	28,48
Standard deviation (n-1)		N$	21,00	16,54

Carvings weighing less than a kilo had extreme asking prices per kilo and asking prices per day worked. Small items probably have a higher price per kilo and per day worked, but another reason may be that the weighing equipment was not sensitive enough for low weights.
There were only 6 weights above 8 kg and they all substantially higher than the rest of the results. For this reason they were left out.

TOTAL ECONOMIC VALUE

Column I below contains the total economic values of the various wood products as calculated in "The Most Important Functions of the Forestry Sector in the Namibian Economy, A.Marsh, Directorate of Forestry, Windhoek. March 1996." In Column II, some of the figures are amended to reflect the findings in this study.

Product		Column I Mill. N$	Column II Mill. N$
Logging	*	2,4	0,4
Charcoal	*	22,4	2,4
Fuelwood	*	131,0	102,0
Construction poles	*	383,0	52,0
Fencing poles		6,6	6,6
Crop production		175,0	175,0
Kraals		31,0	31,0
Crafts/Implements		21,0	21,0
Carving	*	1,0	3,5
Basketry		4,0	4,0
Mortar and pestle	*	1,5	0,0
Mahangu baskets		12,4	12,4
Ornamental roots	*	1,1	1,2
Food		4,8	4,8
Beverages		1,5	1,5
Medicine		31,5	31,5
Goat forage		9,5	9,5
Mopane worm forage		0,5	0,5
Tourism		218,0	218,0
Total		1058,2	677,3

All figures marked with an - * - have been amended.

The differences in values are explained by differences in quanities and/or prices.

The value of mortar and pestles has been set to nil since these in the amended figures are include carvings.