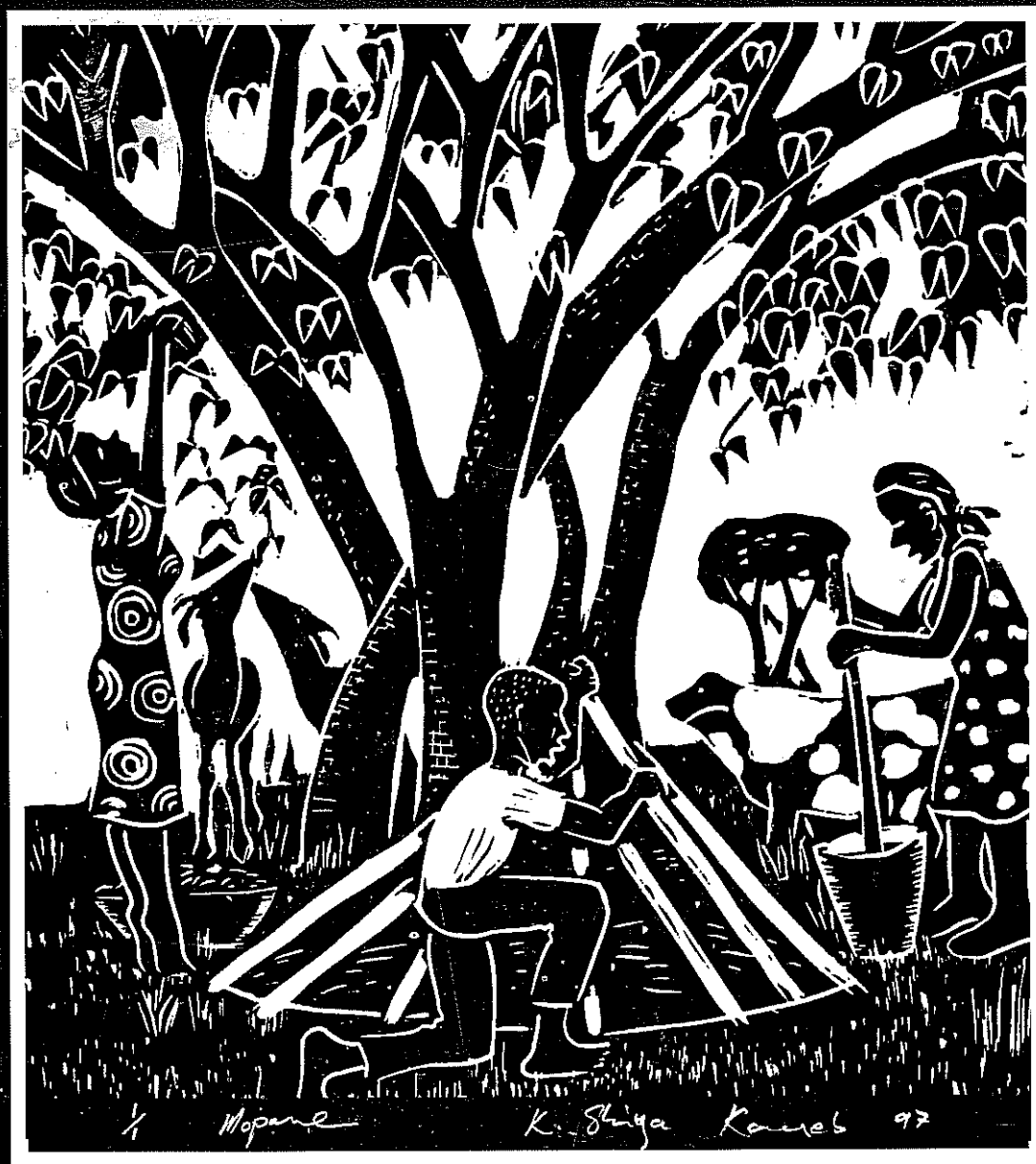


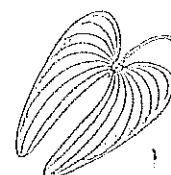
# Management of Mopane in Southern Africa

Proceedings of a workshop held at Ogongo Agricultural  
College, northern Namibia, 26th to 29th November 1996



Edited by Charlotte Flower, Grant Wardell-Johnson and Andrew Jamieson

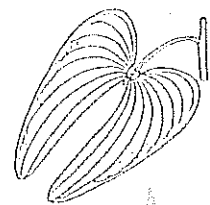
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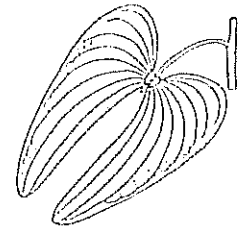
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## CHAPTER TWELVE

## SOCIO-ECONOMIC ASPECTS OF COLOPHOSPERMUM MOPANE USE IN OMUSATI REGION, NAMIBIA



Czech Conroy<sup>a</sup>

### ABSTRACT

A survey of socio-economic aspects of *Colophospermum mopane* (mopane) use and management was undertaken in north-central Namibia in 1996. Local people use mopane wood and twine in numerous ways, including homestead construction, crop fencing and food storage and processing. The mopane resource has been degraded during the last few decades and in some areas scarcity has led to bricks replacing poles in house construction and more efficient use of mopane as fuelwood. Some households are worse affected than others and theft of mopane wood is widespread. Policy and research recommendations are made.

**Keywords;** *Colophospermum mopane*, Namibia, timber, non-timber tree products, socio-economics.

### INTRODUCTION

*Colophospermum mopane* (Kirk ex Benth.) Kirk ex J. Léonard, known commonly as mopane, is the principal tree species in most regions of north-central Namibia (Kreike 1995). It forms extensive woodlands that in some areas comprise large trees and in others shrubs (Erkkilä and Siiskonen 1992). Mopane is also a major resource. Land is cleared for agriculture and mopane is cut, initially to obtain poles for construction (*ibid*). Shrubland is maintained by continued cutting. Traditionally, mopane wood was used essentially for subsistence purposes (*ibid*), but more recently, commercial exploitation of mopane became important in some areas (Forbes-Irving *et al.* 1993).

There is currently a lack of systematic research on social and economic factors of mopane use. Most of the information on mopane use and management and the benefits that the resource offers to local communities in northern Namibia, is anecdotal (e.g. Marsh 1994). This study seeks to provide a systematic approach to understanding the social and economic factors governing the use and manage-

ment of mopane in Omusati Region, north-central Namibia<sup>1</sup>.

### METHODS

This paper is based on a survey of socio-economic aspects of mopane use and management in Omusati region of north-central Namibia (formerly known as Ovamboland). Omusati, which is the local word for mopane, is one of four regions in north-central Namibia. Mopane is the principal multi-purpose woody species in three of these regions, including Omusati (Kreike 1995). The land use system in north-central Namibia is an agro-silvipastoral one. The principal crop is pearl millet (*Pennisetum glaucum*) and the main types of livestock are cattle and goats (*ibid*). The four wards<sup>2</sup> where the survey was conducted were selected because they are close to the Forestry Research and Development Project / Directorate of Forestry (FRDP / DoF) mopane trial site, near Ombalantu.

The survey used a combination of group interviews and semi-structured individual interviews<sup>3</sup>. One group interview was held in each ward, organized via the village headman, with 20 - 40 people present at each. In the group interviews, to obtain an overview of the situation at the ward level, people present were asked to draw a map of the ward and nearby areas, indicating where mopane used by village members was present.

There were 17 individual interviews and these were combined with direct observation of the respondents' homesteads and, in some cases, the mopane shrubland on their farms. The survey was undertaken in September and October 1996. It was intended that the farmers who were interviewed individually would all be selected randomly. However, this proved to be impracticable in two of the wards, so only about 50 % were selected in this way. The others were people who attended the group meetings and volunteered to be interviewed.

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<sup>1</sup> The study was commissioned by the DFID-supported Forestry Research and Development Project (FRDP) and the Directorate of Forestry (Ministry of Environment and Tourism), to complement the biological research on mopane management that they have been supporting through a programme of field trials near Ombalantu. The full report is being published by the Directorate of Forestry.

<sup>2</sup> Ward is synonymous with village.

<sup>3</sup> The checklist of topics used in the interviews is reproduced as Appendix I of this paper.

## RESULTS

### Uses

The survey found that there is very little trade in mopane products in the survey area, the exceptions being small amounts of firewood and mopane worms, the latter harvested outside the survey area. The numbers of respondents using mopane for different purposes are shown in Table 12.1. Mopane has numerous subsistence uses in the local farming system, most of which can be grouped into four categories. These are homestead construction (huts and palisades), agricultural production (crop fencing, fodder and shade for livestock, green manure), food storage and processing (granary baskets, pestles and to some extent, mortars<sup>4</sup>) and firewood.

### Mopane scarcity and its implications

Almost all of the people interviewed had switched during the last 10 - 15 years from using poles for constructing hut walls to using bricks. Most people would prefer poles, partly because that is what they are used to and partly because mopane poles are stronger and longer lasting. There are no easily affordable or obtainable substitutes for mopane for the other major uses. Thus, people remain heavily dependent on mopane shrubland for meeting these needs. However, mopane shrubland (as well as mature mopane trees) is becoming scarcer. All respondents are using mopane for making roofs, fuel and crop fencing. Most people are gradually replacing poles with bundles of smaller mopane branches for palisade walls.

Few of the households surveyed are self-sufficient in mopane from their own land (Table 12.2). However, scarcity

is affecting some people more than others. The survey found that in two of the four villages (Okahwa and Ehungaelo) mopane shrubland was present on about half of the farms, but not on the other half. In the other two villages, there was not such a clear division but some farms were "mopane-rich" and others were "mopane-poor".

The households living on mopane-poor farms have to obtain their mopane primarily from common land. This may be satisfactory if there is a big enough area of common land nearby with mopane bushes that contain the necessary size of wood to meet these needs. However, the number of homesteads has been increasing, leading to a decrease in the area of common land, and a growing proportion of mopane-poor households who are unable to meet their needs from the mopane bushes on common land. The survey found that people are responding by asking for mopane wood from mopane-rich friends and relatives, both in their own and in other wards, by stealing mopane from mopane-rich farms and by reducing their mopane use.

Obtaining enough firewood and other fuel is a particularly acute problem for some households, because this is a product that is needed every day for cooking (Table 12.3). Most people are using firewood more economically, or efficiently, than they used to. They are also using animal dung as well as *Hyphaene petersiana* (makalani palm) fronds and kernels. Five out of six respondents said that fuel collection takes longer now than it used to. Despite using fuels more efficiently and substituting other materials, two of the households said that they do not always have enough fuel for cooking.

Table 12.1: Respondents' uses of mopane products in northern Namibia

Uses	Respondents																Total
	1	2	3	4	5	6	7	9	11	12	13	14	15	16	17		
Hut wall	+	+			+	+	+	+		+	+	+	+	+	+	13	
Hut roof	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	16	
Palisade	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	16	
Firewood	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	16	
Fencing	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	13	
Rope	+			+		+	+	+	+	+	+					6	
Mortar					+	+		+	+	+	+	+		+	+	11	
Pestle	+				+	+	+		+	+	+	+				1	
Fodder						+										7	
Granary baskets		+				+		+		+	+	+				2	
Worms						+						+					
Other uses*				*4		*6		*9				*13	*14	*15	*17		

#### Notes:

"+" indicates the respondent uses mopane for this purpose.

\* The other uses mentioned by the respondents with entries in this row were:

4) making stool (furniture); 6) firing clay pots, making wall round toilet, sweet gum, mopane worms; 9) support poles for roofs; 13) drinking trough; 14) kraal fence, support poles; 15) and 17) use of leaves as green manure.

Respondent 10 is not listed because he had just started building his first hut - he had not yet constructed a palisade, field fencing etc.

<sup>4</sup> The preferred species for mortars is *Combretum imberbe*.

Table 12.2: Important current sources of mopane in northern Namibia

Source	Respondents																
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17	Total
On-farm (fenced)	-	-			+	+	+	+		+	+	+	-	++	+	++	10
On-farm (unfenced)	-	-	+	+					+			+	-	+	+		6
Ward common land	+	+				+	+	- <sup>a</sup>	- <sup>b</sup>	+	+		+		++	- <sup>c</sup>	9
other sources <sup>d</sup>										+		+	+				4

**Notes:**

"+" indicates the source of fuel is used by the respondent, and "-" indicates that it is not.

<sup>a</sup> Respondent 8 obtained wood from this source until recently, when she was told that cutting was banned.

<sup>b</sup> Respondent 9 has no common land near the farm.

<sup>c</sup> Respondent 17 has no common land near the farm.

<sup>d</sup> The other sources mentioned by the respondents with entries in this row were:

1) bakkie loads of firewood from cattle post; 11) asks neighbours - e.g. for roofing materials; 13) gets some wood from the oshanas - not clear whether within ward or not; 14) asks people with mopane on their land to give her certain materials.

Respondent 10 only recently started constructing homestead. He has a lot of mopane on his farm, at least some of which will be fenced off.

Table 12.3: Aspects of fuel use by respondents in northern Namibia

Farmer	Mopane	Other wood	Palm fronds	Palm kernels	Cow dung	Other fuel <sup>a</sup>	Reduction in fuel	Collection time longer
1	+	-	+	+	+		+	?
2	+	+	+	+	+		+	?
3	+	-		-	-	+	N/A	N/A
4	+	+		+	+		?	?
5	+	-		-	-		?	?
6	+	-	-	-	-		?	yes
7	+						?	?
8	+			+	+	+	+	yes
9	+	-	+	+	+		+	yes
10	? <sup>b</sup>						N/A	N/A
11	+						+	yes
12	+	+					?	?
13	+						-	?
14	+	+		+			-	no
15	+						?	?
16	+		+	+	+		-	?
17	+			+	+	+	+	yes
<b>TOTAL</b>	<b>17</b>	<b>4</b>	<b>4</b>	<b>8</b>	<b>7</b>	<b>3</b>		

**Notes:**

"+" indicates the type of fuel is used by the respondent, and "-" indicates that it is not.

<sup>a</sup> The other fuels mentioned by the respondents with entries in this column were:

3) paraffin (occasional); 8) marula seeds; 17) marula seeds.

<sup>b</sup> Not known, as respondent 10 had not yet started living on his farm: there was plenty of mopane on it.

### Management of mopane by respondents

Of the 16 households, 13 have mopane on their private land. Nine of these 13 were asked how they harvested mopane. Eight of the nine are actively managing their mopane in one way or another, through singling and pruning etc. The person who said she does not manage her mopane, explained that she has only a limited area of small bushes. Box 1 gives some examples of mopane management by respondents. There are some similarities with the management treatments being used in the FRDP / DoF mopane field trials (see Gelens, Chapter three).

## DISCUSSION

### Original findings

The study found that the degree of mopane product scarcity experienced may vary markedly between households, even within a given ward, because the amounts of mopane shrubs and trees found on farms are highly variable and sometimes zero. The consequences of this inequitable distribution of mopane - gifts of mopane wood from mopane-rich to mopane-poor households and widespread theft of mopane wood by the latter from the former - have been documented here for the first time. That a small survey like this should produce some original findings on the nature and consequences of mopane scarcity is perhaps not surprising when one considers that there has been little previous research on mopane use and management in Ovambo, particularly on socio-economic aspects.

### Scarcity and its causes

It is well known that there is a growing scarcity of mopane wood in large areas of the former Ovamboland where this species is found (Kreike 1995, Marsh 1994). This survey has shown how people are adapting to that scarcity and the problems that it is posing. In the survey area the principal reason for mopane deforestation and degradation appears to be the gradual increase in the number of homesteads during the last few decades<sup>5</sup>. There used to be forests there that were populated by large animals, such as elephants, antelopes and lions - until 30 to 40 years ago. However, the forests and wildlife gradually disappeared and now there are few tall mopane trees remaining and just extensive areas of mopane shrubland.

As the population has increased in the survey area, demand for mopane wood has been increasing. At the same time, supply has been contracting, as some mopane areas are cleared for crop production. Respondents made no reference to the removal of mopane wood by commercial operators, although this is a major factor in mopane over-exploitation in other parts of north-central Namibia, such as Uukwaluudhi (Forbes-Irving *et al.* 1993, Quan *et al.* 1994). The likely reason for this is that the area was one of the first to become heavily degraded and was probably already in a poor condition before commercial exploitation of mopane began on a significant scale in Omusati region.

### BOX 1: EXAMPLES OF MOPANE MANAGEMENT BY RESPONDENTS

**Respondent 5** has quite a large area of fenced-off mopane. On some of the bushes that used to have multiple stems she has been cutting off stems at the base, and leaving just one or two to grow. She has also pruned the remaining stems, removing the small branches from them. There are a few piles of small branches on the ground, which she will use as firewood. There are also some bigger mopane trees, which are mainly along the field boundary, but there are also two in the main field. These have been allowed to grow to provide shade for cattle.

**Respondent 6** has a large area of mopane that is completely fenced off. The household has a rule that you only cut the big stems to use for specific purposes. You leave the small ones for 2 - 3 years to grow and then cut them, e.g. for use as roof materials. If the bush has three stems, you might cut one; if it has ten, you might cut five. For making rope they cut a slightly smaller size of stick than is used to make the roof. There are a few larger trees that have been deliberately left to grow big.

**Respondent 15** is actively managing trees on his land, in an area that is not fenced. He has several leading shoots / stems on each bush and he is continuously removing small branches from them. The leading stems are not being developed with any specific purpose in mind - they could be used in roofs, or as replacement poles in palisades or hut walls. He showed us an old tree that he recently felled; he is going to use the trunk to make pole(s). He also showed us a standing tree, from which he cut thick branches some time ago, for use as poles.

**Respondent 17** has pruned most of her bushes to one long stem (pretty straight). She says she does not cut the other small stems. She prunes the long stem when the branches are big enough to make firewood; or if she wants a straight piece of wood, she may even prune it before the smaller branches have reached firewood size. Many of the bushes show no sign of having had other big stems cut off at the base - it seems that they naturally have only one main stem. It seems that she is not managing each of the bushes or stems with any particular product in mind. In general terms, however, she knows that some will be used as small palisade poles, when they move their homestead, while others will be used as roofing sticks, and smaller ones to make rope.

<sup>5</sup> Specific figures are not available for the survey area, but the population of the former Ovamboland as a whole more than doubled between 1960 and 1990, from 230,000 to 550,000.

### Future consequences of mopane scarcity

As mopane scarcity increases, the number of households suffering a shortage of fuel can be expected to grow, since there is no easily affordable substitute. This could result in malnutrition and health problems for those unable to cook meals every day, a problem that may require government intervention.

When homesteads were established in the past, large quantities of poles, of the order of 4,000 (Marsh 1994) to 8,000 (Erkkilä and Siiskonen 1992), were used to construct hut walls and palisades. These consisted entirely of heartwood, which is resistant to termite attack and highly durable, some poles lasting for 40 - 50 years. To produce that many poles it was necessary to fell 1,000 (Marsh 1994) to 2,000 trees (Erkkilä and Siiskonen 1992).

It is likely that poles in palisade and hut walls will gradually disappear from the homesteads in these villages, as they reach the end of their useful lives. This is because there are very few tall, mature mopane trees remaining in the survey area and people in the area do not seem to be purchasing mopane poles. This may be because they are too expensive.

### Size of the resource relative to demand - a case of unsustainable use?

There have been no previous attempts in the survey area to relate the amount of mopane wood being produced with the amounts being consumed. Thus, it is not known how current mopane use compares with the capacity of the local mopane resource to supply products on a sustainable basis. However, there are a few pieces of circumstantial evidence that suggest that consumption may be exceeding the maximum sustainable yield. Firstly, people are switching to mopane substitutes for two of the current principal uses, i.e. fuel and fencing. Secondly, stumps have become a significant source of fuel, but they are a finite resource in the short to medium term. Thirdly, people in at least one ward (Okafimbi) said that the mopane fuel supply situation had been getting worse during the last 5 - 10 years. Lastly, few of the respondents, if any, have enough mopane on their private land to make them self-sufficient.

### Mopane management

Previous studies have suggested that the management of mopane on private land has been widely practised traditionally (Erkkilä and Siiskonen 1992, Forbes-Irving *et al.* 1993). According to Erkkilä and Siiskonen (page 179):

"Mopane trees could be raised from shoots, which sprout from the stumps. The number of stool shoots should be gradually reduced to one or two. This type of management was practised during the 1960s in Ombalantu-Oshikuku area. According to Jansen, the method has been known among farmers for generations."

Observations by FRDP staff in the survey area suggest that many farmers are not managing their mopane (M. Gelens<sup>6</sup>,

pers. comm.). However the survey reported here found that almost all respondents are actively managing their mopane. It would be desirable to determine through a follow-up study, both the level of management activity in mopane woodland and the reasons for some farmers actively managing while others do not.

## CONCLUSIONS

In this particular part of Omusati region the problems are so severe that government policies can probably only have a limited effect on the problem. Ultimately, only the broader economic development of the former Ovamboland region will enable people to overcome the problems posed by the scarcity of mopane products. Providing more employment opportunities in urban areas and hence relieving pressure on the land may contribute to the solution. However, there is also a need to provide those remaining in rural areas with the cash that they need to purchase alternative construction and fencing materials and perhaps eventually alternative fuels. In the meantime, however, there are ways in which the government can contribute to the alleviation of the problem.

### Community-level management of natural forests.

The Government of the Republic of Namibia (GRN) has a policy of encouraging community-level management of natural resources (Ministry of Environment and Tourism 1995, 1996). This is a desirable policy in principle, particularly if an integrated, rather than a sectoral, approach is followed. It is probably the main intervention that GRN can take to tackle the problems associated with mopane use and scarcity. However, certain problems would need to be addressed in applying it in the survey area.

The main problem is that the areas of common land in these wards are small, so that if the products were distributed equally to all households the quantity received by each would be rather small. Furthermore, as was noted earlier, some households are much more dependent on mopane from common lands than others. Thus, ways would need to be found for the mopane-poor households to receive a greater share of the benefits than the mopane-rich ones. If this were not the case, then mopane-poor households could be worse off under a community management regime than they are at present. It would also need to be recognised that some households would struggle to meet their everyday-ongoing mopane needs if there were a complete ban on mopane use during the first years of a community management regime.

Even if community management were successfully introduced, it is probably not possible to utilize the mopane resource on a sustainable basis in the survey area while meeting current levels of demand for mopane products. Thus, there will have to be a gradual shift to alternative materials. This is already happening for hut wall construction, with the use of bricks instead of poles. People are start-

<sup>6</sup> M. Gelens, Forestry Research and Development Project. Present contact-address: Forest Science Division, International Institute for Aerospace Survey and Earth Sciences (ITC), P.O. Box 6, 7500 AA Enschede, The Netherlands.



ing to use metal sheets as wall and roof materials. However, most people have difficulty affording substitute materials that have to be purchased, so the transition will be a painful and slow one.

#### Assistance in the transition to mopane substitutes

The government may be able to ease the transition to a certain extent by making substitute materials available at less than market prices, but this would require substantial financial resources. Farmers mentioned recent government schemes to provide fencing materials on the basis of a low interest loan. In principle, such schemes could relieve pressure on the mopane resource to some extent and give further protection to mopane on private land that has not been fenced-off (and hence greater incentive to manage the mopane well).

However, to be eligible for the current schemes you have to have a regular income, which, according to the Ombalantu office of the Ministry of Agriculture, Water and Rural Development, excludes 70 - 80 % of households in the Ombalantu area. The farmers argued that this scheme assists the rich, but not the poor. For government assistance to be most effective it needs to be extended to those who most need it i.e. the poor, and especially the mopane-poor. However, such people have little, if any, collateral, as they do not 'own' their land. However, this may change as a result of the Land Bill that is currently under consideration. High default rates could ultimately undermine the financial viability of the scheme.

The Government of the Republic of Namibia has tried to get round this problem by making loans available to individual farmers, backed by a guarantee from an informal ("joint liability") group. However, farmers have been reluctant to form such groups in the former Ovamboland, which is thought to be a reflection of their somewhat individualistic culture (Tapscott 1990) and so they remain ineligible for these loans. If the Ministry of Environment and Tourism were successful in promoting community management in Omusati region then the community groups formed to manage local natural resources might also prove to be a suitable vehicle for extending credit. This would make it possible for fencing loans to be made available to poorer farmers under the current credit schemes. This is one reason why community management initiatives should come first. Another reason is that more extensive fencing of mopane by mopane-rich farmers would, all things being equal, lead to greater hardship for the mopane-poor, who will find it more difficult to steal mopane. Thus, adequate alternative sources of mopane should be available to them before further fencing of privately owned mopane takes place.

#### Future research

A previous study recommended that,

"Research into the properties, use, traditional management and possible improvement of mopane management should be a first priority in north-central Namibia" (Kreike 1995).

Given the importance of mopane in people's livelihoods, that recommendation is endorsed here. More specifically, it is recommended that a larger and geographically wider survey of mopane uses and management be undertaken in north-central Namibia, with particular reference to socio-economic factors, covering a range of mopane resource situations from severely to lightly degraded. It would be desirable to determine both the level of management activity in mopane woodland and the reasons why some farmers actively manage the resource while others do not.

Another priority area for research in north-central Namibia concerns the quantities of mopane wood consumed by households *vis-à-vis* the quantities produced by the local mopane resource, so that a better understanding can be obtained of sustainable yields. This kind of information will be needed for the development of management plans in association with community management initiatives.

This paper was the only one presented at the regional workshop that specifically addressed socio-economic aspects of mopane use and management. This suggests, as does the lack of socio-economic references in Timberlake's annotated bibliography (Timberlake 1994), that there may be a dearth of socio-economic studies in the southern Africa region generally and not just in Namibia. If this is so, it is recommended that surveys similar to this one, using the lines of research demonstrated in this study be undertaken in other countries.

### ACKNOWLEDGEMENTS

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### ISSUES RAISED DURING PARTICIPANTS' DISCUSSION

*Did Martinus Gelens do a similar survey before the experiment referred to in his chapter?*

No, not really. There had however, been a two week PRA survey done in the area, with many follow-up discussions with farmers on mopane use and management that contributed to the design of the trial.

*If a more detailed survey had been done, could it have directed Martinus' project a little more?*

I don't think it would have changed the treatments, the survey supports those, but it would have helped in identifying how the community could be more involved.

*A desk study was carried out earlier in the year, and estimated that mopane woodland was worth N\$300 million to the country; would your survey agree with this figure?*

It is not an easy thing to estimate; few things are marketed and so one can only make rough estimates. Also need to know how much is consumed. Cost of substitution is one way to approach this.

*What area would a household need to have to be self-sufficient in mopane products?*

Not sure; none of the farmers knew the size of their farms and we did not have the time to measure.

*It would be interesting to see if the size of farms allocated is increasing or decreasing. This might indicate whether the traditional authorities are aware of the need for enough land to include some mopane.*

It is difficult to generalise about whether farm sizes are increasing or decreasing; they found examples of them doing both. The Ministry of Agriculture has just completed a two-year survey of farms, this might provide some useful information.

*What was the mopane managed for?*

Different people manage for different reasons; some for products, others for beautification and conservation. Trees are protected for public use - fruit, shade at a bus stop or cuca shop. It is always important to be aware of who the informant is. Women and men have different perceptions of what might be needed, mopane rich and mopane poor farmers would have different needs, etc..

*Is awareness or attitudes changing? You mentioned that people used to be concerned about being surrounded by forest [it harboured wild animals and bandits], but now people say that they want to manage their trees so that they do not feel "exposed".*

Awareness in the mopane poor areas does seem to be greater than in areas where there are more trees. There is also awareness that the Government is concerned about people chopping too many trees.

*Is it awareness being raised or just that there is openness in discussion? We found some farmers very reluctant to talk with us as they saw Forestry as a punitive authority; however once over that barrier we found that people were indeed already aware that there was a problem and concerned to know what to do about it.*

Communication barriers have to be removed to allow proper discussion. Communication has certainly improved, but is still not totally open. There was one village in which we worked where it was very difficult, as there were many negative preconceptions about what the survey was about.



## APPENDIX 1: CHECKLIST OF TOPICS FOR INTERVIEWS

(I = Individual, G = Group)

### INFORMATION ABOUT HOUSEHOLD (I)

Household head - male / female? Respondent's age and sex.  
Household size - no. of members working on farm - full-time / part-time.

### INFORMATION ABOUT FARM (I)

Farm size. Farming system (crops / fallow; livestock (type, numbers, trends); tree species - which are most important, and why?). Off-farm income.

### MOPANE SOURCES

(farm, ward's communal land, other land, purchased)

### MOPANE BENEFITS

- Uses (why fence fields and construct palisades?)
- Services (e.g. water retention, shade, effect on soil, relationship between mopane and crops - competition or symbiosis?)

### QUANTITIES OF MOPANE PRODUCTS USED, SOLD OR GIVEN AWAY

(Esp. for firewood, fencing poles and palisade / house poles)

Types of firewood (sticks and twigs, bushes, chopped wood). Easy or difficult to find?

Minimum sizes for different uses (poles, etc.).

### MOPANE PRODUCT PRICES (Sale / purchase - Seasonal variations in prices?)

- Firewood and baskets
- Poles for house walls and palisades / poles for fencing

- Worms

### LONG-TERM TRENDS

Increasing scarcity? Changes in sources? Reduced sales?  
Increased purchases?

Changes in mopane product prices?

Substitution of other products for mopane?

(Firewood, fencing materials, house construction)

Reduction in use of mopane products? (e.g. less firewood, smaller houses)

### LONG TERM TRENDS - COLLECTION / REPLACEMENT COSTS

- Firewood collection times and vehicle hire and fuel costs
- Pole collection time and vehicle hire and fuel costs
- Fence maintenance time
- Costs of fencing / housing replacement materials

### MOPANE MANAGEMENT

Does farmer manage any mopane? (None / passive / active); or has farmer planted any (seeds / transplanted saplings)?

Why / why not? Since when? On or off-farm?

What type of active management? (One leading shoot plus removal of all regrowth / continuous removal of material when it reaches a certain minimum size / combination of 1 and 2)

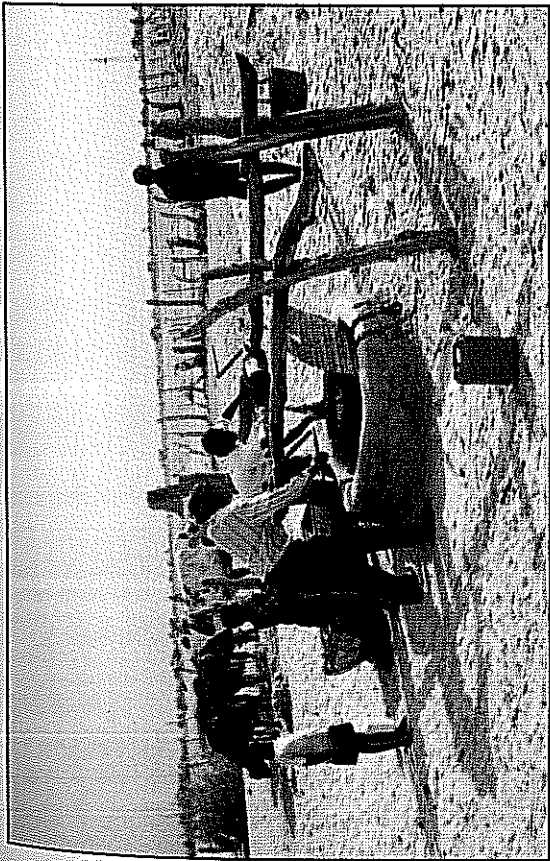
Managed to produce what?

Is land-holding tenure perceived as secure? What happens to land-holding if male head dies?

### GENDER MATTERS

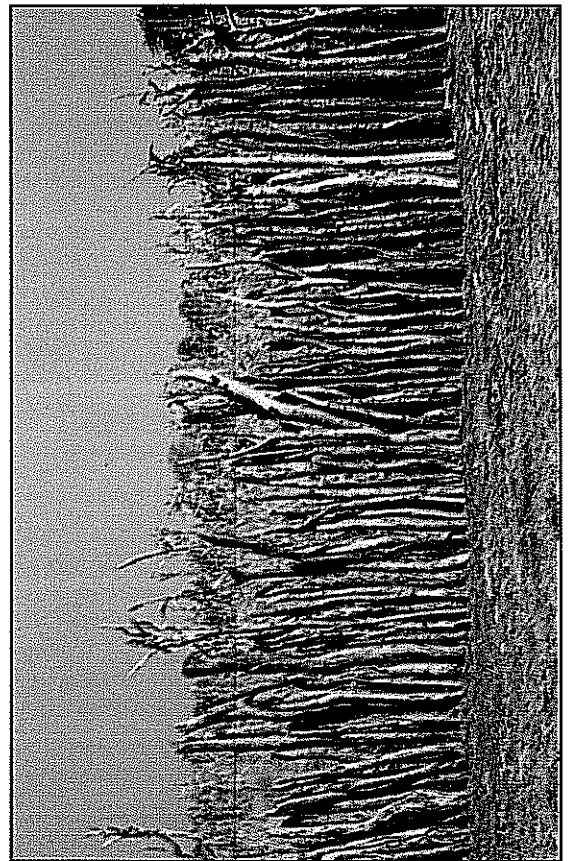
Collection / Management / Production (eg baskets) / Marketing

### PROJECTED TRENDS



*Plate 17:* Typical water point in western Namibia (Desert Research Foundation of Namibia).

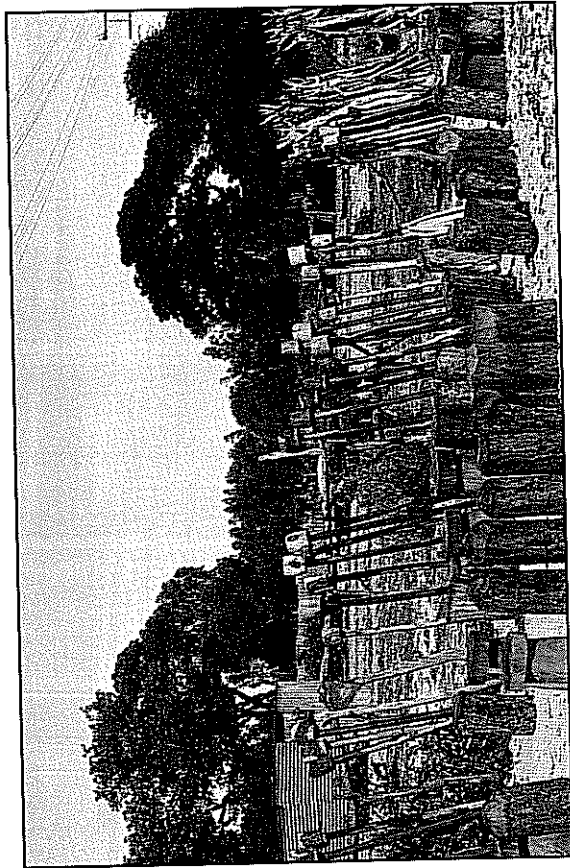
*Plate 18:* Large mopane poles used to build a field boundary fence in northern Namibia (Desert Research Foundation of Namibia).



*Plate 19:* Small mopane branch material used to make a fence in northern Namibia (Desert Research Foundation of Namibia).

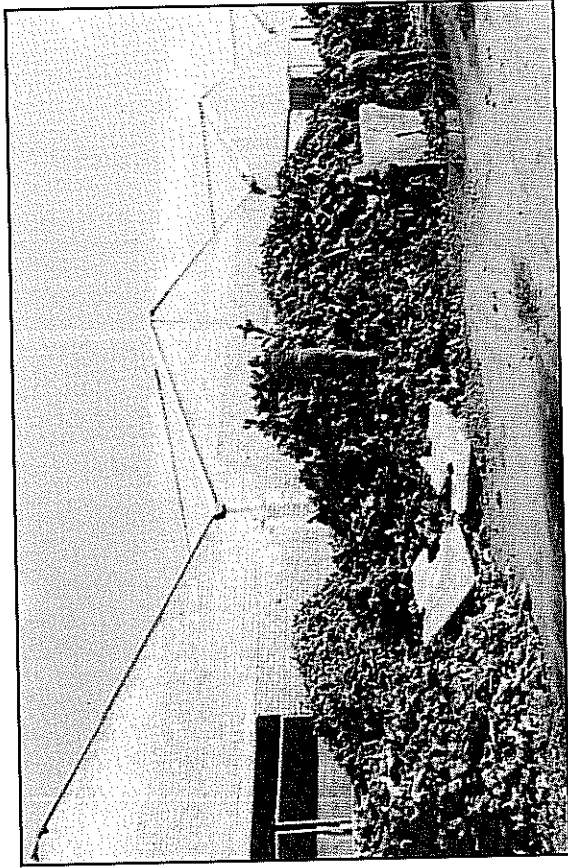
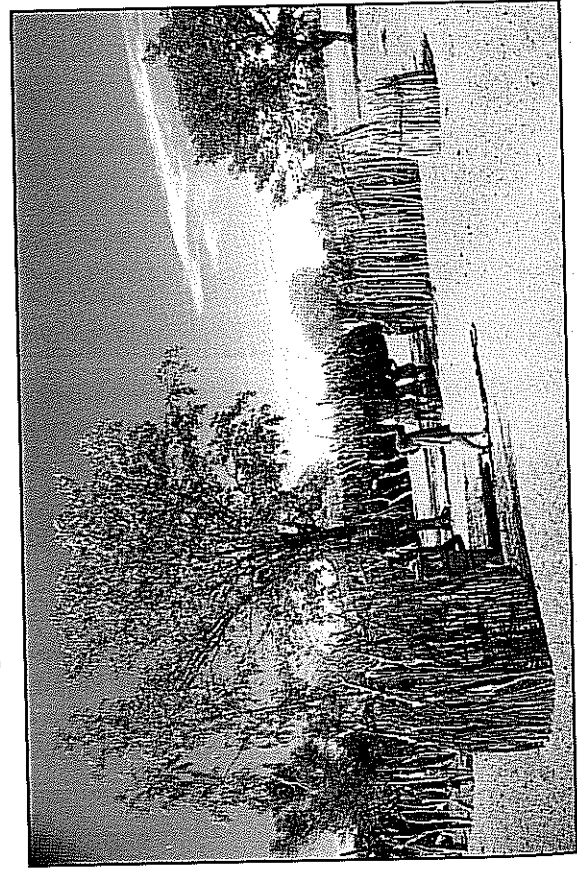
*Plate 20:* Homestead of northern Namibia, showing use of mopane in the construction of traditional granaries.





*Plate 21:* Traditional mortars and pestles made from mopane and other woods, on sale in northern Namibia (Desert Research Foundation of Namibia).

*Plate 22:* The homestead and farmland of Mr. Pineas Aindongo, showing the use of mopane poles in fence construction as well as tree planting and presence of trees in the farming area.



*Plate 23:* Piles of mopane roots waiting to be collected from the farm (North Trade Namibia).

*Plate 24:* Examples of decorative mopane roots that have been sand blasted and are ready for export (North Trade Namibia).

