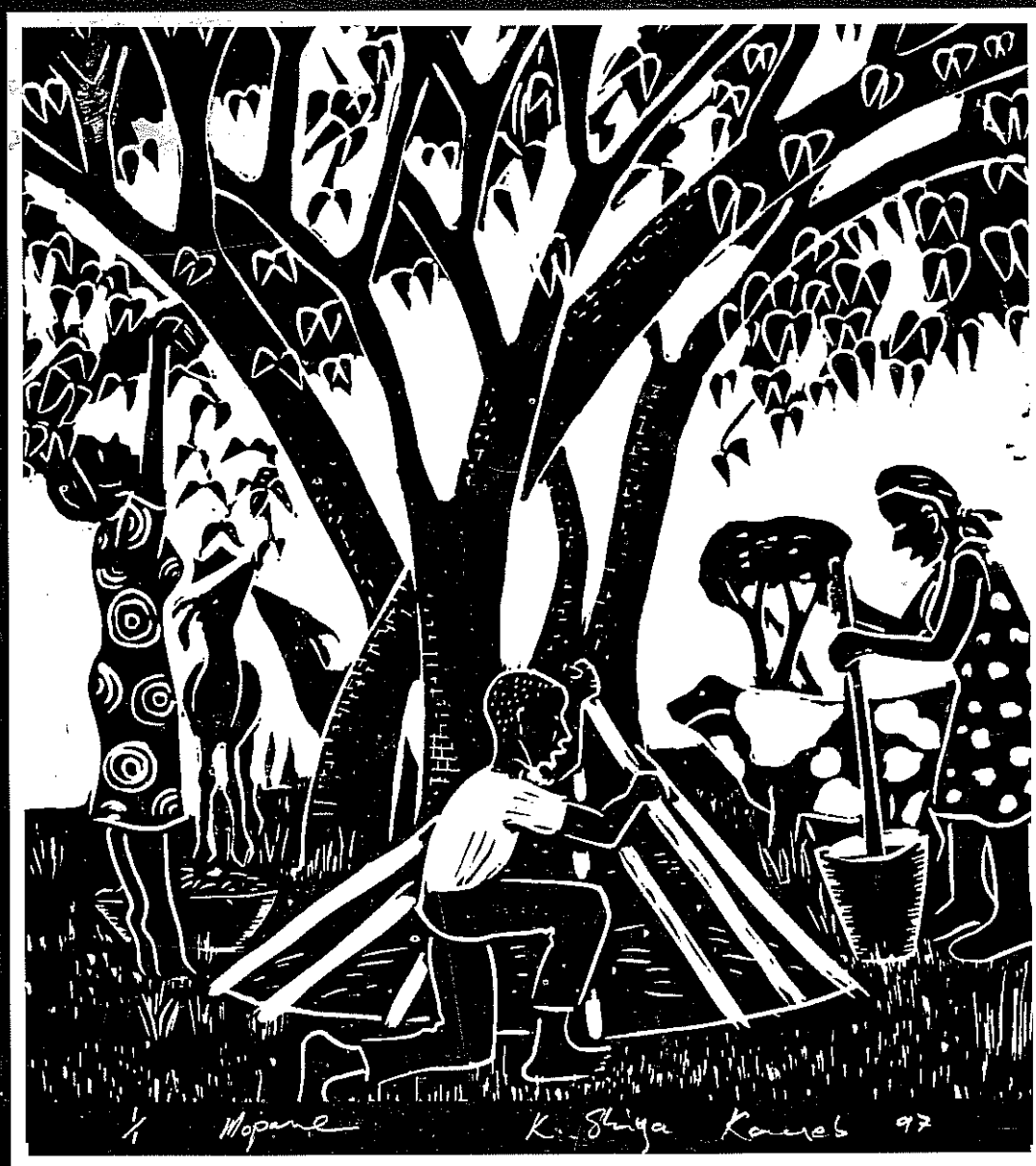


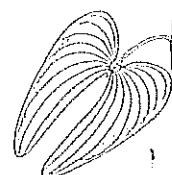
Management of Mopane in Southern Africa

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



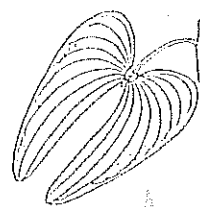
Edited by Charlotte Flower, Grant Wardell-Johnson and Andrew Jamieson

TABLE OF CONTENTS



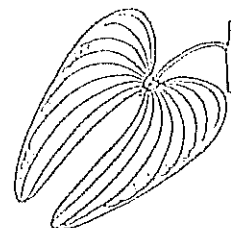
List of Plates	iii
List of Figures	v
List of Tables	vi
Acknowledgements	viii
Preface by Harrison Kojwang, Director of Forestry, Ministry of Environment and Tourism, Namibia	ix
Abbreviations used	x
Opening address by Simwanza Simenda, Deputy Permanent Secretary, Ministry of Environment and Tourism, Namibia	xi
Management of mopane in southern Africa: an introduction, by Grant Wardell-Johnson, Charlotte Flower and Andrew Jamieson	xiii
Chapter 1: A review of the ecology and management of <i>Colophospermum mopane</i> , by Jonathan Timberlake	1
Chapter 2: On-farm research in mopane woodland: a case study from Chivi, Zimbabwe, by Patrick Mushove	8
Chapter 3: Mopane shrubland management in northern Namibia, by Martinus Gelens	12
Chapter 4: Influence of intensity of tree thinning on the vegetative growth, browse production and reproduction of <i>Colophospermum mopane</i> , by Nico Smit	19
Chapter 5: A brief outline of research for the management of <i>Colophospermum mopane</i> in Malawi, by Chris Masamba and Tembo Chanyenga	23
Chapter 6: Prospects for the sustained utilization of mopane (<i>Colophospermum mopane</i>) for charcoal production in the Venetia Limpopo Nature Reserve, South Africa, by Peter Cunningham	26
Chapter 7: The exploitation and utilization of mopane root stems: a case study from northern Namibia, by Walter Piepmeyer	31
Chapter 8: Comparative analysis of chemical and traditional methods of seed treatment of mopane in Moçambique, by Natasha Ribeiro	34
Chapter 9: Interactions between the mopane caterpillar, <i>Imbrasia Belina</i> and its host, <i>Colophospermum mopane</i> in Botswana, by Marks Dithlogo, J. Allotey, S. Mpuchane, G. Teferra, B.A. Gashe and B.A. Siame	37
Chapter 10: Mopane (<i>Colophospermum mopane</i>) as host for the development of the mopane worm, <i>Imbrasia Belina</i> Westwood, in Botswana, by Joseph Allotey, G. Teferra, S. Mpuchane, M. Dithlogo, B.A. Gashe and B.A. Siame	41
Chapter 11: Woodland management strategies for communally-owned mopane woodland in the Zambezi valley, Zimbabwe: an alternative to commercial logging, by Isla Grundy	45
Chapter 12: Socio-economic aspects of <i>Colophospermum mopane</i> use in Omusati Region, Namibia, by Czech Conroy	55

Chapter 13:	Mopane caterpillar resource utilization and marketing in Namibia, by John Ashipala, T.M. //Garoes and C.A. Flower	63
Chapter 14:	Case studies of mopane management in Omusati Region, Namibia, by Charlotte Flower	70
Chapter 15:	Recommended procedures for the establishment of permanent sample plots (PSPs) in the mopane domain: a discussion paper, by Grant Wardell-Johnson	73
Chapter 16:	The management of mopane woodland: a summary of the workshop and directions for the future, by Charlotte Flower, Grant Wardell-Johnson and Andrew Jamieson	78
Index		83



CHAPTER THIRTEEN

MOPANE CATERPILLAR RESOURCE UTILIZATION AND MARKETING IN NAMIBIA



John Ashipala^a, T. M. //Garoes^b and C. A. Flower^c

ABSTRACT

Results of a resource utilization and marketing survey of mopane caterpillars (*Imbrasia belina*) in northern Namibia and Windhoek are reported. There is informal marketing of the caterpillar as well as subsistence use and the emergence of conflict between the two. The market for the caterpillar is undeveloped and informal.

Keywords; Mopane caterpillar / worm, *Imbrasia belina*; *Colophospermum mopane*, market, northern Namibia, Angola.

GENERAL INTRODUCTION

In northern Namibia, as in other parts of southern Africa, insect resource utilization for food is very common (Marais 1996). In the Kunene and Omusati districts (see Figs. A and B), *Colophospermum mopane* (Kirk ex Benth.) Kirk ex J. Léonard (mopane), is the predominant woody vegetation. Mopane leaves are the principal food of the larvae of the *Imbrasia belina* (mopane emperor moth) and the final larval stage is an important food for the local people of that region (Oberprieler 1995). Since it occurs in the mopane woodlands, it is commonly known as the mopane worm or caterpillar.

Traditionally the caterpillar was harvested by families for their own use. However, with urbanization increasing and with the development of informal markets, the caterpillar is increasingly traded, both in the north and in Windhoek (Marais 1996). In Botswana and South Africa there is a well developed trade in mopane caterpillars and harvesting them is important seasonal work for hundreds of unemployed women (Styles 1994a). There has not yet been any market research in Namibia.

With the increase in marketing comes concern for the resource itself and how robust it is to withstand increased harvesting. This question is further complicated by concerns for the food resource of the caterpillar, as the mopane resources of the area are under increasing pressure. The north-central area of Namibia has suffered extensive deforestation in the past (Erkkilä and Siiskonen 1992) and with population pressure increasing, people will move further west.

In two separate projects, we aimed to determine mopane caterpillar resource utilization in the north of Namibia and at the marketing structure of mopane caterpillars within the capital, Windhoek.

RESOURCE UTILIZATION

Introduction

The objective of this study was to develop an understanding of traditional mopane caterpillar utilization, with regard to local (traditional) knowledge and information on the ecology of the caterpillar and community resource management systems.

Methods

The survey was carried out in the Kunene and Omusati districts (Fig. B). Mopane trees grow as woodland in these areas and they are important areas for mopane caterpillar harvesting. Semi-structured interviews and Participatory Rural Appraisal (PRA) techniques were used to analyze factors affecting caterpillar production, to establish trends in these factors over time and to investigate how the factors might relate to each other. Interviews were carried out with individuals or groups of people who used, harvested or sold the mopane caterpillars. Attempts were made to ensure that information was collected from people with different ethnic backgrounds within the area. Eleven villages and two town areas were covered in the survey carried out in May 1996. The following villages and towns were visited in the survey; Oshakati town (Omatala open market), Okahao, Opuwo, Okanguati, Okonjota, Omaiopanga, Omuangete, Oshifo (Ruacana area), Otjerunda, Otjitoko, Ovinjange and Omuaramba. They are all in an area from Oshakati to west of Opuwo, with the Angola-Namibia border to the north and the Etosha National Park to the south. (see Fig. B).

Results and discussion

There are a number of different caterpillars collected in the area (Table 13.1), but it is the *Imbrasia belina* (black) and the *Gynanisa maja* (yellow) caterpillars that are the most numerous. The yellow caterpillar is not collected in such large numbers as the black and only in particular areas.

The occurrence of mopane caterpillars is considered to be dependent on the annual rainfall (Fig. 13.1). The rain

^a Directorate of Environmental Affairs, Private Bag, Windhoek, Namibia

^b Hamoye Research Station, Directorate of Forestry, Private Bag 295, Rundu, Namibia

^c PO Box 11339, Windhoek, Namibia

Table 13.1: Different edible caterpillars that were mentioned by respondents during the survey in northern Namibia

Scientific name	Common names	Himba	Damara	Oshiwambo	Food source
<i>Imbrasia belina</i>	mopane caterpillar, black	Omiungu	/drub	Omahaikya/ Omaungu	mopane leaves
<i>Gynanisa maja</i> (klug) (Oberprieler, 1995)	mopane caterpillar, yellow	Oruwowo	!Gobabes	Omaenghova	mopane leaves, <i>Acacia erioloba</i>
	commiphora caterpillar		/Hubeb	Ombakarumba	<i>Commiphora</i> spp.
	acacia caterpillar		#Eibeb	Outaraha	<i>A. fleckii</i> <i>A. mellifera</i>

determines when the moths will emerge from the ground and lay their eggs. If the rains continue, the caterpillars will be numerous and fat. It is usual that there is only one generation of moths in the rainy season, although it was reported that there can sometimes be two in the Kunene area and in Angola. The first generation comes with the early rains in October; they are known as "omiungu-yomakoto". They are only for the birds and are not harvested. In Botswana and South Africa, it is common for there to be two generations in one year (Styles 1994b), and it is the first generation, coming in December, that is considered the best for harvesting.

Many older people stated that there were more caterpillars in the past, but it was also noted that there was more rain in the past as well. There was also reported to be variation from place to place in any given year, just as the rainfall varies from place to place. In 1996, for example, there were two caterpillar generations in one year in Angola, but in Omuaramba, in the same year, the rains were poor and so there were few caterpillars.

The mopane caterpillar is harvested from either a tall tree or a shrub. However, the caterpillars are occurring less and less in the shrubland areas and large numbers are only found in the woodland areas. No clear explanation for this was given, as it was felt that caterpillars do not necessarily do better on trees rather than shrubs, or that the moth prefers to lay eggs on trees rather than shrubs.

It was noted that there are a number of predators of the

caterpillars. Jackals dig up the over-wintering cocoons, birds (such as rollers, starlings, hornbills and sparrows) eat the small caterpillars that first emerge, snakes eat the caterpillars (one reason why some people fear collecting caterpillars), as do *Hedredus pupus* (crickets) and baboons. In addition there are predators at the egg stage, crickets and *Mesocomys pulchripes* (a parasitic wasp).

A heavy infestation of caterpillars can defoliate large areas of mopane, but how damaging this might be to the tree resource is unclear. One interviewee stated that "the caterpillars can not affect the environment, only leaves are eaten". The trees are generally able to recover from defoliation within the same season, although this does depend on the rain. The impact of harvesters can however be detrimental to the trees. Some people might climb the tree or even cut off branches to facilitate harvesting. Trees are also shaken to get the caterpillars down. Commercial pickers are accused of using the most damaging techniques, such as pushing over whole trees in attempts to get all caterpillars. It is said that the best stage for collecting the caterpillars is just when they are ready to bury themselves, when they are descending the trees or on the ground. This should therefore forego the necessity of climbing, cutting or otherwise damaging the trees in the harvesting process. It is also important to leave sufficient caterpillars to bury themselves and continue their life cycle. Commercial pickers are blamed for removing all caterpillars and ignoring this important rule for sustainable management.

Figure 13.1: Mopane caterpillar life cycle, described by village group in Opuwo

November	Butterflies emerge after the rain
December	Eggs are laid on leaves
January	Hatching of eggs
February	Harvesting can begin, but dependent on the rain. If no rain in January/February the worms can die
March	Harvesting
April	Harvesting, but mature worms are now ready to bury themselves
May	Cocoon can change to butterfly and the process starts again

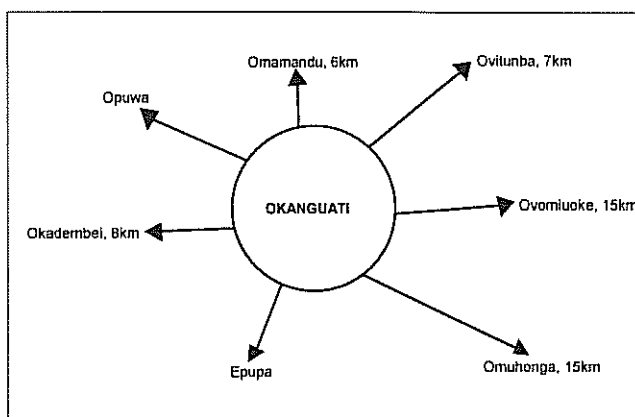
Most interviewees were unable to say how many caterpillars they picked from each tree; they pick until a bag is full and this would be from many trees. It was estimated by some that up to five kilograms can be collected from a big tree and up to 2.5 kilograms only from a shrub. Five kilograms was estimated to be about 500 caterpillars by many of the interviewees. In a day a person can collect half a bag (a 50 kg maize sack) to one bag.

The processing of mopane caterpillars consists of eviscerating the live caterpillar by squeezing them by hand (to remove the faeces); they are then either boiled for a few minutes in salted water and left to dry in the sun, or roasted on charcoal. Caterpillars can be stored in this dried state for a number of months. Mixing with ash can reduce insect attack during storage.

Most people collect their caterpillars in their village area (Fig. 13.2). The locations of outbreaks differ from year to year and so people have to follow the movement of the caterpillars. News of the occurrence of caterpillars is spread by word of mouth. In most cases, an outsider to the community is required to seek permission from the headman of the village before harvesting. This is not formally required but seems to be considered the proper approach.

In the past people (traditionally women and children) might travel one or two days to an area where there are good caterpillars. They would take everything that they needed to be able to camp out for a few days, including water and food. This would either be carried on their backs or by donkey cart. The amount that they could harvest would be determined to a great extent by the amount that they could transport back with them. However, nowadays "bush taxis" can be available to make transportation much easier. The only

Fig. 13.2: Diagram illustrating areas around Okanguati that people go to collect mopane caterpillars



element of conflict that was apparent in the interviews was between people collecting a few bags for their own consumption and those collecting commercially. The former would arrive by donkey cart to an area only to find that people with access to motor vehicles had taken most of the caterpillars already.

Caterpillars are collected both for domestic consumption or to sell. In the past most people collected just for themselves, and even now most of the people interviewed collect enough for their own use and may sell only if there is some surplus. They might do this by taking a sack to a market or roadside and selling small quantities, usually by the tin, or they sell sack loads to travelling wholesalers (these are people who will travel from farm to farm and buy sacks that they will then take to a town market and sell). It is said that you can get more for a sack of caterpillars by selling them by the tin full yourself (see Table 13.2), but obviously you need time and transport to get yourself to the market. Some

Table 13.2: Wholesale and retail prices for mopane caterpillars in northern Namibia

Place	Wholesale, per sack	Retail
Opuwo (town)	12 kg: N\$40.00 to N\$70.00 50 kg: N\$200.00 to N\$400.00	
Oshakati (market)	50 kg N\$200.00 to N\$400.00, depends on demand	¹ A 50 kg sack sold in the market at 500 ml/N\$2.00, will earn N\$350
Oshimanje	50 kg: N\$200.00	
Okonjota	50 kg: N\$200.00	
Otjikoto	50 kg: N\$300.00 to N\$400.00	
Okanguati	50 kg: N\$250.00 to N\$350.00 People from Oshakati come to buy from here	
Ruacana		Handful wrapped in cone of paper, N\$0.20
Kapika	50 kg: N\$350.00 to N\$450.00, if the demand is high	

¹ This is calculated using the conversion rate of 1,650 ml/kg, developed in the Windhoek survey

women in Kunene said that they pay school fees and buy school wear for their children from the money that they earn through harvesting and selling caterpillars.

Both the black and yellow caterpillars are harvested and sold. Many people consider the yellow caterpillar to be superior to the black, but often they are collected and processed together and so are sold mixed. In Oshakati market it was observed that the yellow and black are usually mixed together, but sometimes are sold apart. It was mainly the caterpillars brought from Angola that were separated. However, despite yellow being reportedly more superior they were almost always sold at the same price. One trader said that she gave a slightly smaller volume of yellow compared to black for the same price.

The market survey at Oshakati showed that caterpillars are being brought from Angola, Kunene region and the Okahao area. The local sellers consider the best caterpillars to come from the Kunene. Much of the preference is due to the way that the caterpillars were processed when harvested. Higher quality caterpillars are sold at a higher price. The best selling time was said to be at the end of the month, when it is possible to sell one and a half to two bags in one day. The rest of the month, it can take three to four days to sell a bag.

WINDHOEK MARKET SURVEY

Introduction

The objective of this survey was to understand the mopane caterpillar marketing system, in particular inflation rate, elasticity of demand, location of sale and to identify the customers. This would enable the identification of opportunities for market growth and any constraints to the development of the market.

Methods

In August 1996, one to one interviews were held with retailers, using a questionnaire. Ten retailers (nine women and one man) were selected at random and interviewed in the Okuryangava, Ombili, Hakahana and Wanaheda areas of Katutura.

Results and discussion

Caterpillars are supplied by Namibian and Angolan suppliers, through three different supply channels to get the product from producers to consumers. These are: producers to consumers, involving Namibian producers as retailers; producers to retailers and then to consumers, involving Angolan as well as Namibian producers and Namibian retailers; and producers to wholesalers to retailers and then consumers, involving Angolan producers and Namibian wholesalers and retailers.

Caterpillars are imported from Angola to match the demand in the market. At the moment there is an import duty between Angola and Namibia, but this does not seem to have pushed up the price of caterpillars unfavourably compared to prices of Namibian caterpillars. Some retailers sug-

gest that there is a shortfall in Namibian supplies because the harvest of caterpillars in Namibia is dependent on rainfall patterns; greater rainfall in southern Angola would mean a better mopane caterpillar resource. Others, however, suggest that the resource is not insufficient in Namibia, the problem lies with the Namibian producers not being very business oriented. It seems that harvesting may be more organized in Angola; this could be due to a greater caterpillar resource and it is also suggested that people in Angola are not so keen on eating the caterpillar themselves, and so harvesting is done for commercial purposes only. The importing of mopane caterpillars is important to the Namibian market (as it provides an important supply). If the import duty was removed then the profit margin would be greater for traders and the market might grow.

The costs of making this product available to consumers varies depending on where the product was produced (Table 13.3). At the moment, most of the caterpillars that are commercially harvested from the north of Namibia are in remote areas, in the north-west from where transport is expensive. The highest transport costs seem to be from Opuwo, which reflects the lack of transport available from that area, compared in particular to the transport available from the Oshakati area to Windhoek and from the Angolan border to Oshakati. The caterpillars that are traded wholesale in Oshakati are from these remote areas and also from Angola. The wholesalers are obviously absorbing the cost of transport in their prices, but it makes it difficult for individual producers and retailers to compete, as the example of the interviewee number seven illustrates.

The prices recorded in the survey (see Table 13.4) are similar to those recorded by Marais (1996) in May 1996 in Windhoek. Given a conversion rate of one kilogram of caterpillars being equivalent to 1,650 ml, then a 50 kg sack would yield an income of N\$742.09 uncooked (of which N\$607.20 is profit) and N\$1,098.90 cooked (of which N\$724.35 is profit), at the Windhoek market (see Table 13.4). In Oshakati, a 50 kg sack will earn N\$350.00 (see Table 13.2). If the retailer has picked the caterpillars themselves this is direct profit. However, if the retailer had to buy the sack (which will cost at least N\$200.00), the profit margin in Oshakati is a quarter of that in Windhoek. The profit margin in Windhoek therefore seems very attractive. Unfortunately, no information was gathered on how many kilograms of caterpillars retailers in Windhoek are selling. It is therefore not possible to estimate how much a retailer is able to make in a day (or indeed, the demand on the supply or extent of the market). If the market is similar to that in Oshakati, where it can take on average three to four days to sell a bag, during a month (given six selling days per week) a retailer could sell about eight bags of caterpillars. Uncooked, this would give a profit of about N\$4,800 per month².

The survey indicates that the income from cooked caterpillars is considerably more than uncooked (see Table 13.4). However, there is no estimate of cost involved in preparing the caterpillars, in terms of resources required (e.g. oil, fire-

wood, seasoning) and the time taken to cook them. There is also a risk involved in cooking them as any that are unsold at the end of the day are a loss as they cannot be sold the following day. It seems that most retailers sell both cooked and uncooked to minimise that risk.

Credit was raised as an issue with one interviewee. She felt that as the trade required an initial outlay - for the caterpillars themselves and for transport - this led a number of traders into non-favourable credit arrangements. Access to formal (and therefore less expensive or risky) credit might facilitate more people getting into the trade.

One interviewee (number one) appears to be selling at a loss (see Table 13.4). This is common within informal marketing systems, when income from sales is immediately used for basic needs. As no simple accounting is carried out, the overall loss from the marketing sometimes goes unnoticed.

All retailers interviewed described the demand for the product as being constant. There appears to be no tough competition in the market, so the business can be quite profitable. The product is produced seasonally, but the demand is all year round. There appears to be a shortage in supply compared to demand, which indicates potential market growth for this product. Most interviewed felt that the producers were not sufficiently organized, or just did not realize that there was a good market for the product. Many collect just for subsistence use and this was felt to keep much of the product off the market. It was suggested that if these people knew that there was a good market for the caterpillars, then they would harvest to sell rather than for home consumption.

CONCLUSIONS

At the time of the survey, there were no apparent mechanisms in place to manage the resource. It is considered to be owned by no-one. It is normal for someone from outside the area to ask the traditional leader's permission to collect, but there seems to be no limit on the amount that can be collected. When harvesting was limited by the lack of resources that the harvesters had to collect, then this open access system worked, within the limits of the resource itself. However, with motorized transport and the increase in commercial marketing of the product, the capacity to harvest caterpillars is increasing all the time. It is apparent that there are beginning to be conflicts between local (and mainly poorly resourced or subsistence) and commercial (and mainly outside) gatherers.

There is no perception that the resource is decreasing, only that it is dependent on the rain. It is observed that the rain is less than it was in the past. There is greater competition for the collection of the caterpillars and some concerns that irresponsible harvesting techniques (always ascribed to

commercial gatherers) could damage the resource. It is unclear what effect the pressure on the mopane resource itself and its conversion into shrubs, will have on the caterpillar resource. Although in wooded areas the caterpillars occur on both large trees and small shrubs, they do not seem to be so numerous in shrubland areas.

There is a limited supply of mopane caterpillars in Namibia, due to many of the producers harvesting for their own consumption. This could be improved if the producers realized that they could profit from selling caterpillars. However, care is required in ensuring that subsistence consumption is protected. For many farmers this is an important nutritional resource. The resource survey indicates that there could be conflict between consumption and wholesaling, requiring sensitivity in any development of a market.

It is important that harvesting is controlled to ensure that the resource, both food and insect, is protected. This could be achieved by ensuring that the traditional authority and community within the area concerned are able to gain some benefit from the harvesters and that protection and good management of the resource is advantageous to them. At the moment there appears to be no control at government level of the resource. A partnership between MET staff and local communities might be necessary to ensure that marketed caterpillars are harvested within the rules laid down by sustainable management.

Further research on the harvesting and marketing organization is necessary. It is recommended that the research be carried out at the time of year when mopane caterpillars are being collected, so that the people involved, be they commercial pickers, wholesalers, subsistence farmers and traditional leaders can be contacted during the research. It is important to also look at how the market is structured, between Angola, Namibia and possibly South Africa and Botswana, as well as within Namibia. Oshakati, Rundu and Windhoek are all important markets for mopane caterpillars.

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² At the time of the survey, the average domestic servant's wage in Windhoek was less than N\$ 1000 per month.

Table 13.3: Total supply costs to the ten retailers interviewed, summarized to the cost per 500 ml of mopane caterpillars

Place of purchase	Oshakati			Oshikango	Opuwo		Namakunde		Single quarters	see note 1
Interviewee	5	6	10	4	3	7	1	10	2	8 9
Unity purchased	30kg	65kg	80kg	50kg		80kg	75kg	80kg	500ml	see note 2
Purchase price	N\$198	N\$300	N\$500	N\$300	see note 3	see note 4	N\$824 ⁵	N\$400	N\$2	see note 2
Transport cost	N\$15	N\$25	N\$10	N\$10	see note 3	N\$70	N\$25	N\$20	see note 1	see note 2
Import duty							N\$60	N\$60		see note 2
Total cost	N\$213	N\$325	N\$510	N\$310	see note 2	N\$70	N\$90	N\$480	N\$2	see note 2
Number of 500ml units, see note 6	990	214.5	264	165		264	247.45	264	1	see note 2
Cost per 500ml	N\$2.15	N\$1.52	N\$1.93	N\$1.88		N\$0.27	N\$3.67	N\$1.82	N\$2.00	see note 2

1. The retailer had bought the caterpillars within walking distance of the site from where they were selling them, therefore no transport costs incurred.
2. Interviewees No 8 and 9 did not know where the caterpillars were purchased from; neither did they know the cost of the worms as they were only recruited to sell them.
3. Interviewee No 3 did not know the purchase or transport price as they were recruited to sell the caterpillars.
4. Interviewee No 7: no purchase price as producer and retailer are the same.
5. She reported the cost to be N\$55.00 for 750 ml; the sum given in the table is worked out from that for the 75kg that she imported.
6. Using a 10kg bag of caterpillars, it was established that thirty-three 500ml measures could be had from this amount. The conversion used is therefore 33/10kg sack or 1650ml/kg.

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Does the government benefit from mopane caterpillar harvesting?

No; there are currently no permit requirements on harvesting, marketing, etc. of mopane caterpillars.

Is government making any effort to control harvesting?

In principal [as mopane caterpillars are classed as a non-timber forest product] they are supposed to control. At present though there are no real concerns about over exploitation. Protecting woodland areas might be the most effective way of protecting mopane caterpillar resources.

In Opuwo, the DoF have asked commercial harvesters to seek permission from traditional leaders and to take care when collecting not to damage trees.

In Botswana they have produced a small leaflet explaining guidelines for harvesting

ISSUES RAISED DURING PARTICIPANTS' DISCUSSION

What are the Ministry's intentions after the survey?
The survey was done mid '96. The Ministry will know what to do about mopane caterpillars by the end of the year.

Table 13.4: Summary of selling prices and profit made by each vendor in the Windhoek survey, standardized to per 500 ml of mopane caterpillars to facilitate comparison between vendors

Location of sale	Worms sold cooked and ready to eat					Worms sold uncooked			
	Okuryongava	Ombili	Hakahana	Wanaheda		Okuryongava	Ombili	Hakahana	Wanaheda
Interviewee									
Unity sold	2 3 5	6	8 9	10		1 4	7	8	10
	200ml 50ml 100ml	75ml	75ml 75ml	75ml		500ml 100ml	300ml	500ml	75ml
Selling price	N\$2 N\$1 N\$1	N\$1	N\$1 N\$1	N\$1		N\$3 N\$1	N\$2	N\$4	N\$1
Price equivalent per 500 ml	N\$5 N\$10 N\$5	N\$6.66	N\$6.66 N\$6.66	N\$6.66		N\$3 N\$5	N\$3.33	N\$4	N\$6.66
Average/ location	N\$6.67	N\$6.66	N\$6.66	N\$6.66		N\$4.00	N\$3.33	N\$4.00	N\$6.66
Place of purchase	Single quarters		see note 2	Oshakati Nama-kunde		Osha-kati Oshi-kango	Opuwo	see note 2	Oshakati Nama-kunde
Per 500 ml unity:									
Purchase price	N\$2.00	N\$1.52	see note 1	N\$1.93	N\$1.82	N\$3.67	N\$0.27	see note 1	N\$1.93 N\$1.82
Selling price	N\$5.00	N\$6.66	N\$6.66	N\$6.66	N\$6.66	N\$3	N\$3.33	N\$4.00	N\$6.66 N\$6.66
Profit made	N\$3.00	N\$5.14	N\$6.66	N\$4.73	N\$4.84	N\$0.67	N\$3.06	N\$4.00	N\$4.73 N\$4.84
Average profit, see note 3	N\$4.11					N\$3.68			

Notes: 1. Retailer did not know purchase cost of caterpillars (see Table 13.3)

2. Retailer did not know origin of caterpillars (see Table 13.3)

3. Calculated excluding values in italics