

Namibia' s Biomass Energy Management Programme

Results of a Baseline Survey in Northern Namibia

Working Document



by

Catherine Matthew (Desert Research Foundation of Namibia)

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Conservation)

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List of Abbreviations

BMZ	-	German Ministry for Economic Cooperation and Development
DRFN	-	Desert Research Foundation of Namibia
EU	-	European Union
GTZ	-	Gesellschaft für Technische Zusammenarbeit
MME	-	Ministry of Mines and Energy
NBEMP	-	Namibia Biomass Energy Management Programme
NEC	-	National Energy Council
NSC	-	National Steering Committee
NGO	-	Non-Governmental Organisation
ProBEC	-	Programme for Regional Biomass Energy Conservation
RAP	-	Regional Awareness Project
SADC	-	Southern Africa Development Community

Namibia's Biomass Energy Management Programme, Baseline Survey in Northern Namibia

Chapter 1. INTRODUCTION

Namibia is the most arid African country south of the Sahara. The geographic position on the western edge of southern Africa gives rise to certain climatic characteristics. The rainfall is low and highly variable with an extremely high rate of evapo-transpiration. One of the relevant net results is that the rate growth of woody biomass is fairly low.

The population of Namibia is concentrated in the northern regions of the country, comprising mainly poor subsistence farmers. The population increase is approximately 3% per annum with a higher rate in urban areas. Within the area surrounding Windhoek, Namibia's capital city, the rate of population increase results in a doubling of informal settlement populations every 13 years (NHAG 1995). There is a great demand for wood for a variety of purposes vital to people's basic survival and quality of life, both in the rural and urban areas. The climatic rainfall patterns and the population growth rates combine to put great pressure on woody resources within Namibia.

To address the needs and problems that communities face in relation to woody resources in Namibia, the Government has established Namibia's Biomass Energy Management Programme (NBEMP), under the co-ordination of Ministry of Mines and Energy (MME). The MME has set up a National Steering Committee (NSC), through the National Energy Council (NEC), whose overall goal is to put in place a National Biomass Strategy.

NBEMP networks with the SADC-wide Biomass Energy Conservation Program (ProBEC) at regional and local levels, with a wide range of local and locally-based community organisations (Appendix 1.1), non-governmental organisations (NGOs) and governmental directorates in northern Namibia. ProBEC has its main office in Harare, Zimbabwe. In Namibia, the DRFN operates as the Secretariat for the implementation of some of the activities set out under the main objectives of the programme. The aim is to reach the overall national goal as set out below.

ProBEC was launched in 1997 starting with an orientation phase for interested member countries, which lasted until June 1998. A three-year implementation phase then followed with the objective of "Enhancing capacities and commitments of governments and development institutions in six SADC countries to plan and implement an integrated biomass energy conservation programme". With financial and material support from the EU and the BMZ via the GTZ, ProBEC partners from Lesotho, Malawi, Mozambique, South Africa, Zimbabwe and Namibia have shared ideas and experience in various fora to facilitate successful project implementation and management. These included two regional meetings held in 1998 and 1999, as well as the NSC representative workshops at national level.

In addition, the programme was streamlined during a regional workshop held in October 1999, at the Organisational Training and Development Centre, Hararé which addressed three main target implementation areas which are (1) Strategy Development (StrateBEC), (2) Information Gathering & Exchange (IgeBEC) and (3) Demonstration Projects (DemoBEC). These were to be supplemented with higher level activities to enhance project management and co-ordination, advisory services to government services and project backstopping services.

Goal and Objectives of Namibia's Biomass Energy Management Programme

Goal

To put in place a National Biomass Energy Management Strategy that will contribute to the sustainable utilisation and supply of traditional biomass energy for private households and small-scale industries in Namibia.

Objectives

1. Identify organisations and programmes involved in, and key stakeholders and partners for future involvement in, biomass energy conservation activities.
2. Co-ordinate and liaise at national and regional levels with organisations and partners involved in biomass energy conservation.
3. Mobilise stakeholders nationwide to formulate a national strategy and programme for promoting sustainable use of biomass energy resources in Namibia.
4. Identify potential stakeholders and assist with planning, including for pilot projects in Namibia.

Goal of the Baseline Biomass Survey

To provide basic information which is necessary for the integration and improvements of Biomass Energy Conservation measures in the ongoing activities of the DRFN through the Regional Awareness Project and Namibia's Programme to Combat Desertification. Some of the data are also used for the impact monitoring of BEC measures in the frame of the demo projects.

Objectives of the Baseline Biomass Survey

To reach this goal a survey was conducted with the objectives of:

- developing an effective baseline of information
- identifying appropriate energy technologies that increase the efficiency of biomass use and
- mobilising relevant organisations to manufacture and disseminate appropriate technologies.

Chapter Two. BACKGROUND

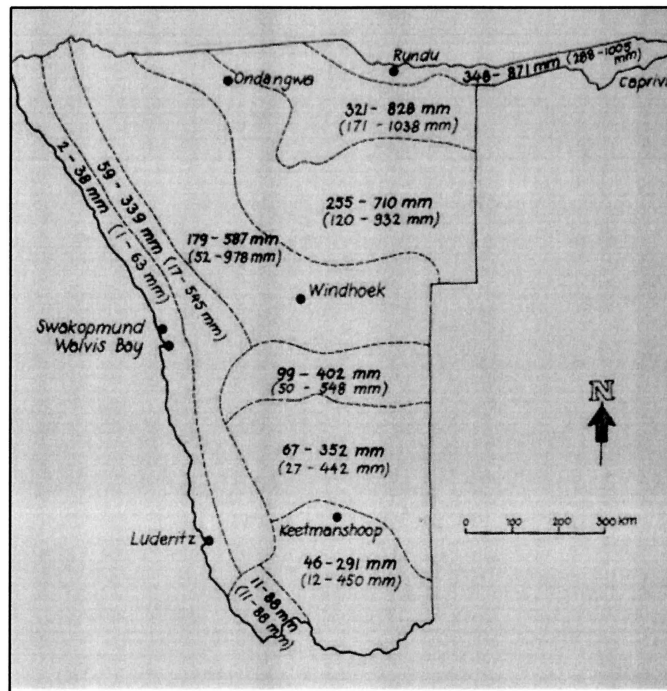


Figure 2.1 Namibia's rainfall map
Dark numbers indicate the range expected 90% of the time
Lighter numbers indicate the 95% range

Namibia is the least populated country in SADC, with some extreme environmental limitations especially in relation to rainfall and its variability (figure 2.1). Consequently there are severe limitations to provision of firewood in Namibia because of the low rainfall-limited growth rate of biomass within the country.

Regional Statistics

This chapter gives a brief overview of the regions in which the survey was conducted and of the chosen study areas. The regions consist of areas of the country with higher than average population densities (see Table 2.1), this is also indicative of the more productive nature of the land within these regions due to the higher level of rainfall than in many other parts of Namibia. The table presented below the descriptions summarises the data.

Ohangwena Region

The Ohangwena Region occupies an area of 10 582 km², and has a population of 190 858 people. This is the highest population number for a region, however the population density is lower than in the Oshana Region. There are 25 574 households, of which 57% were female-headed in our sample. The most densely populated sub-area of Ohangwena has the lowest average income (*Wamukonye & Hamutwe 1998*).

Omusati Region

Omusati occupies 13 638 km² and has a population of 153 030 people who live in 21 822 households (*CBS 1994*). Just over half the households sampled (53%) were female-headed. Nearly all the people reside in the rural areas. The regional town Uutapi was proclaimed in 1997. About 65% of the economically active population is employed in agriculture (*Wamukonye & Hamutwe 1998*).

Oshana Region

Oshana is the smallest region in Namibia, with a land area of 5 291 km² and is populated by 161 491 people living in 24 198 households. The population density is nearly 30 people per km² making Oshana the most densely populated region of the whole country. Nearly 47% of the economically active are employed in the trade and service sectors. The average income is N\$10 528 and only 53% of the population is employed in agriculture (*Wamukonye & Hamutwe 1998*).

Table 2.1 General statistics for the three regions surveyed (*Wamukonye & Hamutwe 1998*)

	Ohangwena	Omusati	Oshana
Area (km ²)	10 582	13 638	5 291
Population	190 858	153 030	161 491
Population Density (No.people/km ²)	18	11	30
No. of Households	25 574	21 822	24 198
Female-headed %	55	53	52
Average Income N\$/year	6 439	8 441	10 528
% population employed in agriculture	72	65	53

Most people in the northern areas of Namibia are subsistence farmers, mainly farming with crops and stock. Consequently, they consume a lot of wood for cooking, heating (the winters are relatively cold at night), fences (around mahangu¹ fields and goat kraals) and building materials for homesteads. These factors, combined with the increase in new settlements and subsistence farming, play a crucial role in deforestation in northern Namibia. This form of land degradation leads to a considerable decrease in the livelihood security of people dependent on woody resources.

Although Namibia's population is low, it is increasing at a high rate, >3% nationally with an even greater rate in the urban informal settlements. This puts severe pressure on a limited resource and there is an ever-increasing demand for fuel-wood. Land degradation is one result of this phenomenon, shown through the complete loss of many wooded areas in Namibia, and the incremental loss of biodiversity in these same

¹ Mahangu is the local name for millet (*Pennisetum glaucum*)

areas where valuable firewood species, such as Omusati² (*Hardwickia* (syn. *Colophospermum) mopani*) are removed.

Biomass fuel is the main source of energy used for heating and cooking in Namibia by most rural settlements and some urban communities (figure 2.2).

The socio-economic status of the people in these areas is thus crucially linked to the status of the biomass resource. Biomass fuels are in great demand within these 3 northern regions, Oshana, Omusati and Ohangwena, but are diminishing in availability and accessibility as a result of lack of feasible alternatives and the unsustainable use of the increasingly limited resource. This is shown by the fact that less than half of the people use wood for cooking and heating having to use a diverse array of other materials used.

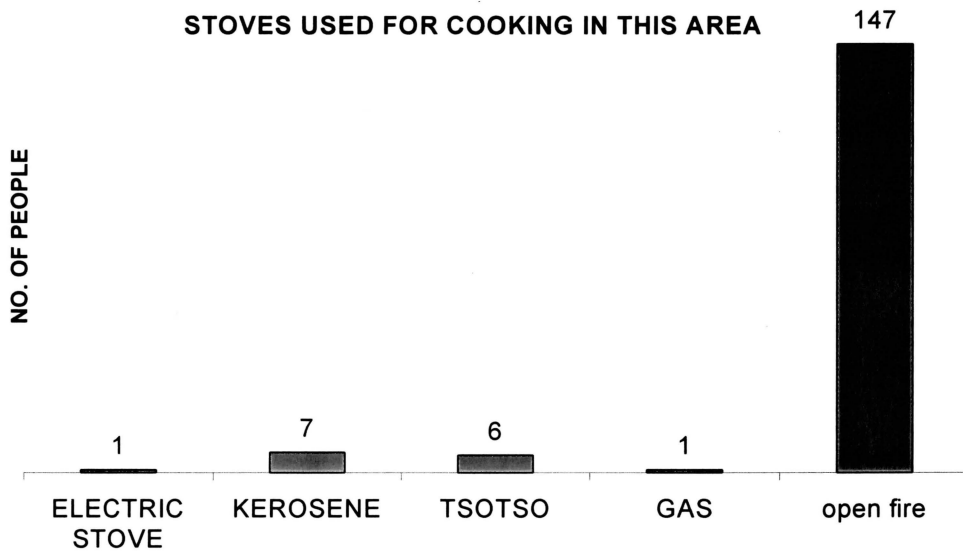


Figure 2.2 Number of people using different types of stoves for cooking in the three regions surveyed (n = 160 households)

There is a need for feasible alternatives to be encouraged, which will be willingly used by communities. Figure 2.3 shows the dependence on biomass fuels for burning compared to alternative stove technologies. Alternatives must, however, be continuously available and always accessible to communities in order for them to want to use them.

² This is the local Oshiwambo name for the Mopane tree.

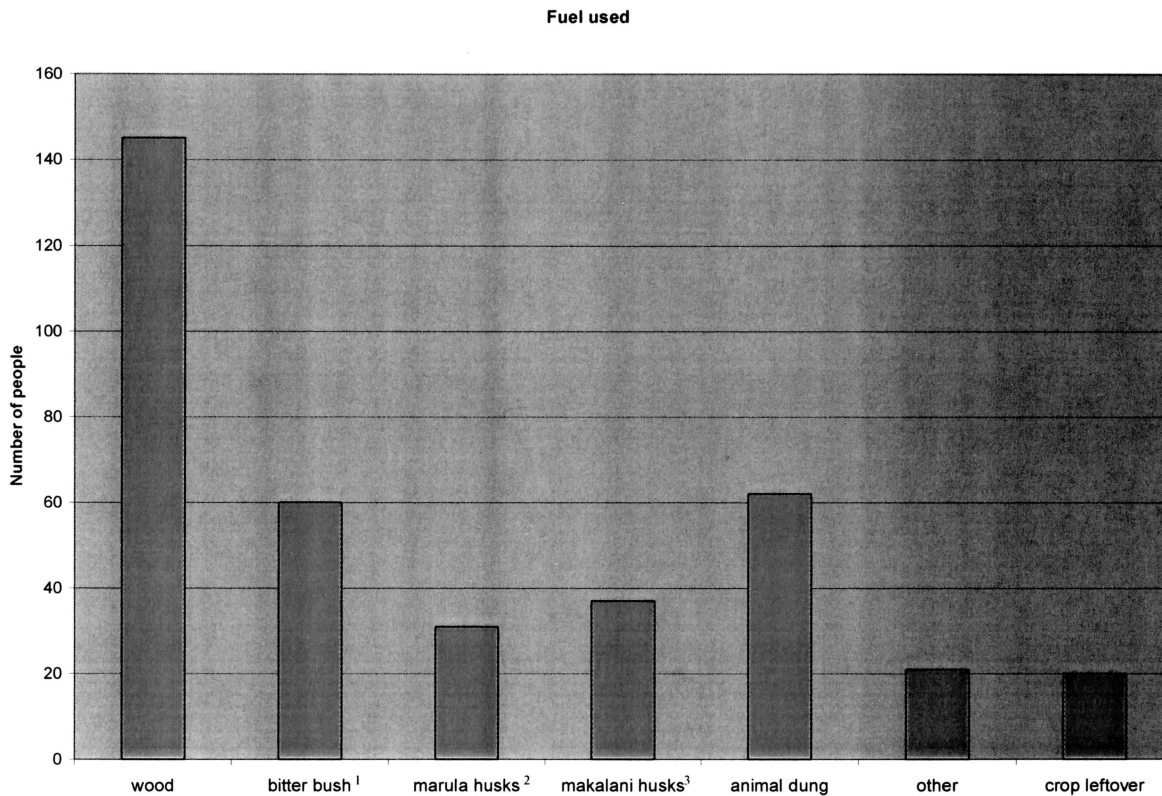


Figure 2.3 Types of fuel used for cooking in three regions surveyed. 160 people were interviewed, some using more than one type of fuel.

¹ = *Pechuel-Loeschea leubnitziae*

² = *Fruit husks from the Marula Tree*

³ = *Palm fruit husks*

Programme for Biomass Energy Conservation

Project Background

The idea behind ProBEC is that of enhancing capacities and commitments of governments and developing institutions/organisations to plan and implement integrated biomass energy conservation programmes. ProBEC is intended to contribute to a better quality of life for the poor rural and urban populations by increasing livelihood security. This will be accomplished by enabling them to meet their energy needs in a socially and environmentally sustainable manner. Realising the importance of such a project, funding was generously provided by the Federal Republic of Germany through the Gesellschaft für Technologische Zusammenarbeit (GTZ) and by the European Union.

ProBEC is conducted in six SADC countries: Lesotho, Malawi, Mozambique, Namibia, South Africa and Zimbabwe. One of the ProBEC outputs is the creation of demonstration projects, this being done through the bringing together of different

partners with different sectoral expertise who can pool their complementary resources to benefit the communities

The Desert Research Foundation of Namibia (DRFN) expressed an interest in taking the lead with demonstration projects to be implemented in co-operation with the Rural Awareness Project (RAP) and Namibia's Programme to Combat Desertification (Napcod).

A baseline survey was conducted in the year 2000 which covered 110 households. The survey describes various basic information in relation to biomass. This information is vital to ensure that there will be integration and improvements of biomass energy conservation measures in the ongoing activities of Biomass-ProBEC/RAP and Napcod. An additional survey of 50 households was conducted later in Oshana region, bringing the total sample to 160 households. The purpose was to gather additional information, which wasn't covered in the previous survey. The result of both the surveys have been integrated into this report.

RAP, ProBEC and Napcod projects implemented by the DRFN deal with many similar issues with regard to deforestation. The survey was conducted by Catherine Matthew of the DRFN with support provided by the RAP staff (Menete Ashipala and Fiona Olivier) and the additional survey was conducted by Napcod staff member Otilie Amaambo all of whom were already familiar with the area and were welcomed by the people.

Chapter 3. BIOMASS BASELINE SURVEY

Methodology

Study Area

The study was conducted in the Ohangwena, Omusati and Oshana regions in northern Namibia. The survey focused on two villages per region. Additional people from other non-target villages who were visiting friends in the two focus villages were also interviewed, which brought the original sample size of households from 100 to 110. An additional survey was conducted later with another 50 households in Oshana bringing the total sample to 160 households

Table 3.1 Target villages and additional villages of the 160 households surveyed

Regions	Village 1	Village 2	Non-target villages
Ohangwena	Ohaingu	Omungwelumbe	Omatundu, Engava, Okambebe Oshiwiyu
Omusati	Okahao	Oshikuku	Onampila, Etilyasa, Uukwamatsi, Uutsima, Onoolongo
Oshana	Uupindi	Uuvudhiya	Onampila, Onkani, Oshikushashipya, Oshikango, Oneshila, Onangombe

The survey focused on northern Namibia because it was identified as being the most vulnerable area to fuel-wood shortages because of its high population density. The regions and villages which were targeted, corresponded to those where the Regional Awareness Project (RAP) and the DRFN had been active in the past. As part of environmental awareness raising, RAP promoted alternative resource use to encourage less wood consumption and thus encouraged combating of deforestation and land degradation. Their activities also supported the objectives of ProBEC.

A wide range of different individuals was interviewed to ensure an equal representation within each village especially as regards gender and age representation. People less than 21 years old were categorised as boys and girls.

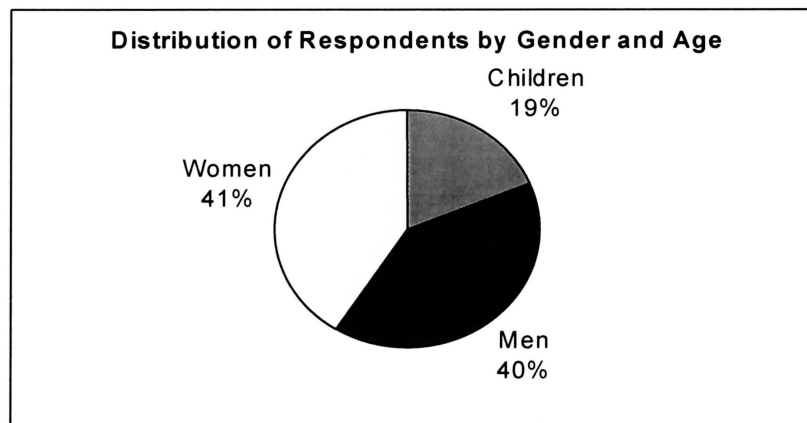


Figure 3.1 Age and gender representation of household members interviewed (n = 160 households)

Data processing: For many of the questions, percentages were calculated from the number of individuals who answered that question. Thus, if people could respond to more than one of the choices, the numbers used to calculate the percentages could be higher than the individuals in the 160 households. All the statistics are derived from the Baseline Biomass Survey unless otherwise stated.

Results

Table 3.2 General survey findings

Number of Households interviewed	160
Female-headed% expressed as percentage of total interviewees	53.4
Male-headed% expressed as percentage of total interviewees	46.6
Residency times in area greater than 25 years expressed as percentage of total interviewees	57.3

Most households interviewed practised subsistence farming and depended on their crop fields and livestock for survival. However, some households received income from other sources.

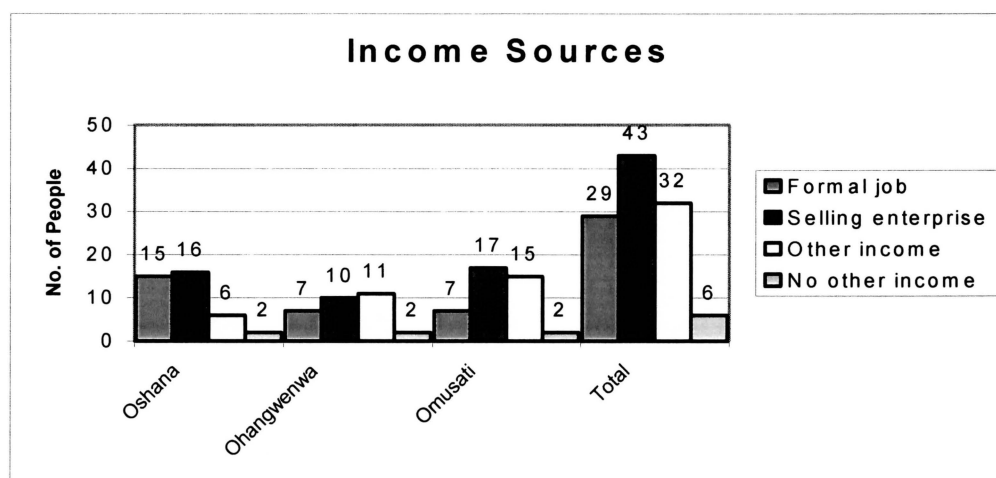


Figure 3.2 Different sources of income per region. (Note: people may have answered more than once, so the numbers do not add up to the sample size of the number of households (160 households).

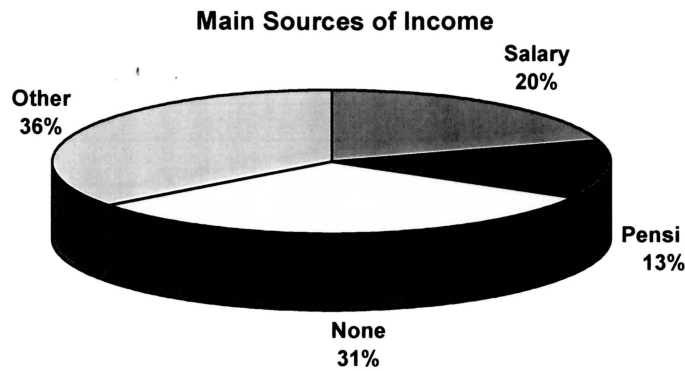


Figure 3.3 The main sources of income in the three regions surveyed (n = 160 households)

Dependence on biomass is evident in all households interviewed in the three regions (Figure 3.4). The following chart of the three regions shows the levels of different kinds of biomass used. All respondents make use of an open fire, they see it as a traditional way of preparing food and they would not like to abandon it. Open fires are used for heating, lighting and cooking. They are used one to three times per day, for an average of 1 hour at a time, with 48% of the households cooking for 6-10 people throughout the year in the rural areas.

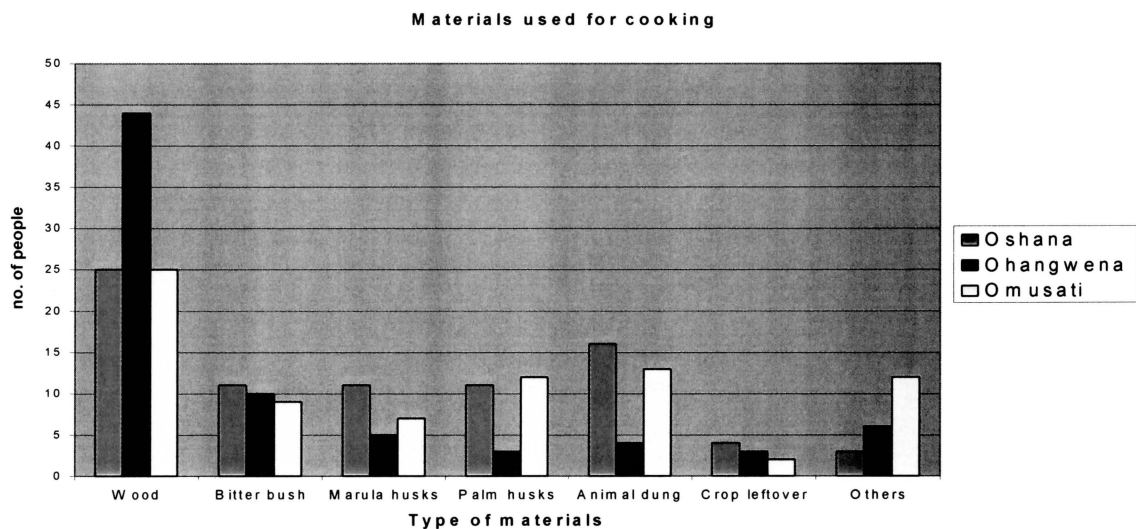


Figure 3.4 Materials used for cooking in the three regions surveyed

Figure 3.4 shows that more wood is available in the more rural area of Ohangwena, whereas the most densely populated region, Oshana, uses a far greater diversity of biomass materials as fuel.

Cooking occurs inside and outside of dwellings, these each have advantages and disadvantages. The table below shows some of the common advantages and disadvantages mentioned by respondents.

Table 3.3 Advantages and disadvantages of cooking in- or outdoors

	Outside	Inside
Advantages		
no or less smoke	X	
food prepared quickly		X
it is cooler		X
Disadvantages		
no protection from the elements	X	
lots of smoke		X

Other stoves used, which are less commonly available are:

- tsotso stoves
- gas stoves
- solar stoves
- electric stoves

They are less commonly used because people cannot afford to buy these stoves with their limited sources of income. The above-mentioned stoves are mostly found in urban settlements such as Oshakati, Namibia's second largest city, in the Oshana Region, where people have a wider variety of income possibilities (Wamukonye & Hamutwe 1998). Table 5.3 details the types of stoves found in each region.

Table 3.4 Types of stoves used in the three regions surveyed

Types of stoves used	No. of Households per region			
	Ohangwena	Omusati	Oshana	Total
Traditional open fire	30	42	38	110
Tsotso stove	1	8	9	18
Gas stove	6	10	5	21
Kerosene stove	2	4	6	12
Solar stove	1	0	0	1
Electric stove	0	1	1	2

Note the population densities for each region Ohangwena (18 people/km²), Omusati (11 people/km²), Oshana (30 people/km²) and the number of respondents saying they use non-wood biomass instead of wood. The tables below also provide information on usage as well as perceptions (Wamukonya & Hamutwe 1998).

Table 3.5 Oshana. Percentage of sample with reasons for using fuel (sample size 95).

Fuel	Usage		Cheap		Accessible		Convenient		No alternative	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Wood	43.3	21.4	27.7	50.0	58.8	50.0	2.8	0	15.3	0
Gas	32.8	3.6	36.4	0	50.0	3.6	0	0	16.7	0
Electricity	23.9	0	18.8	0	81.2	0	10.0	0	0	0
Agric waste	0	75.0	0	23.8	0	76.2	0	0	0	0

Source: Wamukonya & Hamutwe

Table 3.6 Omusati. Percentage of sample with reasons for using fuel (sample size 134).

Fuel	Usage		Cheap		Accessible		Convenient		No alternative	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Wood	76.6	97.5	13.9	15.8	68.1	84.2	2.8	0	15.3	0
Gas	12.8	0	0	0	83.3	0	0	0	16.7	0
Electricity	10.6	0	20.0	100	70	0	10	0	0	0
agric waste	0	2.5	0	0	0	100	0	0	0	0

Source: Wamukonya & Hamutwe

Table 3.7 Ohangwena. Percentage of sample with reasons for using fuel (sample size 128).

Fuel	Usage		Cheap		Accessible		Convenient		No alternative	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Wood	77.5	97.4	13	0	81.2	92.1	2.9	2.6	2.9	5.3
Gas	11.2	0	10	0	100	0	10	0	30	0
Electricity	10.1	0	0	0	50	0	0	0	0	0
Kerosene	1.2	0	100	0	0	0	0	0	0	0

Source: Wamukonya & Hamutwe

When the information from the Biomass survey is combined with the data from Wamukonya & Hamutwe 1998 on the usage of different fuels in all three regions, it can be seen that wood is an important fuel source varying in importance from 50% to 70% in the urban areas, and 20% to nearly 100% in the rural areas (Wamukonya & Hamutwe 1998). The Oshana and Ohangwena data were confirmed by the Biomass Survey. There is however a discrepancy in the Omusati data, where in the Baseline Biomass survey data wood was found to be not as important (31% usage) while the Wamukonya & Hamutwe survey data found it to be important (97.5% usage). Looking at the sample sizes involved provides a plausible explanation of the discrepancy; the results could quite easily be artifacts of a small sample size and of differing distances from large population centres. Households closer to a population centre have less access to wood in the immediate surroundings, due to the depletion of woody vegetation.

The impact of a relatively high population density can be seen in Oshana (30 people per km²) 43% of people use wood in the urban areas yet only 30% (21.4% (Wamukonya & Hamutwe 1998)) in the rural areas use wood. However, people in the rural areas of Oshana believe that wood is still accessible (Table 3.8).

Table 3.8 Perceptions about using wood in the three regions

Wood	Usage		Cheap		Accessible		Convenient		No Alternative	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Ohangwena	77.5	97.4	13	0	81.2	92.1	2.9	2.6	2.9	5.3
Omusati	76.6	97.5	13.9	15.8	68.1	84.2	2.8	0	15.3	0
Oshana	43.3	21.4	27.7	50.0	58.8	50.0	2.8	0	15.3	0

Source: Wamukonya & Hamutwe 1998

In Ohangwena it can be seen that wood is truly accessible in the rural areas as in this study most people use wood (59%) and even more are recorded to do so in the Wamukonya & Hamutwe data (97.4%). Most of the consumers use wood because it is easily available. In rural areas, consumers see wood as a cheap option for fuel. The result is that wood is the fuel most commonly used for cooking in these three regions.

Fuels Collected For Cooking

From the interviews conducted, it became clear that the sources of fuel and what those surveyed chose to use provides some interesting information. Wood is easily accessible in urban areas yet in the rural areas where the survey was done, wood is used by only 39% of all people, and many common non-wood materials, especially agricultural residues, are also used for burning (Figure 3.4).

Table 3.9 Indigenous names for commonly used fuels

Omusati wood	Oikuni
Mahangu crops residues	Omafinde oiya
Bitters Bush	Omadimba
Marula Kernels	Oiyongoti
Makalani palm seeds	Eendunga
Animal dung	Omapupa
Palm leaves	Omapokolo

There is a difference in the types of materials used as fuel by urban as opposed to rural communities. This reflects the availability of various materials. Figure 3.4 shows that wood is predominantly used in the urban area of Oshana as opposed to the use of other biomass materials in the more rural areas. These survey results partly explain the intense pressure on the woody resources surrounding urban settlements in northern Namibia. An intuitive hypothesis would be that due to lower densities of people in rural areas there should be greater availability of woody biomass. However, this has been negated in the biomass survey data and the Wamukonya & Hamutwe data. In the higher population density regions the data show the situation to be the

opposite of what might be expected. Woody resources seem to be more limited in the rural areas of the regions of northern Namibia with high population density, even allowing for the greatly reduced densities of people in the rural areas compared to the urban areas.

Availability of Fuelwood

People do not only collect wood, but 25% of people also purchase wood weekly or fortnightly. Unemployed young wood gatherers collect wood from the Angolan border and bring it to Oshakati to sell on the open market.

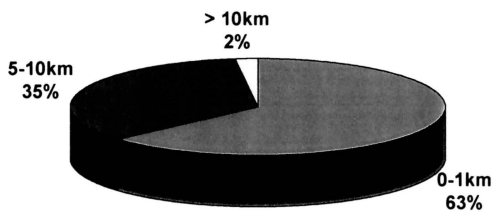


Figure 3.5 Distance travelled to collect wood (n = 160 households)

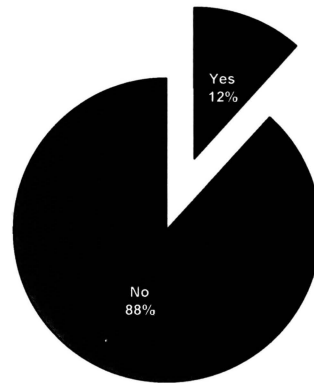


Figure 3.6 Percentages of those buying wood (n = 160 households)

Buying wood is not common now, and when people sell wood, potential buyers often find it too expensive, as much as it is needed. Only in the higher income regions such as Oshana do half the respondents not regard it as expensive (Wamukonya & Hamutwe 1998). The cost of wood may relate to difficulties in locating sufficient wood for it to be worthwhile collecting it. Where there is sufficient wood, there are long distances to be covered and the cost of transport needs to be covered and there has to be some profit so cost of wood to buyers goes up. Thus, communities have to think of alternatives.

Collection Of Fuel

Fuel collection is predominantly the task of the women and children, as in most other areas of Africa, although when necessary anyone will collect the wood, Figure 5.5 shows the opinions of respondents on how biomass is collected for the three regions surveyed.

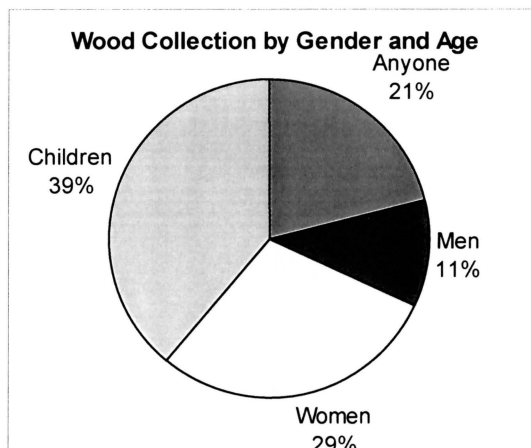


Figure 3.7 Wood Collection by gender and age. (n = 160 households)

Figure 5.6 shows the number of respondents who use different methods to collect biomass

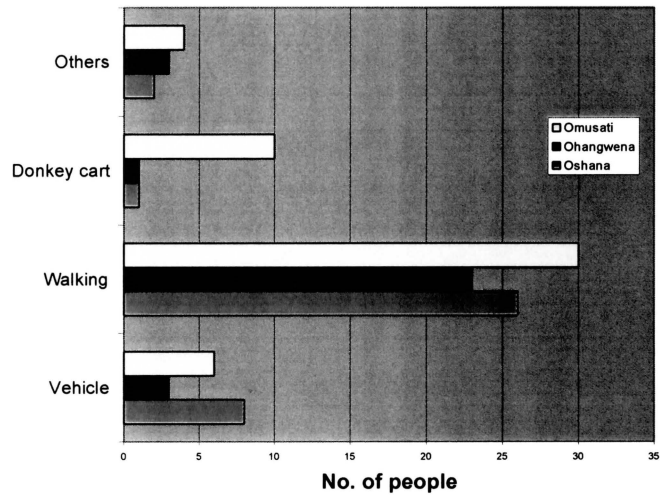


Figure 3.8 Methods used when collecting wood (n = 160 households)

The most common method used is walking, with the donkey cart being the second most common. Use of vehicles is more common in the higher income region of Oshana.

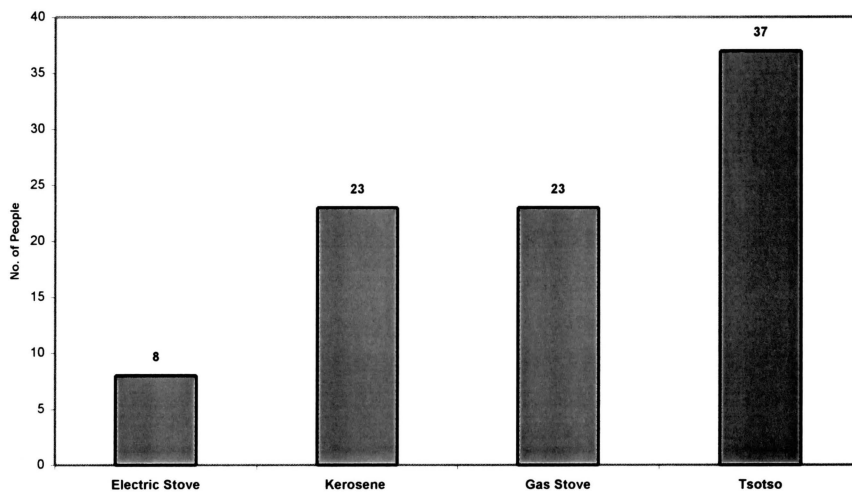


Figure 3.9 Awareness of different kinds of stoves (n = 160 households)

Fuel-wood is collected at various time intervals, or bought from different places. The survey results indicate that people realise that other stoves cook food twice as fast as open fires, and many have heard of what different kinds are available (Figure 3.9). People have heard about these stoves from a variety of sources (Figure 3.10).

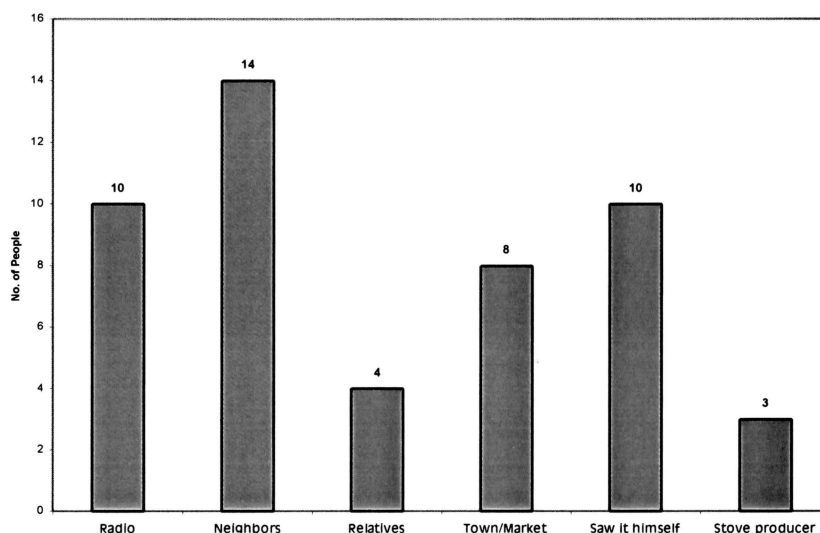


Figure 3.10 Sources of information on different types of stoves (n = 160 households)

Problems Experienced

The problems encountered related primarily to time constraints as the time allowed for the interviews was very short. People were working in their crop fields and it was difficult to keep their undivided attention. However, a longer survey would have resulted in a lot less cooperation, and the likelihood of the target coverage not being met within the time constraints. Another problem was that people thought that the study was politically motivated. A great deal of time was spent explaining, clarifying and convincing people that this was not the case.

Time constraints were the main reason for focusing on the same villages in which RAP and Tsootso stove trainers were active, well known and welcomed into the communities. This allowed for a quick completion of the survey

Chapter 4. PRELIMINARY CONCLUSIONS

The main conclusions that can be reached are based on the findings of the Baseline Biomass Survey (these results are only tentative given the small sample size of 160 households) and combined with supporting information from other sources:-

- wood is a crucial resource in rural people's lives in Namibia.
- alternative biomass sources are much used in rural areas, especially in regions where wood is unavailable.
- alternative energy sources have been heard about.
- alternative stoves have been heard about.
- collection of biomass resources is vital for people's survival.
- there is more woody biomass available in urban areas than in rural areas in regions with high population densities and higher average incomes i.e. the Oshana Region.
- woody biomass, in regions of higher population density and higher income, in both urban and rural areas, is still regarded as accessible, although in the associated rural areas woody biomass is not used much, implying that the woody biomass has come from elsewhere.
- the fuelwood collection burden is on women and, especially, children in Namibia.
- walking is the main collection method, indicating lack of access to better transport, either because of lack of transport or money to access transport.
- woody biomass in rural areas is under great pressure.

DISCUSSION

Woody biomass is of great importance in Namibia, yet it is a declining resource. This is made salient by the fact that people in rural areas can be seen to be using biomass alternatives such as dung. People in rural areas will use alternative biomass resources when some form of energy is required for burning, this implies that in certain areas there is no more wood available for those who cannot travel far. The alternative biomass resources burnt include a wide variety of non-wood biomass resources and include animal dung and crop residues, which would be better used for digging into fields to improve crop yields through better water- and nutrient-retention, and better nutrient supply.

The fact that people have heard of alternative stoves yet still use biomass residues, suggests that these alternative stoves are actually not available either due to cost or distance from the supply source. Thus there does not seem to be the necessary incentive to cause people to switch to alternative forms of energy or biomass-burning stoves. There is an urgent need for an analysis of what incentives currently exist in relation to energy markets in Namibia and why they do not seem to be working.

Although both the biomass survey and the Wamukonya & Hamutwe data (1998) find that wood is not used to any great degree, people in the Oshana region still view it as accessible. This seems to imply that the wood used in the urban areas of the higher income region is coming from areas other than the rural areas of Oshana where the use of wood is extremely low, around 21-30%. There is a strong possibility that wood for fuel is being accessed from other regions and from other countries to cater for a strong fuelwood demand in high density settlements where there is the ability to pay, i.e. Oshakati. It is vital to understand where wood for fuel is being sourced from. The main implication of this is that the urban-rural dynamic and the existence of strong

REFERENCES

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- Schneider, Stephanie. 1999. *Dissemination of improved Cookstoves, Towards a Workable Strategy for the Omusati Region in Northern Namibia*. Kungl Tekniska Högskolan, Sweden.
- Hamayulu, Reinhold L November 2000. A Socio-economic Baseline Study of Onkani Village. Polytechnic of Namibia, Windhoek.

APPENDIX 1

A diversity of jobs were encountered, covering the:-

- formal sector
 - teachers
 - police officers
 - doctors
 - nurses
 - security officers
 - building constructors
 - road constructors
 - mine workers
 - electricians
- pensions
- informal sector selling:
 - traditional drinks
 - livestock
 - baskets
 - wood
 - mahangu containers
 - vegetables
 - cakes and drinks
 - pigs and beans
 - thatched roofs
 - traditional spinach (6 species of plants)
 - fresh mealies
 - clay pots
 - cooked meat(okapana)
 - marula husks
 - cuca shops owners(shebeens)
- remittances

APPENDIX 2

Organisations associated with the Namibia Biomass Energy Management Programme (NBEMP)

Organisation	Status	Telephone	Fax	e-mail or PO Box	Acronym
Community Forestry & Extension Development Project	Directorate of Forestry	065-230-947	065-230-552	darudec@osh.namib.com	CFED
Association of Local Authorities in Namibia	Khomasdal Municipality	061-240914	061-240929	Allan@cyberhost.com.na	ALAN
United Nation Educational and Scientific Cultural Organisation	United Nation Development Programme	061-2046111	061-229084		UNDP
Namibia Non-Governmental Organisation Forum		061-239469	061-239471	nangof@iafrica.com.na	NANGOF
Directorate of Energy	Ministry of Mines and Energy	061-2848111	061-28482000	Lamaambo@mme.gov.na	DOE
CRIAA – Southern Africa Development Consulting	Development consultants	061-220-117 061-225-009	061-232-293	criaawhk@iafrica.com.na	CRIAA-SA DC
Directorate of Agricultural Research & Training	Ministry of Agriculture, Water and Rural Development	061-2087062	061-2087068	Ldupisani@namib.com	DART
Directorate of Community Development – Ondangwa	Ministry of Regional, Local Government and Housing	065-240-514	065-240-453		CD
Directorate of Community Development – Oshana & Omusati	Ministry of Regional, Local Government and Housing	065-220-432	065-220-342		CD
Directorate of Forestry – Windhoek and Oshakati	Ministry of Environment & Tourism	065-230-295 061-221478	065-230-552 061-222830		DoF
Directorate of Resource Management – Oshakati	Ministry of Environment & Tourism	065-230-295	065-230-552		DRM
Directorate of Resource Management – Far North (Etosha)	Ministry of Environment & Tourism	067-229-854	067-229-853	staff@tsu.namib.com	DRM
Directorate of Rural Water Supply	Ministry of Agriculture, Water and Rural Development	065-221-166 065-221-447	065-221-449		DRWS
Etunda Agroforestry Community Project	Community-Based Organisation	065-270-202			EAFCP
Forest Awareness and Tree Planting Project	Ministry of Basic Education & Culture & IBIS (Danish NGO)	065-231-475 065-230-057	065-231-475 065-230-035	forestaware@mweb.com.na	FATPP
Green Namibia Community Project	Community-Based Organisation	065-230-430	065-230-552		GNCP
Farming Systems Research and Extension Unit	Ministry of Agriculture, Water and Rural Development	065-230-284 065-230-446	065-230-570 065-230-578	fsreu@osh.namib.com	FSRE-U
Namibia Development Trust	Non-governmental organisation	065-220-444	065-222-067	ndtosh@mweb.com.na	NDT

Namibia's National Programme to Combat Desertification/Regional Awareness Project	Desert Research Foundation of Namibia	065-231-032	065-231-032	rapdrfn@mweb.com.na	Napcod/RAP
Northern Namibia Environmental Project	Ministry of Environment & Tourism	065-230-295 065-231-051	065-230-552	skean@iafrica.com.na	NNEP
Northern Namibia Forestry Committee	Directorate of Forestry	065-230-295	065-230-552		NNFC
Ogongo Agricultural College	Ministry of Agriculture, Water and Rural Development	065-257-001	065-257-043	PO Box 5520 – Oshakati	
Directorate of Research, Science and Technology	Ministry of Higher Education, Vocational Training and Employment Creation	061-2706111	061-2706100	P/Bag 133391	DRST
Ombalantu Traditional Authority	Traditional Authority of the Mbalantu	065-251-039		PO Box 437 – Ombalantu	OTA
Ondonga Traditional Authority	Traditional Authority of the Ndonga	065-245-832		PO Box 71 – Ondangwa	OTA
Ongandjera Traditional Authority	Traditional Authority of the Ngandjera	065-252-002		PO Box 2 – Okahao	OTA
Oshakati Multi-Purpose Youth Resource Centre	Ministry of Higher Education, Vocational Training and Employment Creation	065-220-354	065-220-310	PO Box 5557 – Oshakati	OMPYRC
Oukwanyama Traditional Authority	Traditional Authority of the Kwanyama	065-260-001		PO Box 444	OTA
Regional Awareness Project	Desert Research Foundation of Namibia	065-231-032	065-231-032	rapdrfn@mweb.com.na	RAP
Rural Development Centre	Ministry of Agriculture, Water and Rural Development	065-230-282	065-230-281	PO Box 1486 – Oshakati	RDC
Stewart Scott Namibia Consulting Engineers	Private Company	065-222-339 065-230-930	065-222-339 065-230-930	PO Box 1620	SSN
The Rössing Foundation: Adult Education Centre	The Rössing Foundation	065-240-259	065-240-259	PO Box 479 – Ondangwa	
Uukwaluudhi Traditional Authority	Traditional Authority of the Kwaluudhi	065-258-126		PO Box 1 – Tsandi	UTA
Uukwambi Traditional Authority	Traditional Authority of the Kwambi	065-220-668	065-221-080	PO Box 5514 – Oshakati	UTA

APPENDIX 1.3 (a)

Baseline Survey Questionnaire

Namibia Biomass Energy Management baseline survey conducted by The Desert Research Foundation of Namibia

Objective of the survey

To identify appropriate energy technologies that increase efficiency of Biomass use and mobilise the relevant organisations to manufacture and disseminate appropriate technology.

Region

Village

How long have you been in this area?.....

(a) How many people live here?

Male -

Female -

Children below 18 years-

Source of income -

(b) Who is the head of the family?

.....

Which are your most important sources of income?

.....

3. What stove do you use for cooking and heating?

METHOD	USED (tick)	FOR HOW LONG HAVE YOU USED THE STOVE	HOW OFTEN PER DAY	SEASON	REASON	HOW LONG DOES IT TAKE FOR THE POT TO COOK
Open fire						
Tsotso stove						
Gas stove						

Kerosene						
Solar stove						
Electricity						
Other (specify)						

4. What are the advantages and disadvantages of your present stove?

.....

.....

.....

.....

.....

.....

5. What materials do you use for cooking and heating?

TYPE OF MATERIALS	TICK
a. wood	
b. bitters bush	
c. marula seed	
d. palm seed	
e. animal dung	
f. crop leftovers	
g. other (specify)	

6. Where do you cook?

PLACE OF COOKING	PROBLEMS ENCOUNTERED	ADVANTAGES
Outside		
Inside		

7. How often do you buy firewood?

WHEN	WHERE	FROM WHOM	WHY

8. How often do you collect wood?

HOW OFTEN (per week)	DISTANCE (km)	WHO COLLECT THE WOOD	TIME SPEND TO COLLECT WOOD (PER WEEK)

9. How do you collect the wood?

METHOD	TICK
Vehicle	
Walking	
Donkey car	
Others (specify)	

10. What other stoves have you heard of?

STOVE	PURPOSE	SOURCES OF INFORMATION

APPENDIX 1.3 (b)

Biomass Survey

General Information

Name of enumerator	Questionnaire number	Gender of respondent
Date	Position in Household	Region
Name of Village	Occupation	Head of Village
Region	How long have you been in this village?	Age

Family

	male	female	total
Adults			
Children			
Total			
Head of family			
How long have you been in this area and in this village?			

Income

1. What is your monthly income?

Money income in Namibian	TICK
Less than N\$ 200.00	
between N\$200.00 – 500.00	
between N\$500.00 – 1000.00	

2. What is your most important source of income?

3. Do you have others sources of income? – selling, small business,

4. What is the nearest town to your village?

Energy

What types of fuel do you use for?

	Winter	Summer
Lighting		
Cooking		
Heating		

What fuels do you burn in an open fire (omafiya/omasiga) (*answer yes or no)
& Why do you use these fuel types (answer as many as possible)

	use	cheap*	accessible*	convenient*	no alternative*
Wood					
Bitter Bush					
Marula husks					
Makalani husks					
Animals dung					

What fuels do you use for lighting & Why do you use these fuel types (*answer yes or no)

	use	cheap*	accessible*	convenient*	no alternative*
Wood					
Bitter Bush					
Marula husks					
Makalani husks					
Animals dung					

What fuels do you use heating & Why do you use these fuel types (*answer yes or no)

	use	cheap*	accessible*	convenient*	no alternative*
Wood					
Bitter Bush					
Marula husks					
Makalani husks					
Animals dung					

Stoves

What stove do you use for cooking & heating?

Method	Used	How often per day	Season	How long does it take to cook food	Why do you cook with this stove and not any other stove?
open fire omafiya omasiga					
Tsotso stove					
Gas stove					
Kerosene					
Solar stove					
Electricity					
other (specify)					

Stoves currently used by your household

PRESENT STOVE(S)	ADVANTAGES	DISADVANTAGES

Where do you cook?

PLACE OF COOKING	ADVANTAGES	DISADVANTAGES
Outside Hut		
Inside Hut		

Have you heard of other stoves?

	no		Would you use any of these stoves if they were available?			
	yes		yes	Why?	no	Why?
Tsotso stove						
electric stove						
paraffin kerosene stove						
gas stove						
other						

From whom did you hear about these alternative stoves?

--

Fuel

When you collect fuel how far do you have to go to collect this fuel?

	TICK	Why do you have to travel so far for fuel?
0-1km(near)		
5-10km(far)		
10km(very far)		

How do you collect fuel?

	TICK	WHY?
Walking		
Donkey Cart		
Bakkie		

Who collects the fuel?

	TICK	WHY?

Men		
Women		
Children		

Do you purchase fuel or collect it or use other methods to get fuel?

	WHY?		WHY?
PURCHASE		COLLECT	
BARTER		other e.g. barter	

What kind of fuel do you collect?

Type of material	WHY?				
wood branches	cut from the tree		dry dead wood collected of ground		wood type
wood stumps					
bitters bush					
marula husks					
makalani palm husks					
animal dung					
Crop leftovers					
other (specify)					

What kinds of fuel do you purchase?

type	WHY?			
Paraffin /kerosene				
Gas				
Charcoal				
Wood	omusati	kameeldoring	other	unknown

Where do you purchase your fuel from?

	tick	WHY?	how much does it costs(N\$)
Woodcutters			
Garages			
others (specify)			

How often do you have to get fuel (kg or a bag compared)?

Frequency	QUANTITY(size of load)	WHY?
Once a week		
twice a week		
3 x /week		
4 x/week		

5 x/week		
6 x/week		
7 x/week		

Kitchen

Position of kitchen within homestead structure	
size	
ventilation	
incidence of smoke	
location	

YES NO

Have there been any accidents where people have been hurt?

What kind of accident was this?

burnt by pot	

Do you use the kitchen for any other purposes other than cooking?	
---	--

Please tick YES NO

Any paraffin lamps?

Any electrical sockets?

Notes