
DIRECTORATE OF FORESTRY
NAMIBIA FINLAND FORESTRY PROGRAMME
COMMUNITY LEVEL FOREST MANAGEMENT COMPONENT



RANGELAND AND WATER MANAGEMENT SURVEY IN
ONTANDA VILLAGE
UUKWALUUDHI

Prepared by:

Carlos Salinas
Martha Amutenya
Johanes Niipale

Outapi
August 1999

Rangeland and Water Management Survey in Ontanda Village, Uukwaluudhi

Carlos Salinas
Martha Amutenya and
Johannes Niipale

Ministry of Environment and Tourism – Directorate of Forestry

Namibia Finland Forestry Programme
Community Level Forest Management Component
Outapi District Forestry Office
Private Bag 508 – Outapi
TEL. 264 65 251064
FAX 264 65 251092
E-mail: outapifo@osh.namib.com

PHOTOS: Carlos Salinas

ACKNOWLEDGEMENTS

The authors wish to express their sincere gratitude to all persons who helped to accomplish the objectives of this survey.

Special thanks are due

To Oswald Mwanyangapo (MWRD/ FSR-E Unit, Ongwediva) and Vilho Ngipondoka (Chief Agriculture Extension Officer MWRD-Outapi ARDC), for their kind support to our work through their field officers, O. Mukulu and F. Negumbo.

To Oswin Mukulu (FSR-E Unit, Ongwediva) and Festus Negumbo (Eunda ARDC), for their committed support and advice during the survey planning phase, and for their assistance in the field data collection, specially in the identification of grasses during the grazing assessment part of the survey.

To Sehu Y. Awudu (Ogongo Agricultural College), for his explanations on the application of the carrying capacity formula and parameters to be taken into account.

To the Headman of Ontanda Village, Tate Ananias Munale, for his support during the complete survey; and farmers Timoteus lipinge and Gabriel Amupolo, for their participation during the location of water sources and cattle posts in the community, and also during the identification and description of grasses around the village.

To the 16 farmers who kindly welcomed the Outapi District Forestry staff to their homesteads, and provided valuable information during the interviews. Without their participation the preparation of this document would not be possible.

CONTENTS

1	INTRODUCTION.....	1
2	OBJECTIVES OF THE SURVEY.....	2
3	METHODOLOGY.....	2
3.1	GRAZING AND CARRYING CAPACITY EVALUATION.....	2
3.2	LIVESTOCK AND WATER MANAGEMENT ASSESSMENT.....	2
4	RESULTS.....	3
4.1	SOCIO-ECONOMIC ASPECTS.....	3
4.2	FARMER'S LIVESTOCK MANAGEMENT OBJECTIVES.....	4
4.3	LIVESTOCK COMPOSITION AND OWNERSHIP.....	5
4.4	HERDING WORK DIVISION AND RIGHTS.....	6
4.5	RANGELAND MANAGEMENT.....	7
4.6	ON-FARM LIVESTOCK MANAGEMENT.....	13
4.7	RANKING OF PRIORITIES AND PROBLEMS IN LIVESTOCK MANAGEMENT.....	13
4.8	FARMERS' SELF-ASSESSMENT ON LIVESTOCK MANAGEMENT...	14
4.9	LIVESTOCK REPRODUCTION ISSUES.....	15
4.10	MILK AND BY-PRODUCTS.....	15
4.11	LIVESTOCK MARKETING.....	16
4.12	LIVESTOCK DISEASES.....	17
4.13	WATER MANAGEMENT.....	18
4.14	GRAZING AND CARRYING CAPACITY EVALUATION.....	20
5	CONCLUSIONS AND RECOMMENDATIONS.....	23
6	REFERENCES.....	26

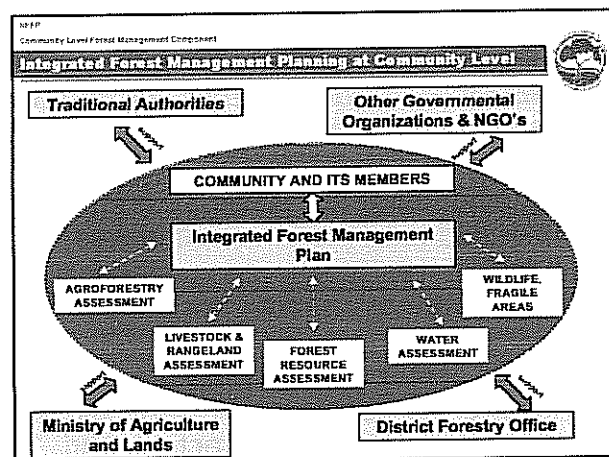
1 INTRODUCTION

The NFFP- Community Level Forest Management (CLFM) Component, based in the Omusati Region, is supporting the Outapi District Forestry office since June 1997. The purpose of the Component (CLFM) is to formulate applicable models of sustainable integrated forest management to be implemented in communal lands by Namibians.

During the past two years several studies have been carried out at regional level in order to obtain baseline information about the traditional management of forest resources in the rural areas, and the impact of deforestation in the livelihood of farmers.

The close contact with traditional authorities and other stakeholders has enabled the CLFM component to select pilot communities whereby the approach and models of Integrated Forest Management Planning (IFMP) will be formulated and further developed.

The IFMP approach considers that, in order to be relevant to the livelihood of farmers, a forest management plan has to be adequately inter-linked with the management of other existing natural resources and socio-economic priorities of people. To achieve this, the role and participation of different rural development organizations and other stakeholders is of paramount importance.



The formulation of an IFMP has been started in one of the pilot communities, Ontanda Village, Uukwaluudhi; where a relevant methodology for assessment of forest resources has been produced. Studies on agroforestry systems and current agriculture practices have also been carried out in the village. These studies and data collection have always been done with the active participation of Ontanda farmers and their traditional authorities.

The present survey on rangeland and water management is part of the natural resource assessments needed to prepare the Integrated Forest Management Plan of Ontanda Village.

This information can be useful as reference material or baseline information for projects, organizations and individuals supporting natural resource management in other villages with similar environments and socio-economic characteristics to Ontanda Village, in the vast areas of the 4-O regions.

2 OBJECTIVES OF THE SURVEY

1. To obtain gender desegregated information on socio - economic characteristics of the village farmers.
2. To obtain information on current livestock population and management practices.
3. To assess the current grass availability of Ontanda village in quantitative and qualitative terms.
4. To calculate the ideal livestock carrying capacity of the village and compare it with the current one.
5. To obtain information on existing water sources and its management in the village.

3 METHODOLOGY

3.1 GRAZING AND CARRYING CAPACITY EVALUATION

The field data collection was carried out during late April 1999, covering the settlement and forest areas of the village. Three forestry officers, two agriculture officers and two village farmers composed the team.

The methodology for grass assessment was the quadrant assessment. The format used to fill the information was the one developed by NOLIDEP (Sweet and Burke, 1998). The assessment was carried out in 7 of the 15 clusters whereby a previous forest inventory for the village was carried out.

Once the center of each cluster was located, 40 quadrant samples were taken as follows: 10 quadrants in North direction, 10 quadrants in South direction, 10 quadrants in West direction and 10 quadrants in East direction. The positioning of each quadrant was done at random. A total of 280 quadrant samples were taken from the above mentioned clusters (7 x 40 quadrant samples).

Geomorphology, vegetation structure and composition, grass species and abundance - among other parameters - were registered at each of the quadrants. All grasses and other herbage inside the quadrant were carefully harvested and stored in labeled paper bags. Unidentified grass and herb samples were labeled and placed in a plant press for later identification.

In order to calculate the dry matter, the collected material was placed into an oven for about 48 hours at ± 30 °C, and weighed later on using an electronic scale.

3.2 LIVESTOCK AND WATER MANAGEMENT ASSESSMENT

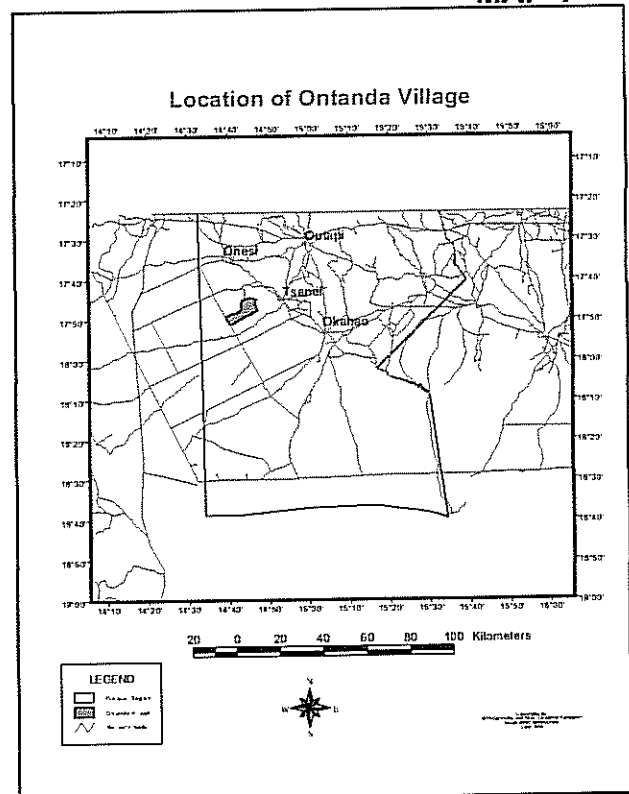
The field data collection was carried out during May-June 1999, covering 8.5% of the village households. A combination of RRA and survey research tools was used for the collection of the information. Headman and forestry committee members were the primary targets for the interviews. Other farmers for interviews were selected from 5 forest inventory clusters located in the settlement area of the village. The criterion of household selection was to approach the two closest households from the center point of the clusters. The location of water sources and cattle posts was recorded in a GPS device for their corresponding mapping later on.

4 RESULTS

General Data of Ontanda Village

Name: Ontanda
Constituency: Tsandi
Tribal Area: Uukwaluudhi
Location: S17°45'18"
 E14°44'21"
Area: 6496 hectares
Households: 190
Population: 2320
Distance from Outapi: 48 Km

MAP 1



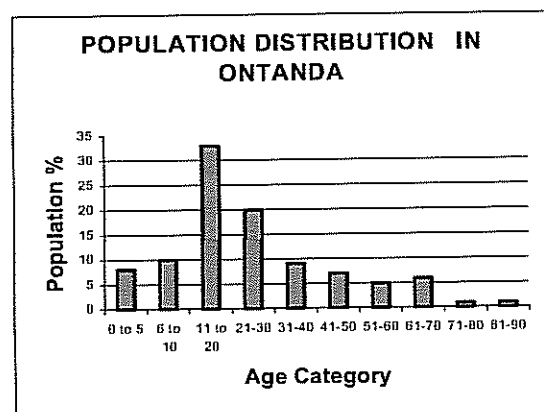
4.1 SOCIO-ECONOMIC ASPECTS

Men head 87% of the households in Ontanda. Women head the other 13%, especially in cases where the spouse has passed away. Almost all couples in the village are married, and no divorce cases were detected.

From the total number of farmers interviewed, 62% were men and 38% were women, being them the older daughter or otherwise the wife of the household head. This fact ensures that the gender related issues are reflected in the results of this survey.

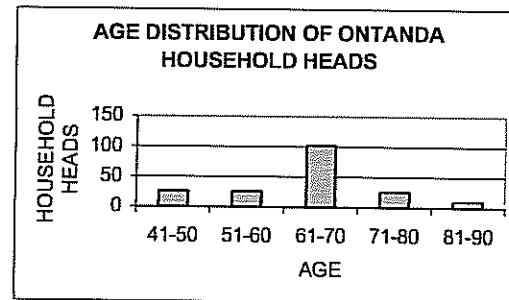
Concerning the population distribution in the village, it is as follows:

AGE CATEGORY	POPULATION	%
0 to 5	186	8
6 to 10	232	10
11 to 20	766	33
21-30	464	20
31-40	209	9
41-50	162	7
51-60	116	5
61-70	139	6
71-80	23	1
81-90	23	1
TOTAL	2320	100

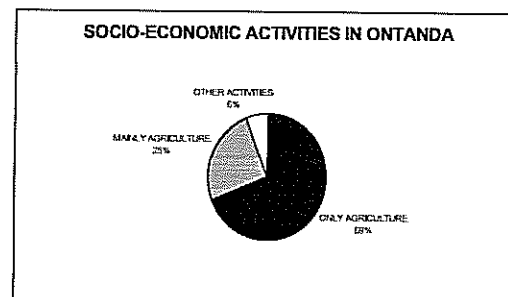
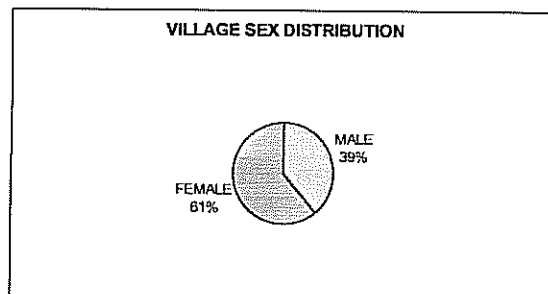


The heads of the households are older than 40 year old, falling most of them within the category of 61-70 year old, as shown in the table below.

AGE CATEGORY	HOUSEHOLD HEADS
41-50	26
51-60	26
61-70	102
71-80	26
81-90	10
TOTAL	190



Women represent 61% of the village population, while the other 39% are men. Concerning the socio-economic activities in Ontanda, 69% of the people is engaged exclusively with agricultural activities (crops, animal husbandry), while 25% share their time between agricultural duties and others related to education (school students, teachers). 6% of the population depends on activities not related to agriculture (employees, pensioners, and cucashop owners).



The first settlers came to Ontanda in the early sixties. However, half of the households were established in the decade of the seventies, forming a compact settlement area. Settlement activities have gradually decreased over the years, but they have moved towards the forest area. Half of the household heads have owned a previous farm, either located in the same Uukwaluudhi area, but also there are farmers coming from Ombalantu and Ongandjera areas. Small size of the farm and bad soils are reasons given for moving from previous locations.

4.2 FARMER'S LIVESTOCK MANAGEMENT OBJECTIVES

Livestock keeping is one of the most important farming activities of farmers: Cattle, goats, donkeys, sheep and pigs are common assets in most of the households. Farmers keep livestock for different purposes according to the type of livestock characteristics.

Meat and milk is the first objective of farmers for keeping cattle. Provision of manure for soil fertility and meat for social occasions, such as weddings and funerals are also important objective for cattle husbandry. Third objective in line for keeping cattle is the availability of animal draught power for ploughing and also the tradition of offering "lobola" to the father of the bride when someone is getting married.

Goats represent food security for farmers, as they provide a good source of meat and milk. After that, manure provision and meat for social events (weddings, funerals) are second objectives for goat keeping.

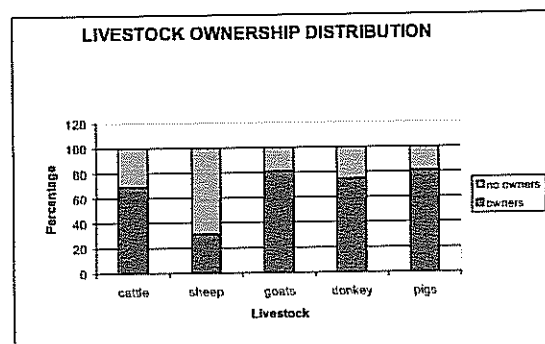
TYPE OF LIVESTOCK	FARMER'S LIVESTOCK MANAGEMENT OBJECTIVES														
	Meat	milk	plough	manure	wedding	funerals	lobola	breeding	carry water	pull a cart	carry fuelwood	to sell them	sign of wealth	as security	
Cattle	1	1	3	2	2	2	3	3	6	6	6	5	4	4	
Goat	1	1		2	2	3	6	5				5	5	4	
Donkey			2	3				4	1	2	1	3			
sheep	2	3		1	1	3		3				3		1	
Pigs	1			3				4				2	4		

1 = first priority, 2 = second priority, 3 = third priority, 4 = fourth priority, 5 = fifth priority, 6 = sixth priority

4.3 LIVESTOCK COMPOSITION AND OWNERSHIP

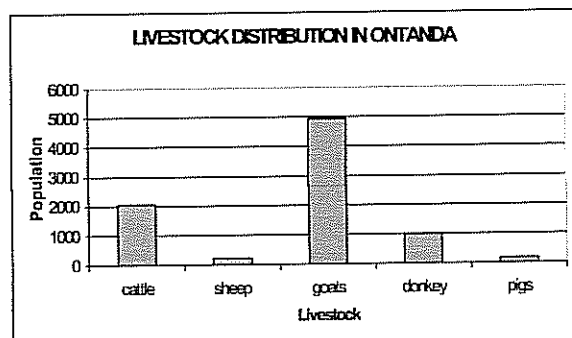
Most of the Ontanda households own cattle, goats, donkeys and pigs. Goats and pigs are the most common assets among village farmers. Sheep is reported in only 31% of the households.

LIVESTOCK	OWNERSHIP (%)
Cattle	69
Goats	81
Sheep	31
Donkeys	75
Pigs	81

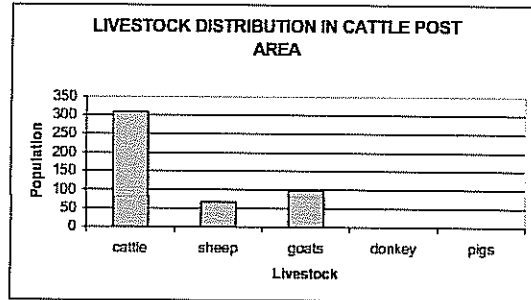


The Ontanda livestock population is shown below. Goats are the most abundant animals in the community, followed in number by cattle and donkeys.

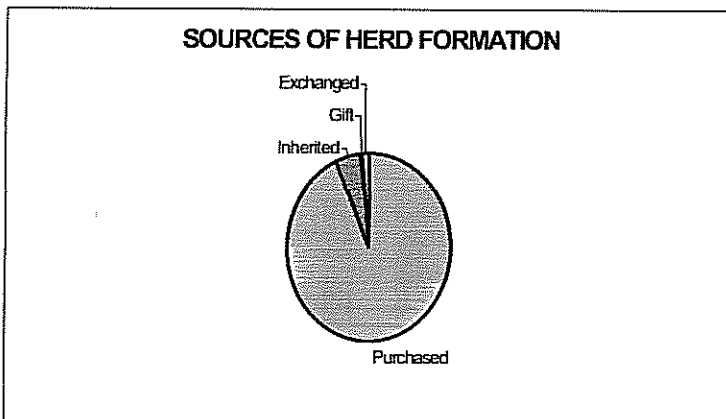
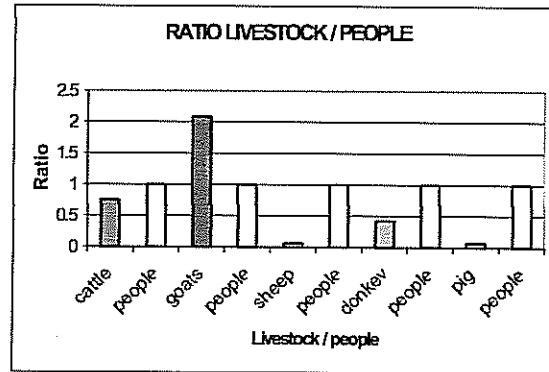
LIVESTOCK	POPULATION
Cattle	2062
Goats	4931
Sheep	206
Donkey	997
Pigs	163
TOTAL	8359



From that amount of livestock, part of it moves to the cattle posts during the dry season. 15% of the cattle and 2% of the goat population is taken to the cattle posts located in the forest areas of the community. Donkeys and pigs remain in the settlement area all the year round.



The ratio of livestock to people in Ontanda varies according to the type of livestock analyzed. The highest ratio is related to goats (2.12:1). It means that there are more than two goats per inhabitant in the village. The ratio cattle/people (0.88:1) is slightly higher if compared with the average for the whole 4-O Regions found by the veterinary service in 1992.



People have obtained their present herd numbers by purchasing animals in most cases. Inheritance is also a source of herd formation. Gifts (lobola offering) and animal exchange with items such as mahangu and male stock for female stock exchange are also

practices to obtain livestock in the community.

4.4 HERDING WORK DIVISION AND RIGHTS

Herding responsibilities are shared mainly among the household members, e.g. the family. Normally the men heading the family are in charge of herding livestock both at home as well at the cattle post. Other relatives include sons, daughters, grandsons and uncles. No economic reward is given to family members participating in livestock herding.

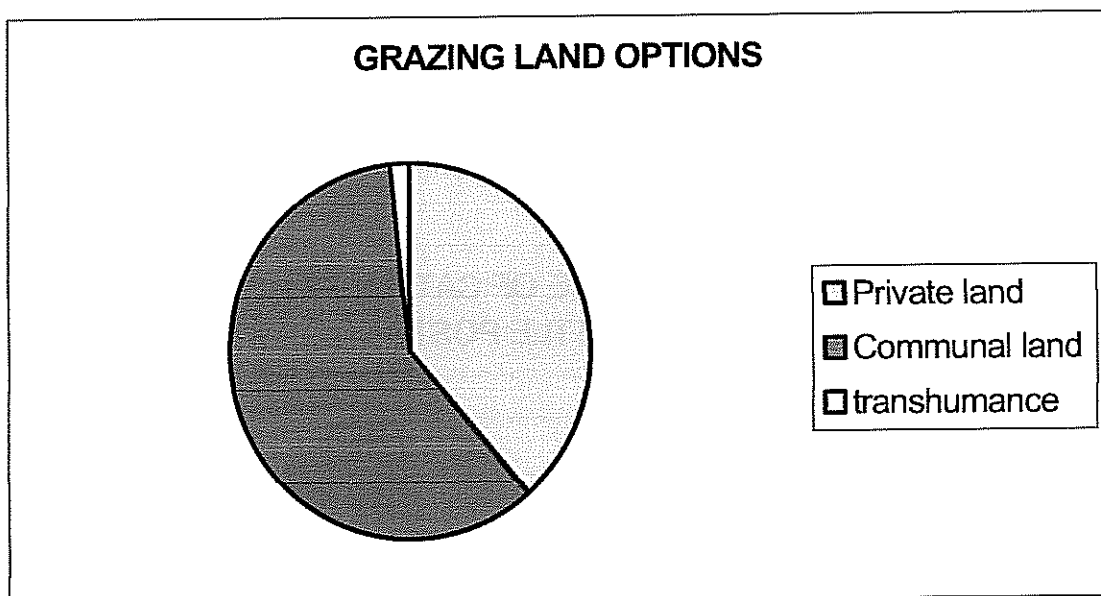
The modalities differ somehow when the herding is done at the cattle posts. Relatives are not paid, only in exceptional cases. Hiring someone to look after the cattle is other modality especially among friends and neighbours. The economic compensation ranges from N\$50-N\$80/ month. Another modality of herding cattle is rotating the duties among friends and neighbours who gather their cattle together. No compensation is done in this modality.

Farmers in Ontanda village very seldom split their cattle herd to be taken care by others. Few farmers practice it, in order to secure the herd numbers in case of disease spread among the herd.

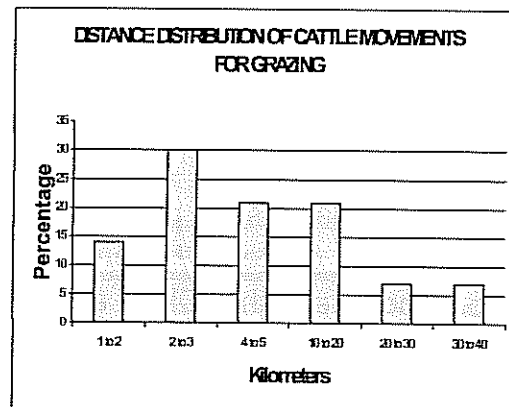
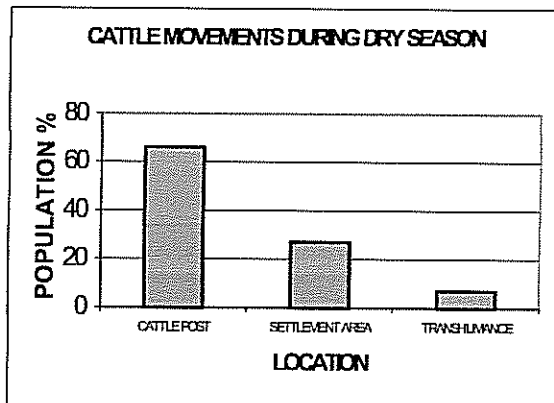
There are certain rights for those who herd cattle for others in the village. They have access to manure for their fields, eat butter and milk, and to use oxen to plough the farmland. In any case newborn calves become theirs.

4.5 RANGELAND MANAGEMENT

Communal land is the primary grazing land in the village. Cattle, goats, sheep and donkey graze in this area, which comprises communal area outside the households and the "Okuti" area (forest area). There are some cases in which owners herd their animals beyond the boundaries of the community in search of better pastures. Livestock is also allowed to graze in the private farmland ("ekove"), during rainy season (especially oxen and donkeys used for ploughing purposes), and likewise after harvesting, so livestock can benefit from the stalks of mahangu and debris from other crops. Pigs remain in pens all year round in the farmland.

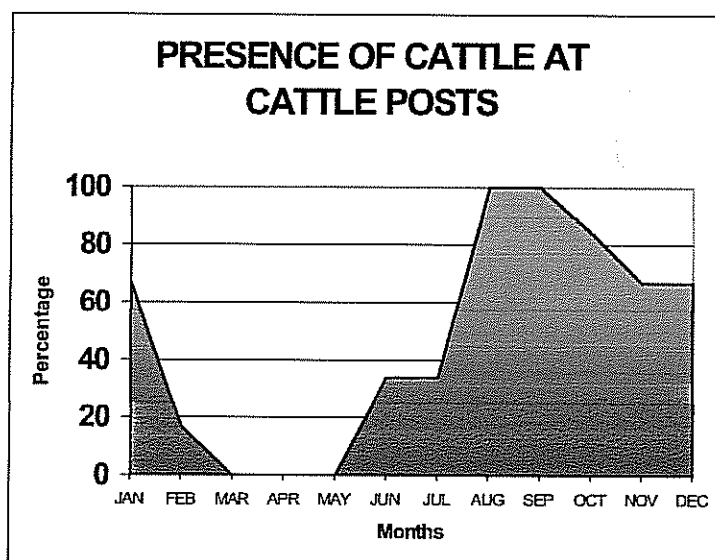


The cattle movements during dry season are shown in page 8. During rainy season all cattle returns to the settlement area due to grazing availability. Animals move in a range of 5 kilometers in their grazing patterns, but there are cases of those practicing transhumance that animals move 20, 30, even up to 40 kilometers away from the community (Omangadha, Tshatsondumbo, Amulunga's well, Oshalata).

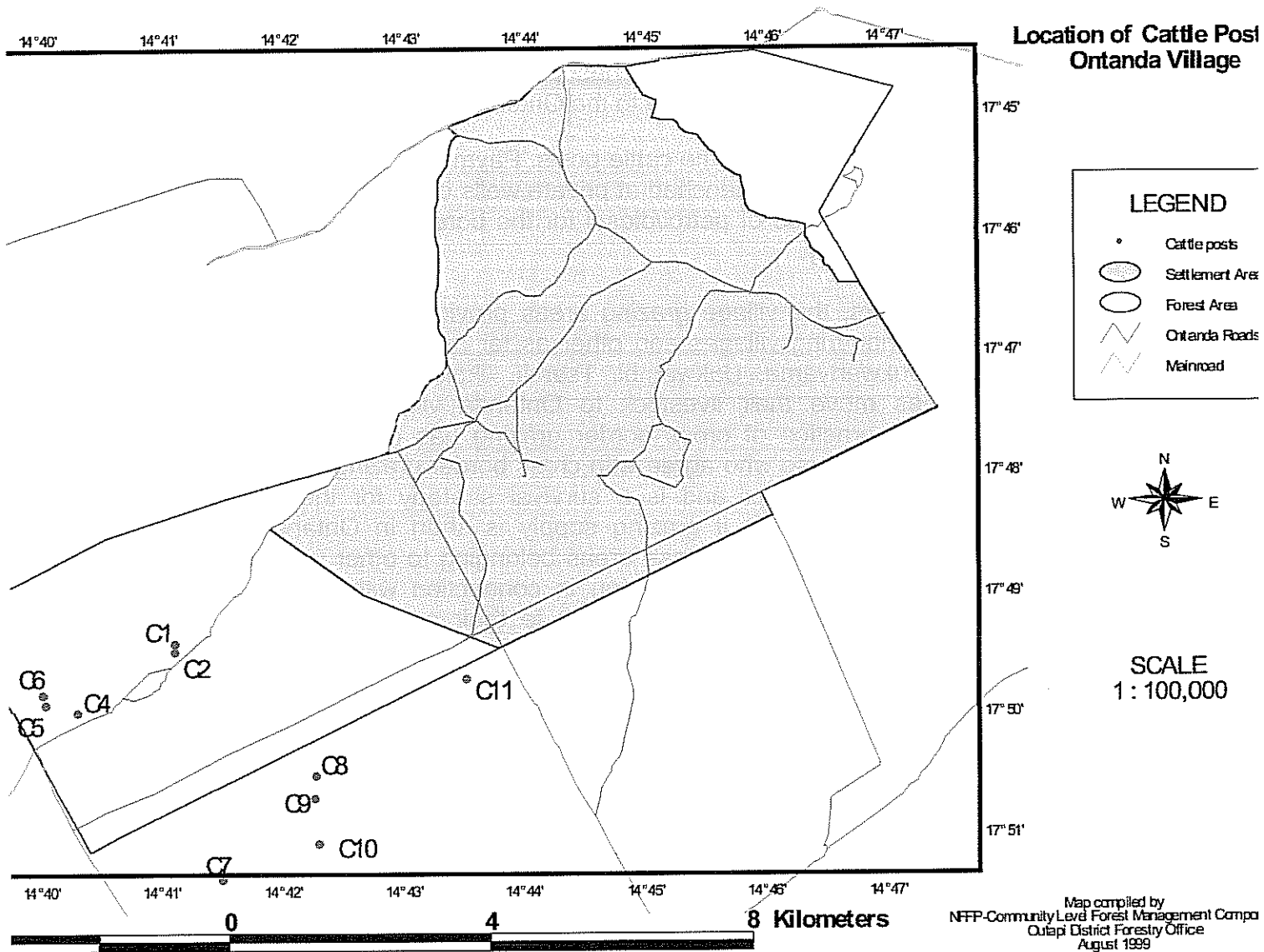


The grazing patterns for goats and sheep are rather similar in the community. They graze all year round around the household, with occasional access to the farmland ("ekove") after harvesting. Herds do not move far from the household, being 1 kilometer the most common grazing distance.

Cattle posts play an important role in the management of livestock. Farmers start taking their herds from late May onwards in such a way that the presence of cattle at cattle posts is high during June to September, coinciding with the dry season period. The main reason to take livestock to the cattle posts is the shortage of grass nearby the homesteads during dry season.



Most of the farmers use the cattle posts in a seasonal basis. There are few exemptions whereby the cattle are kept at the cattle posts all year round. This practice responds to the fact that, some farmers are of the opinion that the cattle concentration in the settlement area increases the cases of destruction of crops belonging to neighbours and themselves. The need to be free for other activities is also reason given to keep cattle at the cattle posts permanently. Map No. 2 shows the location of the cattle posts in Ontanda village.



Farmers consider that the establishment of cattle posts is reducing the availability of water and grass in the forest areas. They foresee that eventually the areas will become overgrazed and erosion processes will take place, thus affecting adversely the village environment.

Normally farmers from Ontanda village do not have to ask permission from anybody to graze their animals at the cattle posts. However, they inform the headman when they are moving their herds to the cattle posts. The case is different when people from other areas want to graze their cattle in Ontanda. They have to ask permission from the headman and some times from the King of Uukwaluudhi to take their cattle to the Ontanda cattle posts.

People do not pay for the use of the cattle posts. Payment or compensation is involved when the cattle are quenched at private wells or boreholes. N\$2 per cattle head or the purchase of petrol/diesel for the borehole pump is normal practice in the community.

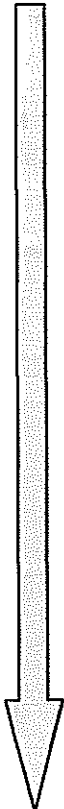
According to farmers, the village grazing areas provide pastures for cattle coming from neighbouring villages and other as far as 30 to 60 kilometers: Farmers from Uukwanyama, Uukwambi, Tsandi, Iikokola, Ongandjera and Ombalantu areas move their livestock to Ontanda village searching for grazing land. The practice of cross border grazing has different reactions among the farmers. Those who agree with cross border grazing affirm that it is a way to help each other and is a survival strategy for the cattle of everyone. It is expected that if grazing supply is short in Ontanda, then farmers can move their cattle to those areas belonging to other villages. On the other hand, there is opposite opinion in connection with the practice: Farmers regard that this brings overgrazing to their area, affects grazing availability for their own cattle, and also that they are affected by stealing of cattle.

Farmers agree that there is not enough grazing land in their village nearby the household area. As result of that they have to take their herds to the cattle posts, or practice long seasonal cattle movements. Other sign of shortage of grazing is the fact that cattle are increasingly browsing on shrubs and trees.

In the settlement area people do not ask permission to let their cattle graze outside the household palisade ("ongumbu"). All farmers strictly follow paddocking practices, which normally take place during sunset. Prevention from loss is reason to paddock large livestock and protection from predators applies for small stock. Other reasons of paddocking is to concentrate manure supplies to be later used in the farming fields, for easier milking and watering activities and to avoid hoove damage if cattle moves during the night. The only case where cattle are not paddocked is when they are allowed to eat the mahangu stalks in the farmland ("Epya") after harvesting.

In regard to browsing habits, cattle feed on a large number of shrubs and tree species. As rule of thumb cattle browse on leaves as first preference; young leaves are of second choice, followed in order of preference by shoots, fruits, bark and flowers. A detailed chart of forest species and cattle preference is shown in page 11.

BROWSING FOREST SPECIES AND CATTLE PREFERENCES

Botanical name	Local name	Palatability	Cattle Preference					
			Young leaves	Shoots	Leaves	Fruits	Bark	Flowers
<i>Baphia massaiensis</i>	Ofufe		1	2	1	3	4	5
<i>Terminalia prunioides</i>	Ohama		1	2	1	3	4	
<i>Commiphora africana</i>	Omukanga		1	3	2	4	4	
<i>Combretum imberbe</i>	Omukuku, Omumbolongondjo		2	2	1	4	3	
<i>Combretum apiculatum</i>	Omulama		2	3	1	4	5	
<i>Hyphaene petersiana</i>	Omulunga		2	3	1	4	5	
<i>Boscia albitrunca</i>	Omunkuzi		3	1	2	5	4	
<i>Acacia erioloba</i>	Omoonde, Omuthiya		2	3	1	1	3	
<i>Lonchocarpus nelsii</i>	Omupanda		2	3	1	4	5	
<i>Albizia anthelmintica</i>	Omupopo		2	3	1	3	4	
<i>Combretum collinum</i>	Omupupwaheke		2	3	1	3	4	
<i>Colophospermum mopane</i>	Omusati		2	3	1	4	5	
<i>Sclerocarya birrea</i>	Omugongo		1	2	2	3		
<i>Ficus sycomorus</i>	Omukwiyu		1	2	1	2		
<i>Acacia hebeclada</i>	Omutyuula		1	1	1	1		
<i>Berchemia discolor</i>	Omuye		2	3	1	4		
<i>Diospyros mespiliformis</i>	Omwandi		1	2	1	1		
<i>Terminalia sericea</i>	Omugolo		1	2	1			
<i>Adansonia digitata</i>	Omukwa		1		1		2	
<i>Ziziphus mucronata</i>	Omusheshete, Omukekete		1	1	1			
<i>Acacia tortilis</i>	Omutshu	1	1	1				
<i>Schinziophyton rautanenii</i>	Omunkete	1	1					
<i>Dicrostachys cinerea</i>	Ongete	2	1					
<i>Elephantorrhiza elephantina</i>	Oshitulu	Less Palatable			1			

Number Codes:

1

First preference

4

Fourth preference

2

Second preference

5

Fifth preference

3

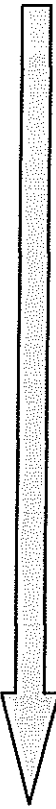
Third preference



Not applicable

Goats have more browsing habits than cattle. However, the preference order to browse in specific parts of the shrubs and trees is the same than in cattle (leaves are browsed as first preference, young leaves are of second choice, followed in order of preference by shoots and fruits). A detailed chart of forest species and goat preference is shown in page 12.

BROWSING FOREST SPECIES AND GOAT PREFERENCES

Botanical name	Local name	Palatability	Goat Preference					
			Young leaves	Shoots	Leaves	Fruits	Bark	Flowers
<i>Schinziophyton rautanenii</i>	Omunkete		1	2	3	4		
<i>Acacia erioloba</i>	Omoonde		2	4	1	3		
<i>Baphia massaiensis</i>	Ofufe		4	2	3	1		
<i>Terminalia prunioides</i>	Ohama		2	3	1	4		
<i>Terminalia sericea</i>	Omugolo		2	3	1	4		
<i>Sclerocarya birrea</i>	Omugongo		2	4	1	3		
<i>Commiphora africana</i>	Omukanga		2	3	1	4		
<i>Combretum imberbe</i>	Omukuku, Omumbolongondjo		2	3	1	4		
<i>Lonchocarpus nelsii</i>	Omupanda		2	4	1	3		
<i>Combretum collinum</i>	Omupupwaheke		2	3	1	4		
<i>Colophospermum mopane</i>	Omusati		2	3	1	4		
<i>Ziziphus mucronata</i>	Omusheshete, Omukekete		2	4	1	3		
<i>Acacia hebeclada</i>	Omutyuula		1	4	2	3		
<i>Berchemia discolor</i>	Omuye		2	4	1	3		
<i>Dicrostachys cinerea</i>	Ongete		2	4	1	3		
<i>Combretum apiculatum</i>	Omulama		1	3	2	3		
<i>Albizia Anthelmintica</i>	Omupopo		2	3	1	3		
<i>Ficus sycomorus</i>	Omukwiyu		2	3	1	2		
<i>Acacia tortilis</i>	Omutshu		1	3	2	2		
<i>Diospyros mespiliformis</i>	Omwandi		2	3	2	1		
<i>Boscia albitrunca</i>	Omunkuzi	1	2	1	3			
<i>Adansonia digitata</i>	Omukwa	2		1	2			
<i>Hyphaene petersiana</i>	Omulunga	1		1	1			
<i>Bauhinia macrantha</i>	Omutsanguta			1	1			
<i>Elephantoriza elephantina</i>	Oshitulu	Less palatable	1					

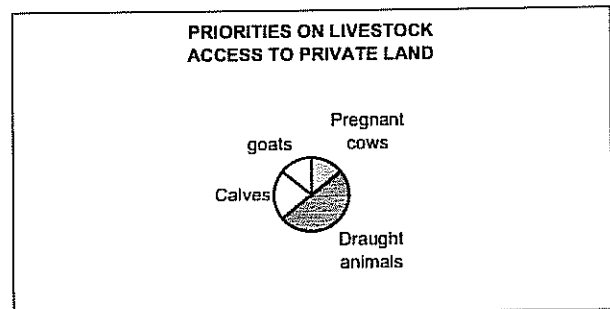
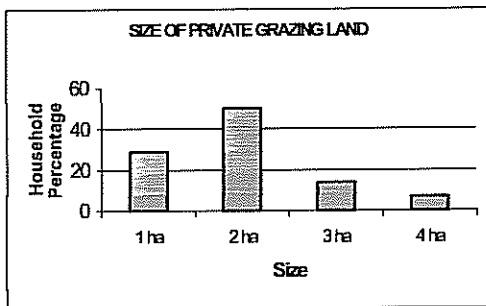
Number Codes:

1	First preference	4	Fourth preference
2	Second preference		Not applicable
3	Third preference		

Sheep feed exactly as goats do. Donkeys feed mainly on grass, but browsing is also reported. Farmers give feed supplement to their cattle, which they make themselves or otherwise it can be obtained at AGRA. Salt stone is an important supplement for cattle.

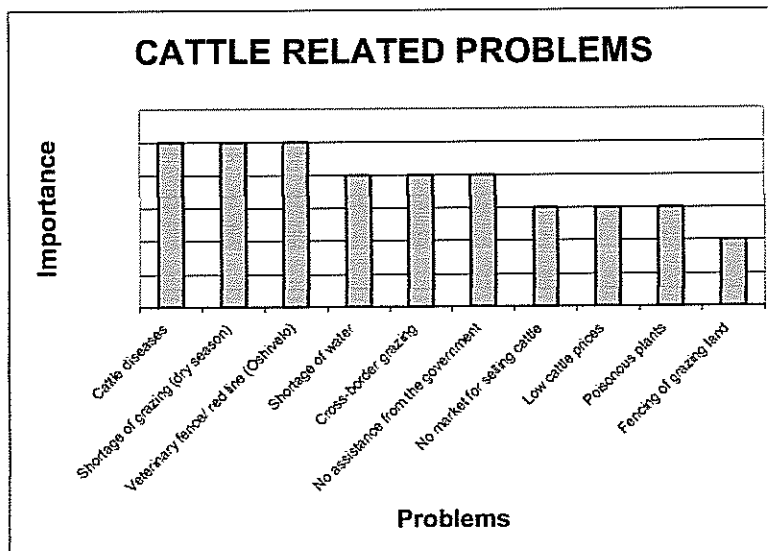
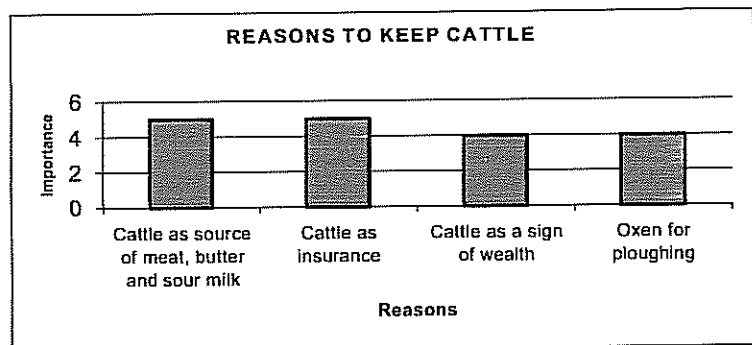
4.6 ON-FARM LIVESTOCK MANAGEMENT

Half of the Ontanda households possess a private grazing area of about 2 ha, but there are an important number of households where the size of the grazing land is only 1 ha. Draught animals are predominantly grazing inside the farmland. However, calves, goats and pregnant cows are given preference to graze in these areas.



4.7 RANKING OF PRIORITIES AND PROBLEMS IN LIVESTOCK MANAGEMENT

Cattle as food security and as insurance are the most important reasons of farmers for keeping cattle. If crops fail, they still have the cattle at the cattle posts, which can be easily exchanged for money or mahangu.



Cattle diseases, shortage of grazing during dry season, and the veterinary restrictions to external markets for live animals and car-casses overseas, are the most serious constraints of farmers regarding cattle keeping. Shortage of water, cross border grazing and insufficient government

assistance for cattle management constitutes a second group of farmers' concerns. Additional problems are lack of markets to sell cattle, low prices and presence of toxic/ poisonous plants in the grazing areas, which weaken or kill livestock.

Farmers feel that the government and the community leaders have to play a key role in the solution of these problems: Supply of inputs, as well as negotiations of selling prices with MEATCO to encourage farmers to sell their cattle are issues expected to be addressed by the government. Farmers also expect that traditional authorities approach the government to convey their problems and to find together ways to solve them, especially to aspects of better marketing strategies, water supply for livestock, and also education and training to farmers in livestock management.

4.8 FARMERS' SELF-ASSESSMENT ON LIVESTOCK MANAGEMENT

In general most farmers feel they are managing and taking good care of their cattle. Taking them for water and grazing to the cattle post, paddocking them at night, vaccinating and giving salt are management activities that farmers implement as a normal routine. As result of that the cattle are reproducing well and many farmers do not need to buy cattle any more. On the other hand some few farmers regard that they are failing to manage their cattle due to shortage of grazing for their livestock and the difficulties to manage the cattle themselves alone. Very few farmers attend training events in order to improve their management skills. Either they check how others are doing or they seek advice at the veterinary service.

When asked about destocking, farmers agree that reducing the number of stock will improve the situation, giving grasses and small trees chance to grow. For that purpose however, definition and implementation of by-laws are critically important.

Most farmers at Ontanda agree that the responsibility of managing the communal grazing areas fall under the community members themselves. Control and extinction of fires, reporting people who enter into grazing land without permission from the King, or reporting those who are illegally at the cattle posts, are common management practices in the area. However, part of the community members think that the grazing area is not subject to any kind of management from the side of the community.

Opinions are somehow divided in relation with the way the communal grazing lands are used. Some farmers think that the management activities are fine so far. However, the majority of the village members consider that there is a need for a change in terms of application of management strategies and by-laws that need to be set in place to improve the general condition of the grazing land. Farmers are of the opinion that there should be division and rotation of grazing areas, cross border grazing have to be regulated or minimized and also fire management measures need to be implemented. Farmers know that the impact of these management measures is the improvement of the grazing material in quantity and quality, and therefore improved livestock production. An important impact identified for the farmers was the fact that the application of by-laws can also contribute to the strengthening of the community organization.

4.9 LIVESTOCK REPRODUCTION ISSUES

Most of the farmers have a mating bull in their herd. However, the communal grazing lands play a very important role in reproduction patterns, especially for those farmers without a bull in their herd. Cows are mated for bulls, which graze freely in the communal grazing areas of the village. The pregnancy period of a cow is about 9 ½ months. It means that the calves are born mostly at the beginning of the rainy season.

Calving problems are limited to the sticking of the placenta in the cow's womb ("okwiindililwa"), which seems to happen in 50% of the deliveries. When such a case occurs, farmers seek advice on elder people. A common practice to deal with this case is to cut the vagina opening in order to facilitate the removal of the placenta and later on to stitch the muscle up.

4.10 MILK AND BY-PRODUCTS

Milk is kept in traditional containers called "oxupa", which are made of big calabashes of diverse sizes, with capacity for 20-25 lt. of milk. There are some factors, which affect how much time it is needed to fill the oxupa with milk. It depends on the milking capacity of the cows, the number of milking cows, the milk left after the calf feeding and the seasons. Taking these factors into account, it may take 2 to three days to fill the oxupa during rainy season and more than a week during dry season.

Most of the farmers get milk from their own cows during the rainy season, due to the fact that the milk production is directly related to availability of food supply and calving period. Farmers experience shortage of milk from their own herds during dry season. Therefore they get milk either from the few farmers who practice continuous breeding and milk production, or they buy milk in town from markets and groceries. The seasonal scarcity of milk is directly



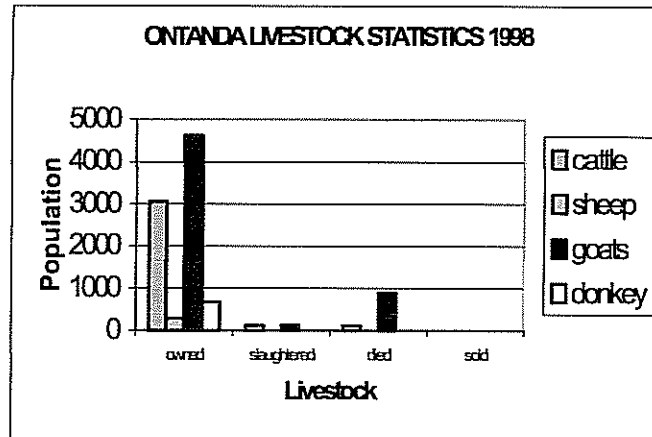
related to the fact that most of the farmers do not practice continuous.

Manure is an important by-product from animal husbandry. It is used to fertilize the farming land before cultivation. Some farmers sell the manure to those who do not own any cattle. (About N\$ 200/tonne).

Oxen are used for ploughing purposes when they are about 3-4 year old. According to farmers they are easy to train at that age, and are strong enough to do the work. Other farmers prefer donkeys for ploughing instead, because they regard that ploughing become oxen weak thus not producing good quality meat.

4.11 LIVESTOCK MARKETING

The graph shows the livestock statistics for Ontanda village during 1998. It is clear that the amount of stock slaughtered, died or sold is minimal compared with the amount owned by the farmers. The main causes of mortality among livestock are diseases and drought. Owners reported that they normally sell three cattle heads every year.



Ontanda farmers sell their cattle especially in Tsandi and Oshakati. Some of them sell cattle at 3-4 year old, but some farmers also sell them when they are very old (8-10 year old). Average price per head ranges from N\$800 to N\$1000, depending on the age and weight of the animal.

Goats are normally marketed in the community, at the age of 4–6 year old. Unit prices for a goat may vary from a wide range of options, but normally they fall between N\$150 – N\$200. Sheep are sold at Oshakati, at 4 years of age. The selling prices are about N\$300 per head.

Donkeys are sold in the Uukwaluudhi area, when they are about 3 year old and strong enough for the occasional work they do. Prices range between N\$400 – N\$700. Pigs are also sold in the community but also in Ombalantu and Oshakati areas. A good age to sell a pig varies from 8 months to three years, time when they have enough weight and the meat is tender. Prices range between N\$200 – N\$500.

Sell of livestock takes place all year round, but it is more noticeable after the rainy season (May – July), when animals are well fed and in good shape.



Slaughtering also takes place during the same season period of the year. Not only meat from livestock is sold: Bowls, hides and skins are also marketed. When asked about the two marketing modalities, farmers said that selling live cattle gives them more money than slaughtering and selling. Half of the farmers use the cash

generated to pay school fees. The other half saves the money in the bank or buys some more livestock.

Improvement of marketing channels, price improvement with farmers participation to set them, building of marketing infrastructure close to the communities, and purchase of cattle in the communities themselves are some the suggestions farmers would like that MEATCO takes into account.

4.12 LIVESTOCK DISEASES

There are many diseases, which affect livestock in Ontanda and in the communities in general. Some of them are mortal to livestock; others weaken the livestock so badly that females become infertile. Livestock get sick especially when they do not get enough food and water, and when they are not dipped or vaccinated regularly.

The table below show the reported diseases experienced by the livestock in Ontanda. The information also displays how farmers identify and treat some specific cases.

LIVESTOCK DISEASES IN ONTANDA

Type of Livestock	Common disease	Vernacular name	Main cause	Symptoms	Treatment
Cattle		Osheenyanya			
	Foot & mouth	Ekondo**	Mud soil	Exposed tongue, moving slowly	
	Botulism	Oshinambunda		Not able to stand up	Tail Bleeding
	Lung sickness or CBPP*	Epunga	Eating bones	Coughing	Vaccination
	Anapasmosis	Onyangongo	Sun burning	Blue saliva	Okanakamuma (give it to drink)
	Anthrax	Ombulwa		Nose bleeding	Veterinary service
		Okaenya	Eating plastic bags		
Goats	Intoxication	Ondolo	Some grass is poisonous	Always crying	
	Coughing	Omukolo		Coughing	
	Dry Gall	Onyangongo		Liver becomes too big	
	Lung sickness or CBPP*	Epunga			
	Foot & mouth	Ekondo**			
		Onkana (Mange)	White skin rashes; falling hairs		Dipping using Calorine
	Black quarter or black evil	Okaenya			
Plant poisoning	Okayanga	Plant poisonous	Loss appetite	Take that plant and put it into their drinking trough	
Sheep	Diarhea				
	Throat swelling		Hunger	Swelling of the throat	
	Scold	Eshikisha		Nose segregates mucus	
Pig	Lung sickness or CBPP*	Epunga		Coughing	Vaccination
	Sudden dearth				
	Anthrax	Ombulwa		Nose bleeding	Veterinary service
	Coughing	Omukolo		Coughing	
Others	Internal worms	Epuka	Lack of food		Crushed roots of <i>Albizia anthelmintica</i> to drink

* Contagious Bovian pleuro pneumonia

** Ekondo = oshitatula = okatatula = elaka = oshimbandanga

When certain disease cannot be identified, farmers seek advice from elder people in first place and then, later on from the veterinary service in Tsandi. Vaccination against most diseases is strictly followed by all farmers, which they carry out once a year. The veterinary service plays a major role in this activity.

Farmers do use modern medicine to treat cattle diseases. However, they have traditional methods to treat certain cases of diseases, which are shown in the table below.

Disease	Traditional method of treatment
Botulism	Okanakamuma seeds Cut the tip of the tail
Internal worms	Unprocessed salt Roughage from mahangu
Lung sickness	Use salty water and Okanakamuma seeds

4.13 WATER MANAGEMENT

Farmers give water to their livestock once a day during the dry season. On the other hand, there are enough water sources for livestock during rainy season; therefore no rigid schedule is followed to water them. Most of the water is obtained for permanent water sources such as boreholes and communal wells. However, hand-dug ponds ("omifima") also represent important seasonal water sources. Livestock in Ontanda obtain water from places that are pretty close to the grazing areas (within 1-kilometer range in most cases and not beyond 5 kilometers away).

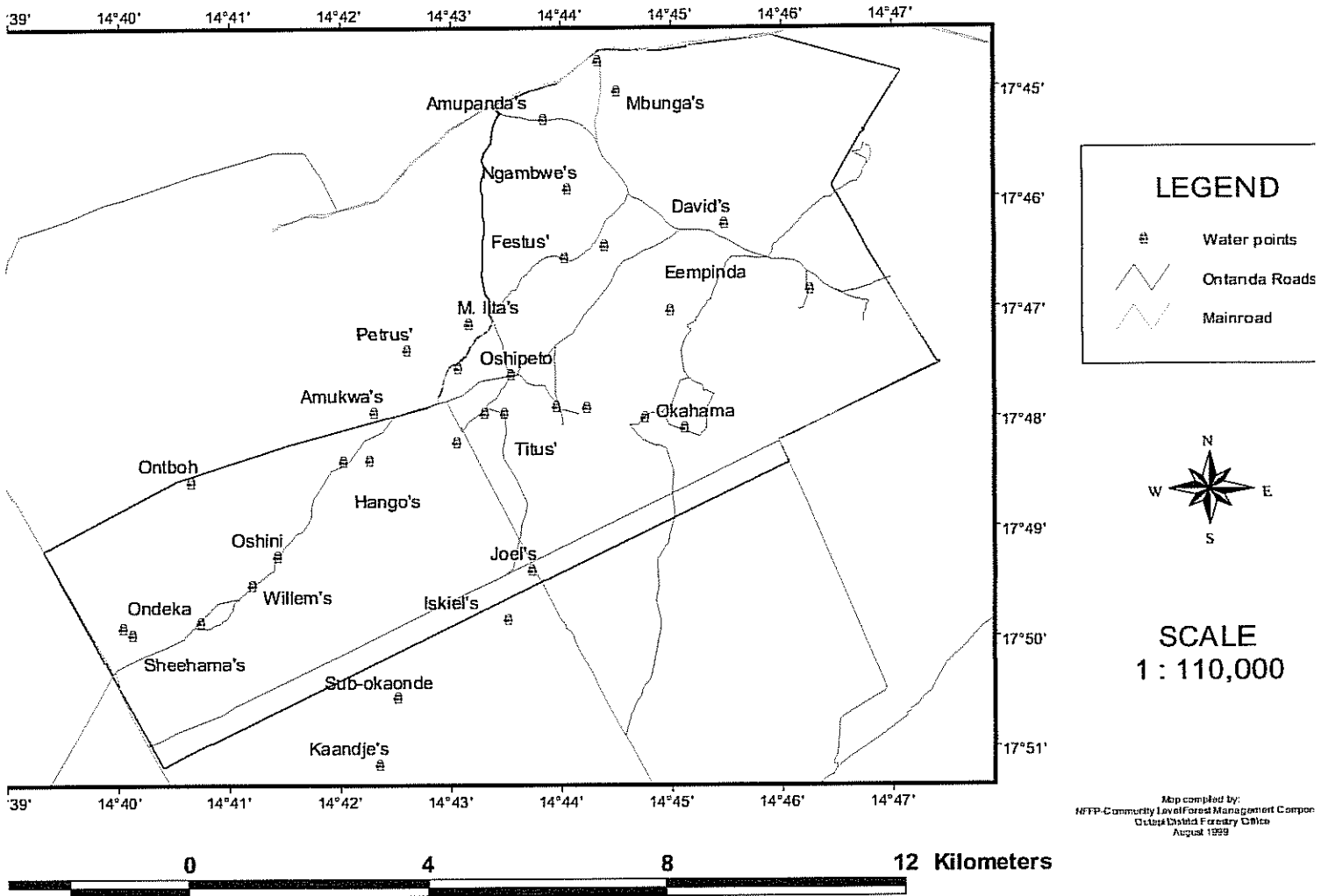


Farmers fetch water for drinking and cooking purposes from wells and boreholes that are scattered all over the village, as shown in Map No. 3. There exist 30 wells and 5 boreholes that make fetching distances vary from 100 meters to 1 kilometer. People gather water from the same sources during both dry and rainy seasons.

Household members are all responsible for fetching water. However, the frequency and means to transport water differs. Women and girls fetch water almost everyday, carrying the water containers on the head. Men and boys fetch water either using wheelbarrow or donkey cart and, in some cases bicycles.

Almost all households collect water from wells, which are often privately owned. Users contribute with labour to clean them, work that is normally done once a year. Wells are made up of strong traditional wooden lining; though, they do not have any winch, crank, hand or motor pump.

Location of Water Sources in Ontanda Village



Map compiled by:
 NFFP-Community Level Forest Management Component
 Okavango District Forestry Office
 August 1999

In lesser cases farmers fetch water from private or government boreholes. Users pay monthly fees of N\$ 2.50/ cattle to private owners to get access to water or contribute with fuel to operate the pumps. When asked about the quality of water for drinking purposes, most farmers stated that they would like to have access to healthier and cleaner piped water.

In regard of water disposal, nearly all water from washing and cooking is thrown away, especially the bathing water. However, some farmers give the water used for washing dishes to pigs and chicken at home.

4.14 GRAZING AND CARRYING CAPACITY EVALUATION

The tables below show the average dry biomass of grasses and herbs (also called "forbs") for the forest and settlement areas of Ontanda village.

CLUSTER	DRY GRASS BIOMASS (Kg./ha)	DRY FORB BIOMASS (Kg./ha)
F1	503.75	121.25
F4	584.75	6.88
F8	641.00	18.25
F10	460.75	11.00
AVERAGE	547.56	39.35

CLUSTER	DRY GRASS BIOMASS (Kg./ha)	DRY FORB BIOMASS (Kg./ha)
S3	517.5	7.50
S4	461.50	33.75
S6	705.00	50.00
AVERAGE	561.33	30.42

F = Forest Area

S = Settlement Area

If livestock grazing selectivity, trampling and termite damages are taken into account, then the available dry forage per hectare of pasture will be 60% of the average grass biomass; e.g. **328.54** Kg./ha in the forest area, and **336.80** Kg./ha in the settlement area.

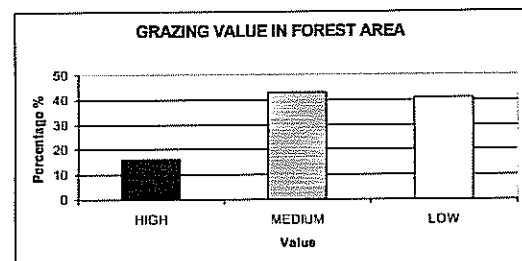
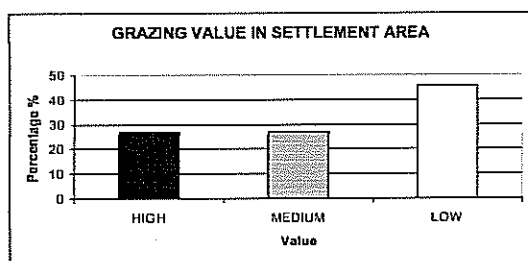
The following tables and graphs present a summary of the existing grasses in the village, including their relative abundance and the frequency as they were found in the quadrants. The tables also show the grazing value of most of the species evaluated.

SUMMARY SETTLEMENT AREA				
SCIENTIFIC NAME	VERNACULAR NAME	RELATIVE ABUNDANCE (0-3)	FREQUENCY %	GRAZING VALUE
<i>Schmidtia kalahariensis</i>	Ontanakugulu	3	23.97	MEDIUM
<i>Eragrostis superba</i>		1	20.97	HIGH
<i>Pogonarthria fleckii</i>	Okanamunyela	1	18.73	LOW
<i>Aristida effusa</i>	Onushe	1	13.11	LOW
<i>Tragus spp</i>		1	6.74	
<i>Pogonarthria fleckii</i>	Okanamunyela	2	5.99	LOW
	Okadhindamagongo	1	3.00	
<i>Aristida stipoides</i>	Omunamaidhi	1	2.25	LOW
<i>Aristida congesta</i>		2	1.50	LOW
<i>Panicum coloratum</i>		1	1.12	HIGH
<i>Brachiaria spp.</i>	Oshinamume	1	0.75	HIGH
<i>Enneapogon cenchroides</i>		1	0.75	HIGH
<i>Aristida congesta</i>		1	0.75	LOW
<i>Stipagrostis uniplumis</i>		1	0.37	HIGH
		TOTAL	100.00	

0 = absent; 1 = present; 2 = moderately abundant; 3 = abundant

SUMMARY FOREST AREA				
SCIENTIFIC NAME	VERNACULAR NAME	RELATIVE ABUNDANCE (0-3)	FREQUENCY %	GRAZING VALUE
<i>Schmidtia kalahariensis</i>	Ontanakugulu	3	37.88	MEDIUM
<i>Pogonarthria fleckii</i>	Okanamunyela	2	12.63	LOW
<i>Pogonarthria fleckii</i>	Okanamunyela	1	9.56	LOW
<i>Eragrostis superba</i>		1	9.56	HIGH
<i>Aristida effusa</i>	Onushe	1	8.53	LOW
	Okadhindamagongo	1	7.17	
<i>Eragrostis superba</i>	Okashendayidhi	2	5.12	
<i>Aristida stipoides</i>	Omunamaidhi	1	3.75	LOW
<i>Tragus Spp.</i>		1	2.39	
<i>Aristida congesta</i>		3	1.02	LOW
<i>Aristida congesta</i>		1	0.34	LOW
<i>Digitaria spp.</i>		1	0.34	HIGH
<i>Enneapogon cenchroides</i>		1	0.34	HIGH
<i>Panicum coloratum</i>		1	0.34	HIGH
<i>Rhizogum spp.</i>		1	0.34	
<i>Stipagrostis uniplumis</i>		3	0.34	HIGH
<i>Tragus spp.</i>		2	0.34	
		TOTAL	100.00	

0 = absent; 1 = present; 2 = moderately abundant; 3 = abundant



More than half (57%) of the grass biomass existing both in the settlement and forest areas present good grazing characteristics and value. Species such as *Eragrostis superba*, *Panicum coloratum*, *Brachiaria spp.*, *Stipagrostis uniplumis*, *Digitaria spp.* and *Enneapogon cenchroides* represent highly valuable forage grass in terms of palatability and animal utilization. These high quality grasses represent 22% of the veld composition.

The most common grass species found in Ontanda village is *Schmidtia kalahariensis*, which alone represents 31% of the veld composition. This grass possesses a reasonable medium grazing value as a fodder in dry condition. The inflorescences are particularly nutritive, thus providing a good supplement to the livestock diet. However, its presence is a clear indicator of veld deterioration.

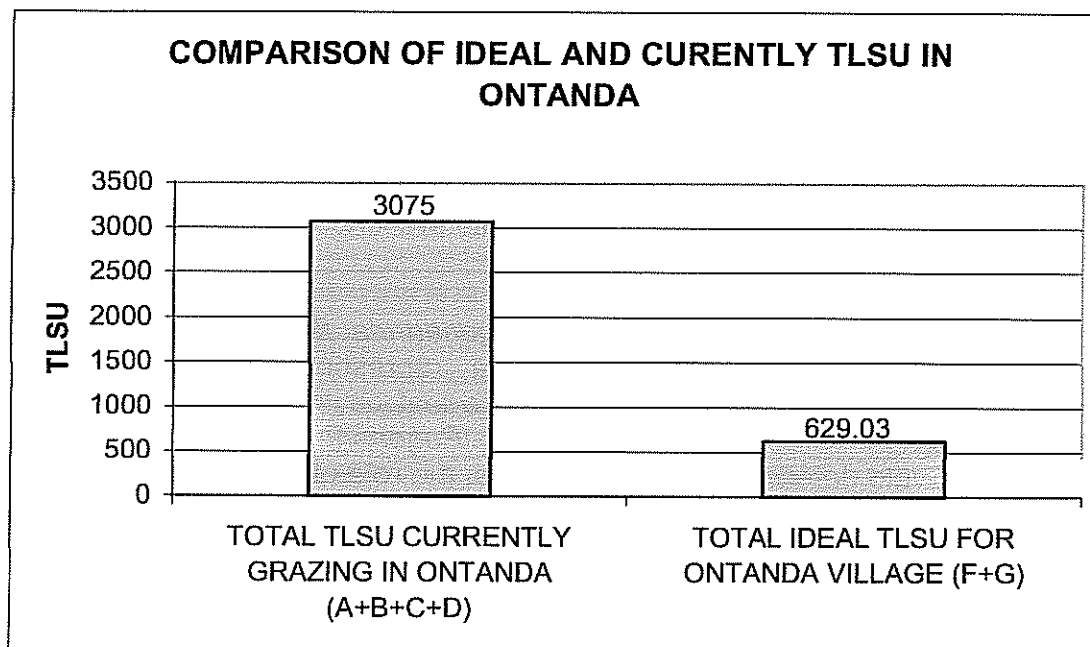
Low grazing value grasses such as *Pogonarthria fleckii*, *Aristida effusa*, *Aristida stipoides* and *Aristida congesta* represent 43% of the veld composition in the village, being the sparse leaf cover the main reason for their low forage value. The presence of *Pogonarthria fleckii* is also an indication of veld deterioration. Nevertheless, the role of these grasses is very important to counteract the effects of soil erosion.

The table below shows the estimation of ideal carrying capacity for Ontanda village.

PARAMETERS	VALUE
1 LIVESTOCK UNIT (LSU, in Kg.)	450.00
1 TROPICAL LIVESTOCK UNIT (TLSU, in Kg.) = 75% of LSU	337.50
DAILY DRY MATTER (DM) REQUIREMENT OF TLSU (Kg.) = 8% of TLSU	9.45
ANNUAL DM REQUIREMENT OF TLSU (Kg.)	3449.25
AVERAGE AVAILABLE DM PER HA. (Kg.), FOREST AREA	328.54
AVERAGE AVAILABLE DM PER HA. (Kg.), SETTLEMENT AREA	336.80
CARRYING CAPACITY IN FOREST AREA (HA/TLSU)	10.50
CARRYING CAPACITY IN SETTLEMENT AREA (HA/TLSU)	10.24

Taking into account the carrying capacity of the forest and settlement areas of the village, it is estimated that the ideal number of Tropical Livestock Units (TLSU) that the village can support is 629. The present number of TLSU found in the village is 3075, which means an overstocking of almost 400%.

ONTANDA CATTLE TLSU	A	2062
ONTANDA SHEEP TLSU (10% OF TLSU)	B	21
ONTANDA GOAT TLSU (10% OF TLSU)	C	493
ONTANDA DONKEY TLSU (50% OF TLSU)	D	499
TOTAL TLSU CURRENTLY GRAZING IN ONTANDA (A+B+C+D)	E	3075
SIZE OF ONTANDA FOREST AREA (Hectares)		2200
SIZE OF ONTANDA SETTLEMENT AREA (Hectares)		4296
IDEAL LSU FOR FOREST AREA	F	209.55
IDEAL LSU FOR SETTLEMENT AREA	G	419.48
TOTAL IDEAL TLSU FOR ONTANDA VILLAGE (F+G)	H	629.03
OVERSTOCKING %	{E-H}/H}x100	388.85



5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Ontanda covers an area of 6496 hectares, and 2320 people live in the village. It makes a population density of 35-people/ km². If it considered that the population is concentrated in the settlement area of the village this number raises to 54-people/ km².

The population pressure is relatively high in the village due to the socio-economic activities of the farmers and the ecological features of the area. This pressure may increase by the fact that half of the village members are 20 year old or younger, which means that future new families will be searching for farming lands. However, Map No. 4 shows that there is very little space in the settlement area for new households. It will eventually force people to move towards the forest and grazing areas of the village, therefore decreasing their availability. It is recommended to:

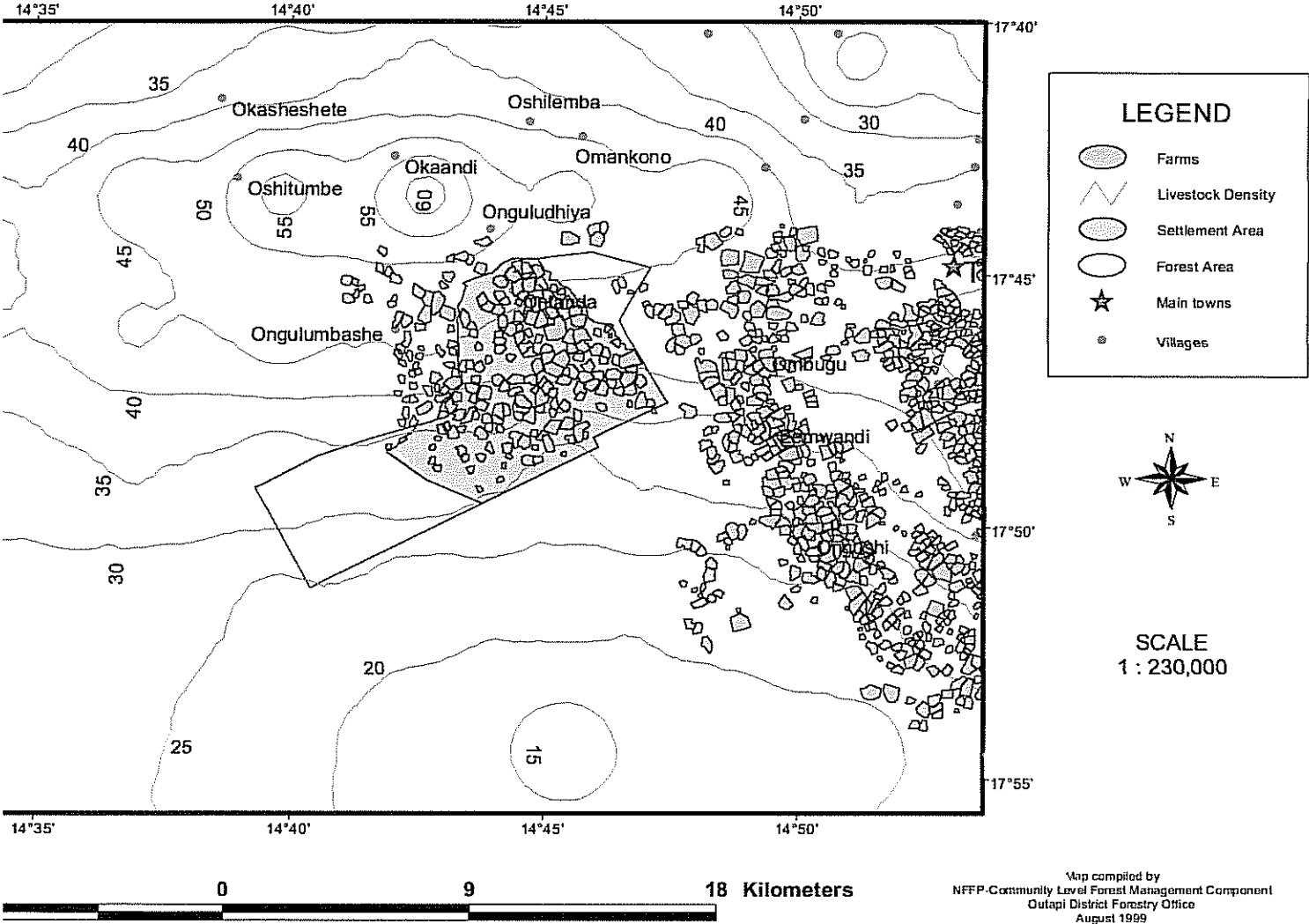
- Discuss with the community on strategies to reduce the expansion of settlements towards areas that currently are sustaining the living of the existing dwellers of the village.
- Create awareness especially among the young members of the community about effects of population pressure, family planning and other related issues, including the importance of adequate natural resource management.

5.2 Communal land is the primary grazing land in the village, though animals also graze in private farm areas during rainy season and transhumance patterns are also practiced. Shortage of grass in the settlement areas is experienced during dry season, therefore cattle move to forest areas where grass and fodder are more available. In that sense, cattle posts play a major role in the management of livestock. However, the movement of cattle directly affects milk availability in the households, which is scarce during dry season.

Livestock as food security and as insurance are the most important reasons of farmers for keeping livestock. In that sense, farmers' subsistence strategies include the spreading of risks: If crops fail, they will still have their livestock that can be exchanged for money or other food products. It also explains the interest of farmers for keeping big numbers of livestock. Important by-product is manure for their crop fields, since soil fertility is generally very poor in the villages. It is recommended to:

- Promote zero grazing practices at household level, keeping 1 – 2 dairy cows to guarantee a continuous supply of milk to the family members of the village. It will also provide with additional manure supply that can be used to improve soil fertility.
- Promote agroforestry practices to increase the overall yield of crops per hectare, to produce green manure for the soils and fodder for dairy cows and other domestic animals. All this will allow farmers to obtain more diverse food products and richer diets, and it will reduce the need to expand the farms in search of more fertile soils.

Farm and Livestock Density around Ontanda Village



5.3 There are 8359 animals in Ontanda village, which represent 3075 livestock units. The grazing assessment shows that the ideal number of livestock units for the village is 629. This means that there is an overstocking of nearly 400% if only grass is taken into account. One reason to explain this situation is that trees and shrubs play a very important role to supply fodder for the animals in the area. Species such as *Terminalia sericea* and *Combretum appiculatum* show good qualities as browsing material in terms of palatability and availability in the forest areas of the village. Other reason that explains the big number of livestock units owned by the Ontanda farmers is illustrated in Map No. 4: The transhumance patterns take place towards areas with lower livestock density. In other words, it means that the cattle move from Ontanda to other areas where fewer animals are grazing. In that sense, cross border grazing is an advantage for Ontanda farmers. It is recommended to:

- Discuss this situation with the farmers in order to prepare a sensible integrated management plan for communal grazing areas, including by-laws to regulate equity to access and benefits from these areas.
- Avoid any kind of development in the village and surrounding areas that will mean only addition of more livestock in an already overstocked grazing area, but to look towards alternatives for recovery of the grazing land and improvement of its carrying capacity. The collaboration with agriculture extension officers to approach and advise farmers in this regard is very important.

5.4 More than half of the grass biomass existing in the village present good grazing characteristics and value in terms of palatability and animal utilization. The most common grass species found in Ontanda is *Schmidtia kalahariensis*, which represents 31% of the veld composition. This species shows a reasonable medium grazing value as a fodder in dry condition, especially the inflorescences, which are particularly nutritive. However, its presence is a clear indicator of veld deterioration. It is recommended to:

- Identify areas where enrichment grass planting may prove adequate, using valuable species already growing in the village and/or other species with good qualities and fodder potential for the current ecological conditions.
- Promote the establishment of grasses at household level as additional fodder banks to sustain dairy cows for milk production.

5.5 There exist 30 wells and 5 boreholes in the village, which are used for both, human consumption and quenching of the livestock. Although the number and quality of water sources seems adequate for livestock management, the water quality for human consumption is generally poor. Regarding water disposal, nearly all water from washing and cooking is thrown away, especially the bathing water. It is recommended to:

- Develop and promote simple structures for water filtration, using charcoal or activated charcoal -as the main cleaning agent- and metallic drums. It has been recognized that activated charcoal shows enhanced adsorptive powers, which are currently used in purification of drinking water and treatment of sewerage and wastewater.
- Encourage farmers to grow fruit trees at household level, planting them close of the wastewater sources, and using especially the bathing water, which shows better qualities for tree growing activities.

6 REFERENCES

AWUDU, S.Y., 1999 Interim reports on projects being carried out in the Department. Ogongo Agricultural College. 15 pp.

MUELLER, M.A.N., 1984. Grasses of South West Africa / Namibia. John Meinert, Windhoek, 287 pp.

SWEET, J., & BURKE, A., 1998. A manual for resources survey and mapping in NOLIDEP Pilot Communities. NOLIDEP, Ongwediva, Namibia, 52 pp.