## **FINAL REPORT**

## Survey development and implementation in preparation of a De-bushing Advisory Service (DAS)

May 2015







#### DISCLAIMER, PERMISSIONS AND RIGHTS

This work is a product of the authors of the study carried out on behalf of the GIZ. The findings, interpretations and conclusions expressed in this report do not necessarily reflect the views of the GIZ. Also, the scope of the research was set in such a manner that it presents the results from a questionnaire survey and a stakeholder workshop.

This work is copyrighted and licensed under a Creative Commons License. Any part of this publication may be reproduced for educational or non-commercial purposes provided the source is acknowledged. No part of this publication may be used in any form for commercial purposes without the prior written consent of the copyright holder.

Permission to distribute or reproduce content from this report must be obtained from the Team Leader, Mr Frank Gschwender, GIZ – Debushing Project. Windhoek, Namibia, email to frank.gschwender@giz.de.

#### CO-ORDINATION OF THE CONSULTANCY:

Coordination of the consultancy was undertaken by **Dagmar Honsbein**, General Manager: Agra ProVision (formerly known as Agra Professional Services).

#### CONTACT DETAILS:

Dagmar Honsbein **Physical Address** 8 Bessemer Street Windhoek Tel: +264 61 290 9249 Fax: +264 61 290 9345 Email: dagmarh@agra.com.na

Postal Address Private Bag 12011 Windhoek NAMIBIA

### **Executive Summary**

Bush encroachment of farmland in Namibia, whether commercial, resettlement or communal, has been recognized as an area requiring priority attention, given its impact on land productivity and grazing capacity (NDP4, MAWF). Efforts to reclaim land through bush clearing activities have been undertaken by some, using chemical, mechanical and biological methods. The benefits of bush clearing to rangeland and consequently to livestock productivity have been demonstrated, yet despite this comparatively few land users in affected areas have made an effort to undertake bush clearing.

The German development organization "Gesellschaft für Internationale Zusammenarbeit" (GIZ) thus launched a debushing project in Namibia in November 2013, in cooperation with the Directory of Forestry of the Ministry of Agriculture, Water and Forestry. The project aims to promote sensible bush control practices and sustainable rangeland management to further livestock production in commercial and communal farming areas of Namibia. As part of this project, the development of a De-bushing Advisory Service is envisaged, to strengthen existing efforts to create further awareness of, and provide advice and support to land users negatively affected by bush encroachment.

This report presents the results of a survey undertaken among farmers to help identify the advisory needs, including insight into the extent of current and past bush clearing activities, and the perceived success; an assessment of the degree to which farmers have engaged in value addition/bush processing activities; the use of existing extension services; preferred channels/methods of communication and service delivery; and farmers' bush clearing and value addition advisory needs. Based on the results of the survey, a recommendation is made on the organizational structure and form that such an advisory service should take.

In total, 361 responses were received and analysed, of which 106 (29.4%) came from commercial farmers, 65 (18%) from resettlement farmers, and 190 (52.6%) from farmers in communal areas. The principle land use of all respondents was cattle production (93.4%), which for commercial and resettlement farmers is primarily for commercial purpose, but for communal farmers principally for own use.

The majority (86.4%) of respondents were aware of the concept of bush encroachment, and of these, the vast majority indicated that they are affected by bush encroachment (88.8%), with the highest proportion being among commercial farmers (94.0%). Some form of bush clearing activity by those with bush encroachment has been undertaken by 76.5% of commercial farmers, but significantly less resettlement farmers (27.7%) and communal farmers (30.1%). The major reasons selected for not undertaking bush clearing was a lack of suitable equipment and/or financial resources.

Among those who have undertaken bush clearing/thinning activities, manual spraying of arboricides is the most frequent method, primarily by commercial farmers. Manual cutting is the next most frequently reported method overall, but the primary method on resettlement and communal areas.

Only 34.9% of respondents who undertook bush clearing activities reported having used the resulting biomass (12.2% of all respondents), and only 21 respondents utilized the biomass for commercial purposes. The predominant commercial use reported was for charcoal production with other uses reported being firewood, fodder, droppers/poles and compost.

Regarding advisory services received to date, only 26% of all respondents indicated having received advice on bush encroachment in the past, and the main sources have been from the private sector and Ministry of Agriculture, Water and Forestry. Among those that reported having undertaken bush clearing activities, the level of satisfaction with the outcome was not significantly different between those who had received advice and those who said they had not. This would suggest that the advisory services have not added value, however, the fact that persons have undertaken activities suggests that they knew they had a problem, and did something about it applying a method – and most likely had heard about or investigated options – but were unable to attribute such knowledge to a particular source or intervention.

When selecting priority topics for advice, respondents ranked information on bush control (methods) highest, followed by bush encroachment (assessment and ecology) and after care. Resettlement and communal farmers generally ranked topics higher than commercial farmers, suggesting a greater need for advisory services.

Just over half (51%) of respondents indicated that they are comfortable receiving advice in English (and a further 24.1% of respondents did not respond to this question). That left 24.9% of respondents who were not comfortable with English and chose Afrikaans, Otjiherero or Oshiwambo as their preferred language. Preferences for channels for receiving information differed between the categories of farmers, with commercial farmers preferring the use of email and website based information, and resettlement and communal farmers preferring more practical and face to face interactions such as training courses, workshops and demonstrations sites. Resettlement farmers also selected mentoring/coaching and sms, the former most likely due to their exposure to the Farmers Support Project.

Based on the results from the survey, and the inputs from a stakeholder workshop, it is recommended that the DAS should focus on becoming the repository for information, and focus activities on providing the framework and tools for existing extension services, as well as becoming a broker of information and access to financial and technical support. Advisory services to farmers should still be channelled through existing extension service structures, but these should be strengthened in the field of bush encroachment and bush control through training and information on the entire value chain (including marketing and distribution). The DAS should thus consist of a small and focussed core group of staff, under an institutional home in either the private sector or a Parastatal organization that will ensure the sustainability and continuity beyond the lifespan of the GIZ funded De-bushing programme.

### **Table of Contents**

Еx	Executive Summaryiii					
Та	Fable of Contentsv					
Ac	ronym	S	.vi			
Li	st of ta	bles	.vi			
Li	st of fig	(ures	vii			
1	Terr	ns of reference	.1			
2	Intro	oduction	.2			
3	Met	hodology	.5			
4	Res	ults and discussion	.7			
	4.1	Respondents' characteristics and land use	.7			
	4.2	Perspectives on bush encroachment of the land1	2			
	4.3	Bush clearing activities1	17			
	4.4	Bush biomass utilization	25			
	4.5	Advisory services needs	28			
	4.6	Communication channels	32			
	4.7	Stakeholder workshop	39			
5	Sum	nmary and Recommendations4	12			
	5.1	The questionnaire-based survey4	12			
	5.2	The stakeholder workshop4	15			
	5.3	Recommendation on organizational aspects of DAS4	15			
	5.4	Mandate / portfolio of DAS4	17			
	5.5	Way forward5	50			
6	Refe	erences5	52			
7	Ann	exes5	53			
	Annex	1: De-Bushing Advisory Services Questionnaire				
	Annex	2: Travel undertaken for collecting DAS questionnaires				

Annex 3: List of workshop participants

### Acronyms

BE	Bush encroachment
BPG	Biomass Producers' Group
DAPEES	Directorate of Agriculture Production, Engineering and Extension Services, MAWF
DAS	De-bushing Advisory Services
DoF	Directorate of Forestry, MAWF
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
MAWF	Ministry of Agriculture, Water and Forestry
MITSD	Ministry of Industrialisation, Trade and SME Development
NAU	Namibia Agricultural Union
NBII	Namibia Business Innovation Institute
NCCI	Namibia Chamber of Commerce and Industry
NDC	Namibia Development Corporation
NDP4	National Development Plan 4
NRMBEF	Namibian Rangeland Management and Bush Encroachment Forum
QGIS	Quantum Geographich Information System
SME	Small and Medium Enterprise
SVCF	South of the veterinary cordon fence

### List of tables

Table 1 Land tenure category of respondents to DAS questionnaire7
Table 2 Analysis of the three major land uses (cattle, goats and sheep) reported by all
respondents to the DAS questionnaire9
Table 3 Analysis of the three major land uses (cattle, goats and sheep) reported by only
respondents who indicated they have bush encroachment10
Table 4 Awareness and presence of bush encroachment13
Table 5 Main encroacher species recorded by respondents    15
Table 6 Analysis of responses from DAS questionnaire, showing numbers of those affected by
bush encroachment who have and have not undertaken bush clearing activities
Table 7 Main reasons selected by those respondents who said they were affected by bush
encroachment, but have not undertaken any bush clearing activities (multiple reasons could be
selected)19
Table 8 Table indicating the use of various bush clearing methods by respondents who have
undertaken some form of bush clearing20
Table 9 Years in which respondents undertook bush clearing according to different methods21
Table 10 Table indicating the use of various aftercare methods by respondents who have
undertaken some form of aftercare22

Table 11 Satisfaction with bush clearing activities undertaken	23
Table 12 Costs of bush clearing activities undertaken	23
Table 13 Utilization of bush biomass by respondents who indicated they have un	dertaken bush
clearing	25
Table 14 Table summarizing the responses of those who indicated they had ut	ilized the bush
biomass	25
Table 15 Respondents who used bush biomass for commercial purposes	26
Table 16 Summary of responses related to commercial charcoal production	27
Table 17 Summary of responses related to commercial firewood production	27
Table 18 Summary of responses related to commercial fodder, dropper/pole	and compost
production from bush biomass	28
Table 19 Table showing breakdown of respondents who indicated that they have	in the past or
are currently receiving advisory services on bush encroachment	29
Table 20 Table showing the breakdown of category of service providers to res	spondents who
indicated that they have in the past or are currently receiving advisory ser	vices on bush
encroachment	29
Table 21 Comparison of satisfaction from bush clearing activities between those	who indicated
they had received advice, compared to those who indicated they had not received	specific advice.
	30
Table 22 Table showing the advisory service needs, as indicated by questionnaire r	espondents 30
Table 23 Analysis of respondent's language preferences	32
Table 24 Preferred newspapers, radio stations and agricultural publications	37
Table 25 Summary of responses regarding willingness to contribute financial	ly for advisory
services	38
Table 26 Average ranking of priority given by respondents for advisory service	s according to
topics	38

## List of figures

Figure 1 Map of Namibia showing the area of major focus for the DAS questionnaire survey
recorded areas with bush encroachment based on literature of areas surveyed)6
Figure 2 Map showing the distribution of completed questionnaires received
Figure 3 Distribution of respondents who recorded cattle as a land use, indicating herd sizes
ecorded
Figure 4 Distribution of respondents who recorded goats as a land use, indicating herd sizes
ecorded11
Figure 5 Distribution of respondents who recorded sheep as a land use, indicating herd sizes
ecorded11
Figure 6 Distribution of respondents who indicated that they undertake some form of cropping
dry-land and irrigated)12

Figure 7 Distribution of respondents who indicated they are aware of bush encroachment vs those who said they were not......14 Figure 8 Map showing distribution of respondents who consider their land affected or partly affected by bush encroachment, and those who say their land is not affected ......14 Figure 9 Distribution of respondents who said their productivity is affected by bush encroachment......15 Figure 10 Distribution of the six most common encroacher species, as identified by respondents Figure 11 Map showing perceptions of respondents over the trend in bush encroachment over the past ten years......17 Figure 12 Map showing respondents who have undertaken bush clearing activities, and those Figure 13 Map showing distribution of the four most common bush clearing methods recorded by Figure 14 Number of respondents who indicated the cost of bush clearing within specified cost Figure 15 Distribution of respondents who indicated they are comfortable with English vs those Figure 16 Analysis on access to communication media by commercial, resettlement and Figure 17 Graphics showing the respondents' preferences for advisory services communication Figure 18 Graph showing an indication of media used regularly (at least weekly) by commercial, Figure 20 Mind map showing the proposed focus for the De-bushing Advisory Service, where green denotes responsibility of DAS core staff, and purple those activities that lend themselves 

### 1 Terms of reference

The objective of this assignment was to undertake a qualitative survey of a selected farmers' group, which would identify the advisory needs of the farmers by establishing the following:

- a) Identify the extent of current and past de-bushing activities (size of area affected and treated, methods used including after care, sources of funding, stakeholders/service providers involved if any) in communal and commercial areas.
- b) Evaluate the perceived success of these de-bushing activities (satisfaction with the outcome, efficiency of the method and possible side effects) as well as the major challenges (factors hindering an up scaling of the de-bushing activities)
- c) Assess in how far farmers engage/have engaged in value addition/bush processing activities (products, quantity, sales channels and markets, technology/machinery used)
- d) Evaluate the farmers' experience with existing extension services (number of farmers that have made use of these services and their satisfaction; type and format of services used; elaborate on the relation between received information/service and the success of current/past de-bushing and value addition activities, i.e. impact)
- e) Based on the farmers' responses, establish the effectiveness of existing extension services and identify major bottleneck/shortcomings
- f) Based on the above, identify farmers' de-bushing and value addition advisory needs (including training and mentoring), distinguishing between selected categories (e.g. commercial vs. communal farmers, farmers with de-bushing experience vs. farmers without such experience)
- g) Identify the farmers' preferred channel/method of communication and service delivery (e.g. web-based, telephone hotline, on-farm advisory service, central/regional offices, printed information, events & workshops)
- h) Based on the information acquired from the farmers, provide brief recommendations towards a suitable service portfolio (function) as well as organizational requirements (e.g. communication channels, format of information) for a future DAS

The results of the assignment were used to guide strategic decisions about the establishment of an information sharing and capacity building platform, advising farmers on sustainable debushing activities and value addition opportunities on their farms. In particular:

- a) Advisory needs of farmers on bush control and their expectations;
- b) Propose farmer categories with similar advisory needs (e.g. Communal, commercial, game farming, experienced in de-bushing, inexperienced etc.)
- c) Make recommendation towards customized advisory service and information packages;
- d) Make recommendations towards organizational aspects of the DAS (e.g. Communication channels, integration with existing services)

### 2 Introduction

Namibia is affected by bush encroachment on a broad scale. Bush encroachment is said to lower the productivity of the land and its grazing capacity by more than two-thirds, and to severely reduce biodiversity and the formation of groundwater. As a consequence, this causes economic losses to the country.

However, encroacher bush is also potentially a significant biomass resource, estimated at more than 200 million tons and growing each year. Measures to counter bush encroachment create new opportunities for Namibia through, for example:

- the use of bush biomass for electricity generation and other value chains;
- job creation in harvesting, processing and logistics; and
- industrial diversification.

Thus, control of encroacher bush offers the potential to increase ranching productivity, increased energy supply, employment creation and economic growth.

Efforts have been made by some land users to curb the invasion and reclaim the land, using chemical, mechanical and biological methods. These somewhat experimental individual efforts eventually lead to the formation of the Bush Utilization Association in 1998. According to De Klerk (2004), this association had two main objectives: 1) to reclaim agricultural land with a view to utilizing it in a sustainable manner, and 2) to utilize invader bush in an economically viable way.

At the same time, Bester (1999) published a map showing the major problem areas, species and densities. Since then, several studies have re-mapped some or all of these parameters. However, these have generally tended to be limited in scope, producing detailed site specific data. A notable exception is the work done by Lubbe (2013) who conducted extensive field surveys to extend Bester's map to include bush encroached areas in the south of the country.

In recent years, efforts have been made by some larger corporations such as Ohorongo Cement, to make use of woodchips produced from encroacher bush as a source of fuel. Approximately 5,000 hectares of bush encroached areas are cleared per annum, within a radius of approximately 75 km from the cement factory. This can act as an example that can be replicated in other areas of Namibia, involving other industries, to create an incentive for addressing the bush encroachment dilemma.

It is one of Namibia's declared priorities to control encroacher bush (vide NDP4); a programme supported by stakeholders in the public and private sectors. The German Cooperation through its international collaboration agency the GIZ (Gesellschaft für Internationale Zusammenarbeit) is supporting bush control and bush value chain creation through a four-year project "Support to De-Bushing", started in 2014 and partnered by the Ministry of Agriculture, Water and Forestry (MAWF), specifically its Directorate of Forestry (DoF). The overarching project goal is that the Namibian capacities of mobilizing resources for biodiversity conservation on the basis of an

economic valuation of ecosystem services and its mainstreaming into national governance processes have been improved and applied sustainably. The project reasons that the identification and development of opportunities for adding value to bush biomass will enhance bush control in economically viable and environmentally sustainable ways. Project activities hence focus on support measures and on efforts to create an enabling environment, such as:

- Developing strategies for the profitable use of biomass for electricity generation and in agricultural and industrial value chains (e.g. bush fodder and for construction, respectively);
- Enhancing know-how and institutional capacities for the successful development of a national bush control programme; and
- <sup>6</sup> Improving the legal and institutional framework for large-scale bush control projects.

The expected results of the €4 million "Support to De-Bushing" project include:

- Restoration of the grazing capacity of farmland, substantially increasing its productive capacity;
- Employment creation, especially in rural areas that offer few employment opportunities;
- Local value addition in support of the Growth at Home policy and on the basis of a domestic raw material resource with development opportunities for the SME sector; and
- Increasing energy self-sufficiency by substituting imported fossil fuels with renewable and CO<sub>2</sub>-neutral energy sources.

#### The De-Bushing Advisory Service

An important capacity-building aspect of the project is to bring about a "de-bushing advisory service" (DAS) to address the knowledge and information needs of farmers interested in bush control on their farmland, operators of and investors in bush biomass processing machines and plants, and biomass product buyers from domestic and international markets. The DAS should aim to overcome the organizational and geographic fragmentation of the bush biomass sector and is the overarching scheme within the De-Bushing project that links its individual components together and bundles knowledge. It will cooperate with stakeholders to evaluate and optimize harvesting technologies such as chemical and mechanized bush clearing. A special focus will be to develop labour-based approaches to bush control which allow for economically viable and socially fair operations. An integral part of the DAS will be a Bush Information System designed to include spatial, ecological and socio-economic data and supporting planning (e.g. prioritizing regional bush control projects) and monitoring (e.g. impact of bush control). It should generate baseline data and analytical tools quantifying bush encroachment, the resulting land degradation and the biomass resource potential to promote a coherent sector policy.

It is not the intention that the DAS should compete with existing institutional advisory, training and mentoring services that serve communal and commercial farmers in Namibia, described in the 2014 Project Baseline Report. These services provide general agricultural advice but are not focused exclusively on bush control and bush biomass utilization. Their market penetration is

perceived to be high, especially via vernacular radio services and also in remote, communal areas and they may reach 80% of farmers with their message. One of these existing advisory services, the AgriBank/GIZ Farmer Support Programme can serve as an analogue service to DAS and was used to quantify project indicators for DAS. Accordingly, DAS should reach 16% of farmers in the project areas defined for the De-Bushing project with a variety of extension media. Various qualitative aspects were added to this quantitative indicator to enhance the quality and reach of DAS for farmers and biomass users and to effectively connect the supply and demand of encroacher bush and its products.

Based on case studies on a large number of commercial farms, De Klerk (2004) indicated that carrying capacities can double and even triple once bush control has been carried out. There is however a balance to be reached. Grass production will increase with increasing bush densities until a critical state, where after further increases will seriously suppress the productivity of rangelands and livestock (De Klerk, 2004). Total clearing is however to be avoided, and bushes should only be thinned to a desirable number per hectare (De Klerk, 2004). Despite the benefits of bush clearing to rangeland and consequently to livestock productivity being demonstrated, comparatively few land users in affected areas have made an effort to undertake bush clearing. This survey aimed to gain a better understanding of the factors that influence the decisions by farmers to clear bush, or not; as well as a better understanding of the information needs of farmers which would assist them to embark on bush clearing activities. In accordance with the objectives of the De-Bushing Project, farmers' interest in utilising the cleared bush will also be gauged and the advisory needs that would stimulate bush extraction and utilisation determined.

The beneficiaries include all land users, whether commercial or communal, who are affected by bush encroachment. Stakeholders include a broader sector of the economy that can potentially benefit from the downstream economic utilization of biomass harvested from bush clearing activities. Figure 1 provides a map showing the areas identified as affected by Bester (2010) to be affected by bush encroachment. However, the large areas covered by the species/density classes assume a homogeneity which does not exist in nature, and the areas cover only those areas in which field work has taken place.

### 3 Methodology

Following initial consultations with the client, a questionnaire survey form was developed and agreed, as provided in Annex 1. Experience has shown that questionnaires distributed through mass communication do not necessarily result in timely and representative returns, and for this reason it was recognized that a guided survey approach would also be applied.

The questionnaire was designed, based on the information required to be able to understand the current status of bush encroachment, debushing activities; perceptions from farmers; and to inform the advisory needs of farmers on bush control and their expectations. The questionnaire was divided into the following sections:

- Section 1: Background details gathered information on the respondent; the land unit in question; the type of land tenure; and land use activities.
- Section 2: Bush encroachment covered the presence or not of bush encroachment; the species involved; the perceived trends; and whether or not bush clearing activities have taken place.
- Section 3: Bush clearing activities was only to be answered by those respondents who indicated they had undertaken bush clearing activities, and gathered information on methods and extent; costs; and perceptions on impact.
- Section 4: Bush biomass utilization to be answered only by those respondents who indicated they had utilized the biomass from bush clearing activities – and aimed to get more information of the uses, the volumes and purpose of use.
- Section 5: Advisory services gathered information on existing advisory services received, and advisory service needs. It also asked about perceptions on economic potential of various value chains.
- Section 6: Communication channels aimed to get a better understanding of the preferred communication channels of respondents. It also included a section on prioritization of information needs.

#### Data Collection

The 'farmer' target groups for the survey included commercial, resettlement and communal farmers. Questionnaires were distributed through available electronic media, including the Agra ProVision and NAU websites, and through emails to existing contact lists including agricultural unions and farmers associations.

Existing opportunities where a group of farmers were gathered were used to distribute questionnaires and apply a guided questionnaire approach. These opportunities included a series of training courses given to resettlement farmers; farmer association meetings; and information days held by MAWF extension services. Questionnaires were also availed at Agra Retail outlets.

Advertisements were published in the printed media to alert interested parties to the questionnaire, and providing details of where the questionnaire could be obtained.

Finally, specific travel was undertaken as outlined in Annex 2, to reach out directly to the farming communities, and collect more questionnaires.

#### Data capture

Data capture was undertaken using Microsoft Excel.

#### Data analysis

Microsoft Excel was used to conduct the analysis of the data, and developing the graphical representation of results. In addition, data was imported into QGIS for mapping purposes.

#### Stakeholder workshop

The preliminary results of the survey were presented at a stakeholder workshop on 31 March 2015 (Annex 3 provides the list of participants).

The conclusions and recommendations presented in this report are based on the analysis and outcome of the stakeholder workshop.





### 4 Results and discussion

A total of 364 questionnaire responses were received, three of which had to be disregarded due to insufficient information completed. The following results and analysis are thus based on the remaining 361 questionnaire responses that had been received at the time of data analysis (Figure 2), although subsequently a few more responses have been received.



#### 4.1 Respondents' characteristics and land use

67

Table 1 provides a breakdown of the land tenure categories of respondents to the DAS questionnaire. Freehold and resettled farmers together made up 47.4%, whilst 52.6% of responses were received from farmers in communal areas.

Table 1 Land tenure category of respondents to DAS questionnaire

	Number of respondents in category (% of total)	Number that provided area (% of respondents in category)	Total area	Average land unit size (ha)
Total number of respondents	361			
Free hold	106 (29.4%)	88 (83.0%)	540 622	6 143
Resettled	65 (18.0%)	54 (83.1%)	160 682	2 976
Communal	190 (52.6%)	37 (19.5%)	87 715	2 371

The average size of the farming area of 6,143 ha of the 88 relevant responses from commercial farmers well exceeds the 5,000 ha commonly taken as the average commercial farm size. Similarly, the average farm size of 2,371 ha of the 37 communal respondents who provided inputs on this question well exceeds what is normally taken as an "average" landholding in communal areas; viz. about 20 ha of individual-owned fields and open access to grazing lands in excess of 10,000 ha. If the 2,371 ha can indeed be relied upon to indicate individually-controlled communal grazing land, it indicates access to a sizeable farm that should certainly be able to earn the owner a comfortable living if it were operated according to accepted commercial production practices, considering that these farms are predominantly in the better-endowed east and north of the country.

The predominant land use in the three categories of land tenure is cattle production (93.4%) (Figure 3, Table 2). In commercial and resettlement farms, cattle production is primarily for commercial use, in contrast to communal farming where it is primarily for own use. Average herd sizes are significantly higher on commercial farms (412 animals) compared to resettlement and communal farmers (56 and 87 respectively).



Table 2 Analysis of the three major land uses (cattle, goats and sheep) reported by all respondents to the DAS questionnaire

	Overall	Commercial	Resettlement	Communal
Total number	361	106	65	190
Cattle				
Number of farmers	337 (93.4%)	94 (88.7)	60 (86.3%)	183 (96.3%)
Total number of cattle	57 872	38 747	3 364	15 841
Average number of cattle	172	412	56	87
Purpose				
Commercial	97	57	28	12
Own use	98	9	6	83
Both	16	1	4	11
Goats				
Number of farmers	259 (71.7%)	41 (38.7%)	56 (86.4%)	162 (85.3%)
Total number of goats	22 666	6 151	5 858	10 657
Average number of goats	88	150	105	66
Purpose				
Commercial	39	17	13	9
Own use	75	8	7	60
Both	15	1	6	8
Sheep				
Number of farmers	197 (54.6%)	35 (33.3%)	45 (68.2%)	117 (61.6%)
Total number of sheep	33 792	16 674	8 023	9 095
Average number of sheep	172	476	178	78
Purpose				
Commercial	33	15	13	5
Own use	69	9	7	53
Both	8	0	4	4

Goat production was reported by 71.7% of respondents, but more frequently reported by resettlement (86.4%) and communal farmers (85.3%) (Table 2, Figure 4). The largest average herds are held by commercial farmers (150), followed by resettlement farmers (105) and communal farmers (66).

Sheep production was reported by 54.6% of all respondents, but most common in resettlement farms (68.2%) (Table 2, Figure 5). Again for small livestock, in commercial and resettlement farms the primary purpose is commercial production, whilst on communal land production is primarily for own use (Table 2).

 
 Table 3
 Analysis of the three major land uses (cattle, goats and sheep) reported by only respondents who
 indicated they have bush encroachment

l number	94	47	136
e			
mber of farmers	86 (91.5%)	44 (93.6%)	131 (96.3%)
al number of cattle	37 534	3 633	13 338
erage number of cattle	436	83	102
rpose			
Commercial	55	24	10
Own use	8	4	67
Both	1	3	9
S			
mber of farmers	39 (41.5%)	39 (83.0%)	112 (82.4%)
tal number of goats	6 031	4 818	7 760
erage number of goats	155	124	69
rpose			
Commercial	16	11	8
Own use	7	6	45
Both	1	3	6
эр			
mber of farmers	34 (35.1%)	30 (66.7%)	88 (64.7%)
al number of sheep	16 546	6 935	8 674
erage number of sheep	487	231	99
rpose			
Commercial	15	11	5
Own use	8	5	42
Both	0	2	4
rpose Commercial Comme	55 8 1 39 (41.5%) 6 031 155 16 7 1 34 (35.1%) 16 546 487 15 8 0	24 4 3 39 (83.0%) 4 818 124 11 6 3 30 (66.7%) 6 935 231 11 5 2	10 67 9 1112 (82.4%) 7 760 69 8 45 6 88 (64.7%) 8 674 99 5 42 4



In general, average herd sizes are greater in the areas affected by bush encroachment. This is most likely related to higher carrying capacity linked to higher rainfall areas.

Far fewer respondents indicated that they practice dry-land or irrigated cropping, and those that do are situated within the higher rainfall area, as would be expected (Figure 6).



**Figure 6** Distribution of respondents who indicated that they undertake some form of cropping (dry-land and irrigated)

#### 4.2 Perspectives on bush encroachment of the land

The awareness of bush encroachment (Table 4) is similar between commercial (94.3%) and resettled farmers (90.8%), which can be expected because both are exposed to the same sources of information that have been sounding this warning for decades now. Amongst communal farmers awareness is lower (76.8%) as they probably have been less exposed, or only more recently exposed, to the bush encroachment message. However, as far as perceiving the problem on one's own farm is concerned (also Table 3), resettlement farmers are on par with communal farmers in stating that about 28% do not have bush encroachment on their farm. This may be due to different values attached to encroacher bush and different farming systems:

- many resettled farmers (86%) have large goat herds (few commercial farmers do) that utilize the bush intensively and often open up a bush-encroached savanna, or prevent reinfestation after bush clearing efforts
- communal and resettlement farmers tend to use more wood from encroacher bush on their farms, e.g. collection of firewood, wooden poles used for kraal- and home-building etc., which uses more wood than on commercial farms.

This implies that communal and resettlement farmers attach more value to encroacher wood than commercial farmers even before value chains are added, which has serious implications for the advisory message that should reach the different farming tenures. This is in line with the general observation that wood has more inherent value to and many more different uses for communal than for commercial farmers.

	Overall	Commercial	Resettlement	Communal
Aware of bush encroachment				
Number of farmers:	361	106	65	190
Yes	312	100	59	153
No	32	1	4	27
No answer	18	5	2	11
% of all responses	86.4%	94.3%	90.8%	76.8%
Have bush encroachment				
Number of farmers aware:	312	100	59	153
Yes	277	94	47	136
No	35	7	11	17
No answer	2	1	1	0
% of those aware	88.8%	94.0%	79.7%	88.9%
% of all responses	76.7%	88.7%	72.3%	71.6%
Productivity affected				
Number of farmers:	277	94	47	136
Yes	246	85	36	125
No	12	6	6	0
No answer	17	1	5	11
% of those with BE	88.8%	94.4%	76.6%	91.9%
% of all responses	68.1%	80.2%	55.4%	65.8%

Table 4 Awareness and presence of bush encroachment

The last observation can also be expressed differently: as many resettled farmers, like their communal contemporaries, utilize encroacher wood as a matter of farming routine for their goats, for firewood and building of structures and kraals, they perceive it to be less of a problem and more of a beneficial resource than the average commercial farmer, who is more likely to be connected to the electrical grid and builds with concrete rather than with wood. Any advisory service should take cognizance of different values attached to bush and nuance its extension message accordingly.

Figure 7 indicates that most of the respondents who said they are not aware of BE are from the semi-arid north-west. In the north-west, BE is by no means less than elsewhere but the wood itself tends to be less (in diameter and yield), thus being a smaller, more limited resource than in

higher rainfall areas. It is thus more appreciated and perceived as less of a problem in the semiarid north-west, compared to other parts of Namibia.





Survey development and implementation in preparation of a De-bushing Advisory Service (DAS)

614

Figures 8 and 9 show those respondents who consider their land to be affected by bush encroachment, and who are negatively affected by bush encroachment. Greater awareness of bush encroachment seems to be related to those affected by it (i.e. in areas south of the veterinary cordon fence (SVCF)).



Table 5, on woody species that are considered to be a problem tallies with scientific information on the most important encroaching woody species, as does the distribution of problematic species according to farmers in Figure 10, although there are a couple of incidences of unlikely distribution. These can probably be put down to farmers not being botanists and thus unable to distinguish between some of the Acacia and Rhigozum species which look very much alike (e.g. *Rhigozum trichotomum* occurring in northern Namibia is most likely *Rhigozum brevispinosum*).

Table 5 Main encroacher species recorded by respondents

Species	Number of respondents	% of all respondents
Acacia mellifera	236	65.4%
Acacia reficiens	119	33.0%
Dichrostachys cinerea	117	32.4%
Colophospermum mopane	47	13.0%
Rhigozum trichotomum	38	10.5%
Terminalia sericea	31	8.6%



Figure 10 Distribution of the six most common encroacher species, as identified by respondents

Figure 11 shows that only 4% of respondents think that BE is a receding problem over the last decade. Even those in the semi-arid north-west who earlier indicated that BE in their area is not a big problem indicate that it is increasing in severity. This observation confirms newest scientific information that BE in Namibia is expanding in terms of the area occupied (much more than the 26-30 million hectares assumed to be affected in the 1980's, as quoted by De Klerk, 2004) and density.



It appears that there is wide-spread awareness of the BE problem and the threat it poses to farm productivity, irrespective of geographical distribution of farmers or their tenure system. Views appear to diverge when it comes to grading the threat, with commercial farmers seeming to have much less use for encroacher bush than resettlement and communal farmers.

#### 4.3 Bush clearing activities

Whereas awareness of BE was high amongst all respondents groups, Figure 12 and Table 6 indicate that there is a huge gap in bush clearing activities based on tenure. Two-thirds of commercial farmers engaged in bush clearing activities prior to the survey but only about one-fifth of resettled and communal farmers did. If farmers of different tenure groups were equally aware of the BE problem and presumably equally eager to fight it, the huge difference in prior control activities might reflect differing value judgment of the problem (previous section 5.2) and different access to means of control (including knowledge and finance). More than half of all resettled and communal farmers have never undertaken bush clearing before, indicating a narrow experience base.

**Table 6** Analysis of responses from DAS questionnaire, showing numbers of those affected by bush

 encroachment who have and have not undertaken bush clearing activities

	Overall	Commercial	Resettlement	Communal
Undertaken bush clearing (of those with bush encroachment)	277	94	47	136
Number of farmers:				
Yes	126 (42.3%)	72 (76.5%)	13 (27.7%)	41 (30.1%)
No	125 (41.9%)	12 (12.8%)	30 (63.8%)	83 (61.0%)
No answer	61 (20.5%)	10 (10.6%)	4 (8.5%)	12 (8.8%)
Yes as % of total respondents	34.9%	67.9%	20.0%	21.6%



For a problem of which more than 90% of all farmers are aware of and most perceive it as a threat to their productivity (Table 4), there is an unusually large proportion of farmers amongst all tenure groups who did not want to venture an answer to a simple "yes or no" question at all (Have you undertaken any bush clearing activities? Not answered by 15-24% of respondents in Table 6). This is an astounding lack of response that hopefully does not reflect farming inertia.

Table 7 indicates some of the reasons why respondents who are affected by BE did not do anything about it. The majority (46%) indicated that they did not have the resources to tackle BE

# (either equipment or finances) while only 18% indicated that they didn't know how to and 17% thought it too labour-intensive.

**Table 7** Main reasons selected by those respondents who said they were affected by bush encroachment,but have not undertaken any bush clearing activities (multiple reasons could be selected)

Reason for not doing bush clearing	% of all respondents	Commercial	Resettlement	Communal
I don't have the equipment required	23%	19%	27%	23%
I can't afford to do it	23%	26%	27%	22%
Too labour intensive	17%	29%	13%	17%
I didn't know how to do it	9%	3%	10%	10%
No information available	9%	6%	4%	10%
I don't have the authority over the land	7%	0%	4%	8%
No market for the wood if I clear it	6%	10%	7%	5%
It takes too much time	3%	3%	3%	3%
I didn't even think of it	2%	3%	1%	2%
I didn't see any value in doing it	1%	0%	1%	1%

The high proportion of respondents who lacked resources rather than knowledge to tackle encroaching bush suggests that bush control does not take place three to four times more often for lack of a conducive environment (suitable equipment, finance, labour) rather than for lack of knowledge. Lack of knowledge and awareness seem not to hinder bush control as much as a lack of means. Any DAS should thus incorporate facilitation services to machines, equipment and finance while information transfer should include training on labour management, or even training of bush workers.

Table 8 provides an overview of the bush clearing methods used by those respondents who reported having undertaken bush clearing. It confirms the finding of the Baseline Assessment, viz. the predominance of chemical bush control amongst commercial farmers, as many have the means to apply it. In contrast, resettled and communal farmers prefer manual control methods and burning, which is cheaper especially if the labour is supplied by the extended family.

Table 8 Table indicating the use of various bush clearing methods by respondents who have undertaken some form of bush clearing

Bush clearing methods	Overall	Commercial	Resettlement	Communal
Farmers who have done bush clearing	126	72	13	41
Arboricides (manual spraying)	53 (42.1%)	48 (66.7%)	2 (15.4%)	3 (7.3%)
Arboricides (aerial spraying)	18 (14.3%)	18 (25.0%)	0 (0.0%)	0 (0.0%)
Manual cutting	50 (39.7%)	18 (25.0%)	5 (38.5%)	27 (65.9%)
Semi-mechanical	4 (3.2%)	3 (4.2%)	0 (0.0%)	1 (2.4%)
Mechanical	13 (10.3%)	11 (15.3%)	0 (0.0%)	3 (7.3%)
Burning	9 (7.1%)	2 (2.8%)	0 (0.0%)	7 (17.1%)



Figure 13 Map showing distribution of the four most common bush clearing methods recorded by respondents

Survey development and implementation in preparation of a De-bushing Advisory Service (DAS)

The geographic distribution of bush control methods (Figure 13) is instructive, especially for aerial chemical control. This method is generally assumed to be highly unselective and kills off all woody species (except a few tolerant ones such as *Boscia* spp. and the makalani palm). From Fig. 13 it is clear that this method was used widely in the Outjo district, potentially killing off a lot of the protected species *Colophospermum mopane* unselectively, and in the Gobabis district, potentially killing off a lot of the protected species *Acacia erioloba* unselectively. Although these protected species may become encroaching in these districts, their indiscriminate erasure from the landscape is certainly not a desirable outcome of donor-funded bush control. DAS will have to investigate the suitability of unselective bush control methods to avoid unintended environmental damage.

Year	Arboricides (manual spraying)	Arboricides (aerial spraying)	Manual cutting	Semi- mechanical	Mechanical	Burning
<2000	10	4	6	0	1	0
2000	9	1	5	0	1	0
2001	8	1	5	0	1	0
2002	8	1	5	0	1	0
2003	8	1	5	0	1	0
2004	10	2	5	0	1	0
2005	10	2	4	0	2	0
2006	12	2	6	0	1	0
2007	16	2	10	0	1	0
2008	20	1	9	0	2	2
2009	22	2	9	0	2	2
2010	21	4	14	0	1	2
2011	18	2	11	0	2	2
2012	19	6	16	0	1	1
2013	22	5	15	0	2	2
2014	6	1	17	0	3	1
2015 (first quarter only)	10	0	5	0	2	0

Table 9 Years in which respondents undertook bush clearing according to different methods

All methods of bush control showed an up-tick in usage from 2005 onwards (Table 9), which coincides roughly with the time of steep farm price rises which made it more economical again to treat an existing hectare of land against bush rather than to buy a new hectare of farmland. The increase in farmers engaged in manual debushing from 2007 onwards was primarily recorded

amongst commercial farmers. The slump in bush control activities in 2014 seems temporary and without significance/accidental as the tempo picked up again in 2015.

Table 10 confirms another finding of the Baseline Assessment, viz. that only a fraction of commercial farmers applied aftercare control after the initial bush control event. Again, chemicals were the chosen means of aftercare control. Even fewer resettled and communal farmers applied aftercare. It is generally assumed that initial bush control without aftercare is not an effective long-term control strategy and that aftercare has to be applied to treated areas within 3-10 years after initial control, and as required after that.

 Table 10 Table indicating the use of various aftercare methods by respondents who have undertaken some form of aftercare

Aftercare methods	Overall	Commercial	Resettlement	Communal
Farmers who have done bush clearing	126	72	13	41
Arboricides (manual spraying)	23 (18.3%)	21 (29.2%)	2 (15.4%)	0 (0.0%)
Manual cutting	18 (14.3%)	12 (16.7%)	0 (0.0%)	6 (14.6%)
Burning	7 (5.6%)	0 (0.0%)	2 (15.4%)	5 (12.2%)
Grazing	2 (1.6%)	1 (1.4%)	0 (0.0%)	1 (2.4%)

Lack of appropriate aftercare is certainly expected to contribute towards decreased satisfaction of bush control by respondents: the less aftercare (e.g. amongst resettled and communal farmers), the less effective the effort would have been and the greater the dissatisfaction of respondents (Table 11).

Bush control is known to cause a subsequent grass explosion. Accordingly, a vast majority of respondents indicated they had more grass after initial bush control, irrespective of tenure system (Table 11). However, barely half indicated the grass was also better (better and more nutritious species) as most of the time, there is more grass but only of those species already present. Eradicated climax species would require active measures beyond control of competing bushes to increase/become more abundant. This is certainly a topic the DAS should pay attention to.

A surprisingly large proportion of all farmers (irrespective tenure) answered "I don't know" or didn't respond at all to the questions on grass (Table 10). Lack of botanical knowledge may contribute to inadequate evaluation of grass response after bush control and may be another important topic for the DAS.

 Table 11 Satisfaction with bush clearing activities undertaken

	Overall	Commercial	Resettlement	Communal
Farmers who have done bush clearing	126	72	13	41
Satisfied				
Yes	96 (76.2%)	57 (79.2%)	9 (69.2%)	30 (73.2%)
No	25 (19.8%)	13 (18.1%)	4 (30.8%)	8 (19.5%)
Don't know	1 (0.8%)	0 (0.0%)	0 (0.0%)	1 (2.4%)
No response	4 (3.2%)	2 (2.8%)	0 (0.0%)	2 (4.9%)
More grass				
Yes	99 (78.6%)	59 (81.9%)	8 (61.5%)	32 (78.0%)
No	3 (2.4%)	0 (0.0%)	1(7.7%)	2 (4.9%)
Don't know	13 (10.3%)	7 (9.7%)	3 (23.1%)	3 (7.3%)
No response	11 (8.7%)	6 (8.3%)	1(7.7%)	4 (9.8%)
Better grass				
Yes	67 (53.2%)	36 (50.0%)	5 (38.5%)	26 (63.4%)
No	10 (7.9%)	5 (6.9%)	1(7.7%)	4 (9.8%)
Don't know	29 (23.0%)	22 (30.6%)	4 (30.8%)	3 (7.3%)
No response	20 (15.9%)	9 (12.5%)	3 (23.1%)	8 (19.5%)

#### Table 12 Costs of bush clearing activities undertaken

Bush clearing methods	Overall	Commercial	Resettlement	Communal
Farmers who have done bush clearing	126	72	13	41
Number who provided average costs	90	52	9	29
Average costs per ha (N\$)	13 314	16 535	28 324	2 878
Maximum (N\$)	750 000	750 000	200 000	16 000
Minimum (N\$)	100	100	120	145
Average co	sts per ha excluding	the > N\$ 10 000 out	liers (Figure 14)	
Number	83	49	7	27
Average costs per ha (N\$)	1677	1 037	5 131	1943
Source of financing				
Own	113	65	12	36
Loan	5	3	1	1

Of the 126 respondents who controlled bush, only 90 provided some estimates on the cost of control measures (Table 12). Commercial respondents reported that it cost them on average N\$16,535 to control bush on one hectare of land, remembering that they generally prefer chemical control which tends to be the most expensive control method. The cost of bush control by resettled farmers was nearly 72% higher than that of their commercial contemporaries while

communal farmers paid only N\$2,878/ha, which is mainly due to using cheaper methods of control such as manual clearing.

The average cost of bush control per hectare of land reported by commercial respondents exceeds the generally-accepted costs of control of N\$500 - N\$1,500 per hectare as reported in the Baseline Assessment by a factor of 10 to 15. The reported costs are extreme but a lot depends on what costs were taken into account (e.g. labour) and at what unit rate (e.g. is own labour cheaper than contract labour?). The DAS questionnaire did not set out to investigate these financial aspects and while cognisance should be taken that the cost of bush control may have increased steeply recently, the reported average cost per hectare is probably not an accurate reflection of real bush control costs. This is borne out by the reported maximum cost of N\$750,000 per hectare by one commercial respondent, which is most likely the total cost of bush control on the farm but not on one hectare. However, that is what was recorded. The average cost of bush control per hectare on resettled farms was even higher than on commercial farms and is probably even less representative of true costs, while even the relatively cheap price of bush control on communal farms exceeds the generally-accepted costs by a factor of 2 to 3. The only valid deduction seems to be that resettled and communal farmers are probably overpaying for bush control, an outcome likely linked to their inexperience and /or lack of knowledge of the topic. Alternatively that although price per hectare was asked for, that what was reported was total cost.



**Figure 14** Number of respondents who indicated the cost of bush clearing within specified cost clusters.

**1**24

The distribution of the costs of bush control per hectare of land (Figure 14) are instructive, as the graph indicates that most respondents, especially cost-conscious commercial farmers, reported costs that are actually within the generally-accepted price range of N0 - N (1,500 per hectare as reported in the Baseline Assessment. Figure 14 indicates that the average cost/ha reported in Table 12 may have been distorted by a few spurious claims of extremely high costs (or a misunderstanding of the questionnaire's question) in a few isolated incidences. Table 12 provides the average prices when excluding the > N\$ 10 000 outliers in Figure 14: N\$ 1 037 5

for commercial farmers; N\$ 5 131 for resettlement farmers; and N\$ 1 943 for communal farmers.

The small number of respondents who made use of loans (5 out of 118 who answered this section) is believable as the two banks concerned, AgriBank and FNB, did report low market penetration as reported in the Baseline Assessment. Improved market penetration and accessibility of financial instruments should thus be one of the priorities of DAS.

#### Bush biomass utilization 4.4

Only 34.9% of respondents who undertook bush clearing activities reported having used the resulting biomass (Table 13). This translates to only 12.2% of all respondents. In addition, of these, less than half utilized the biomass for commercial purposes (Table 14).

	Overall	Commercial	Resettlement	Communal
Farmers who have done bush clearing	126	72	13	41
Was biomass used?				
Yes	44 (34.9%)	17 (23.6%)	4 (30.8%)	23 (56.1%)
No	70 (55.6%)	50 (69.4%)	6 (46.2%)	14 (34.1%)
No response	12 (9.5%)	5 (6.9%)	3 (23.1%)	4 (9.8%)

Table 13 Utilization of bush biomass by respondents who indicated they have undertaken bush clearing.

Table 14 Table summarizing the responses of those who indicated they had utilized the bush biomass

	Overall	Commercial	Resettlement	Communal
Farmers who utilized biomass	44	17	4	23
Firewood	29 (65.9%)	5	3	21
Own use	24 (82.8%)	4	2	18
Commercial	2 (6.9%)	1	1	0
Both	1 (3.4%)	0	0	1
Charcoal	15 (34.1%)	11	2	2
Own use	1 (6.7%)	0	0	1
Commercial	13 (86.7%)	11	2	0
Both	1(6.7%)	0	0	1
Droppers and poles	6 (13.6%)	3	0	3
Own use	3 (50.0%	0	0	3
Commercial	0 (0.0%)	0	0	0
Both	1 (16.7%)	1	0	0
No response	2 (33.3%)	2	0	0

1025 Survey development and implementation in preparation of a De-bushing Advisory Service (DAS)

	Overall	Commercial	Resettlement	Communal
Fodder	3 (6.8%)	3	0	0
Own use	2 66.7%)	2	0	0
Commercial	0 (0.0%)	0	0	0
Both	1 (33.3%)	1	0	0
Compost	1 (2.3%)	1	0	0
Own use	0 (0.0%)	0	0	0
Commercial	0 (0.0%)	0	0	0
Both	1 (100.0%)	1	0	0

Table 15 Respondents who used bush biomass for commercial purposes

	Overall	Commercial	Resettlement	Communal
Farmers who utilized biomass commercially	21	15	3	2
Charcoal	15	11	2	1
Firewood	3	1	1	1
Fodder	1	1	0	0
Droppers and poles	1	1	0	0
Compost	1	1	0	0

The survey did not investigate further the reasons why farmers did not make use of the extracted wood commercially, but reasons that came up in conversations were:

- Only priority was to repair the grazing capacity of the land,
- Did not know how to exploit the commercial value of extracted wood, and
- Would have cost extra effort, time and money to exploit the commercial value of extracted wood.

A future DAS may do well to investigate these obstacles further.

The majority of those who used bush biomass for commercial purposes did so for the production of charcoal (Table 15), an industry that is already well established in Namibia. Table 16 provides more detail on charcoal producers.

**Table 16** Summary of responses related to commercial charcoal production.

	Commercial	Resettlement	Communal
Charcoal producers	11	2	1
On site production	Charcoal	Charcoal	Charcoal
Equipment used	Drum kilns, chainsaws, pangas & axes	Drum	Axes, pangas, pick, wood cutter
Approximate cost of processing in N\$ / ton	Average N\$ 881 (N\$ 700 – 1000)	N\$ 700 / N\$ 70 000	N\$ 1500
Where did the biomass go?	South Africa (3) Etosha Charcoal (1) Export (1) Private client (1)	Farm near Otjombinde (1) Etosha Charcoal (1)	Marketed locally in Otjinene
How far did you have to transport it - or was it collected?	Average 385 km (0 – 2 000)	110 km	7 km
Approximate income in N\$ / ton	Average N\$ 1356 (N\$ 800 – N\$ 1 600)	Average N\$ 1 400 (N\$ 1 300 - N\$ 1 500)	N\$ 7 500
Approximate volume of bush biomass utilized in this way per year (tons)	Average 5 110 tons (2 - 12 000)	360 tons Can't remember	No answer

Currently, N\$1,500-1,600 is offered by charcoal buyers for one ton of non-FSC graded charcoal at the farm gate (= gross income). Amongst commercial producers, there may have been confusion about net and gross prices: about half the income earned by the farmer from selling charcoal is paid over to the charcoal worker so the low answers may already have accommodated this payment (= net income). The prices indicated in response to this question show that most producers are within the accepted price range. The lone communal respondent who quoted an exceptional income and the resettled respondent who quoted an exceptional cost of N\$70,000 probably did not interpret the question correctly (i.e. total cost instead of cost per ton).

Other forms of commercial use of bush biomass was the production of firewood, which was only reported by one each commercial, resettlement and communal farmer (the rest using it for own use) (Table 17).

 Table 17 Summary of responses related to commercial firewood production.

	Commercial	Resettlement	Communal
Firewood producers	1	1	1
On site production	Firewood	Firewood	Firewood
Equipment used	Pangas, saw	Axes, pangas	Axes, pangas, pick, wood cutter
Approximate cost of processing in N\$ / ton	N\$ 300	N\$ 1 200	No answer
Where did the biomass go?	Windhoek	No answer	Marketed locally in Otjinene
How far did you have to transport it - or was it collected?	No answer	110 km	7 km
Approximate income in N\$ / ton	N\$ 700	N\$ 700	No answer
Approximate volume of bush biomass utilized in this way per year (tons)	Not sure	360 tons Can't remember	No answer

Only one respondent indicated alternative commercial uses of bush biomass in the form of fodder, droppers/poles and for compost (Table 18). Prices reported are within the generally accepted price range.

 Table 18 Summary of responses related to commercial fodder, dropper/pole and compost production from bush biomass.

	Fodder	Droppers/poles	Compost
Same farmer:	1	1	1
On site production	Chipped, ground, mixed	Droppers + Poles	Chipped
Equipment used	Mixer, bosvark, chipper, hammermill, harvester	Axes + Electric saw	Chipper,Bosvark,Hamm ermill, Harvester
Approximate cost of processing in N\$ / ton	N\$ 600	N\$ 2 / dropper N\$ 12 / pole	N\$ 500
Where did the biomass go?	Gobabis	Windhoek area	Windhoek
How far did you have to transport it - or was it collected?	100 km		
Approximate income in N\$ / ton	N\$ 2 000	Droppers N\$ 4.50 Poles N\$ 21.00 Edging N\$ 50.00 / meter	N\$ 1 000
Approximate volume of bush biomass utilized in this way per year (tons)	100		200

Generally, the number of responses to biomass utilization was too small to accurately indicate what is happening within the rather small value addition industry.

#### 4.5 Advisory services needs

Only 26% of all respondents indicated having received advice in the past, whilst another 26% did not respond, and nearly half of all respondents indicated they did not receive advice on bush encroachment and bush control in the past (Table 19). "Advisory services" in Table 19 refers to all kinds of advice, from the established services to freelance consultants to the internet. The fraction of respondents not advised swells to more than half if asked in the present tense. This alone is alarming, but it becomes even more so when considering that the numerically larger pool of communal farmers were even less well served by bush advisory services than the fewer-in-number commercial and resettled farmers, whether present or past.

Of those responding that they had received advisory services, this most frequently was reported as coming from the private sector (companies or individuals) or from government (DAPEES/DoF) (Table 20).

 Table 19 Table showing breakdown of respondents who indicated that they have in the past or are currently receiving advisory services on bush encroachment

Advisory services on BE	Overall	Commercial	Resettlement	Communal
Total responses	361	106	65	190
In the past				
Yes	94 (26.0%)	34 (32.1%)	25 (38.5%)	35 (18.4%)
No	173 (47.9%)	49 (46.2%)	25 (38.5%)	99 (52.1%)
Not answered	94 (26.0%)	23 (21.7%)	15 (23.1%)	56 (29.5%)
Currently				
Yes	47 (13.0%)	9 (8.5%)	22 (33.8%)	16 (8.4%)
No	198 (54.8%)	65 (61.3%)	23 (35.4%)	110 (57.9%)
Not answered	116 (32.1%)	32 (30.2%)	20 (30.8%)	64 (33.7%)

**Table 20** Table showing the breakdown of category of service providers to respondents who indicated thatthey have in the past or are currently receiving advisory services on bush encroachment

Category of service provider	Total		Commercial		Resettlement		Communal	
	In past	Currently	In past	Currently	In past	Currently	In past	Currently
Private sector	28	21	7	1	19	19	2	1
Government (MAWF)	21	13	5	-	1	1	15	12
Education establishments	4	0	1	-	-	-	3	-
Farmers unions / forums	4	5	1	3	2	-	1	2
Word of mouth	3	0	-	-	-	-	3	-
Suppliers	2	0	2	-	-	-	-	-
Publications	0	2	-	2	-	-	-	-

No significant correlation was found between the level of satisfaction of the impact of bush clearing activities, and having recorded receiving advisory services or not, although there was a slightly higher percentage of satisfaction (76% compared to 73%) amongst those who did get advice (Table 21). This would suggest that the advisory services have not added value, however, the fact that persons have undertaken activities indicates that they knew they had a problem, and did something about, and applied a specific method – so most likely had heard about or investigated options – but were unable to attribute such knowledge to a particular source or intervention.

There were insufficient respondents who provided answers to this component to allow for meaningful analysis of differences between the three categories of land users.

**Table 21** Comparison of satisfaction from bush clearing activities between those who indicated they <u>had</u>received advice, compared to those who indicated they <u>had not</u> received specific advice.

	Number of respondents	% of responses
Received advisory service and did bush clearing	37	
Satisfied	28	76%
Not satisfied	7	19%
Did not receive advisory service and did bush clearing	82	
Satisfied	60	73%
Not satisfied	15	18%

Respondents were given a range of topics to indicate on which they would like to receive advice in future. Multiple choices were allowed and respondents could also enter their own topics. Table 22 contains these responses, indicating the advisory needs of a DAS as well as how important that topic was judged to be.

Table 22 Table showing the advisory service needs, as indicated by questionnaire respondents

Advisory services needs	Overall	Commercial	Resettlement	Communal
Total responses	361	106	65	190
Bush Control or Debushing (average)	54.0%	44.7%	67.7%	54.6%
<ul> <li>Professional advice on bush control</li> </ul>	206 (57.1%)	54 (50.9%)	48 (73.8%)	104 (54.7%)
<ul> <li>Methodologies for bush clearing</li> </ul>	191 (52.9%)	48 (45.3%)	42 (64.6%)	101 (53.2%)
<ul> <li>Training (manager or labour level)</li> </ul>	188 (52.1%)	40 (37.7%)	42 (64.6%)	106 (55.8%)
Bush Encroachment (average)	47.9%	42.2%	59.6%	47.1%
<ul> <li>Ecology of bush encroachment</li> </ul>	175 (48.5%)	47 (44.3%)	37 (56.9%)	91 (47.9%)
<ul> <li>Bush encroachment assessment</li> </ul>	174 (48.2%)	44 (41.5%)	43 (66.2%)	87 (45.8%)
<ul> <li>Relationship of bush encroachment to biodiversity</li> </ul>	174 (48.2%)	44 (41.5%)	36 (55.4%)	94 (49.5%)
<ul> <li>Relationship of bush encroachment to water</li> </ul>	169 (46.8%)	44 (41.5%)	39 (60.0%)	86 (45.3%)
After Care (average)	47.3%	41.2%	54.4%	49.6%
<ul> <li>Managed grazing</li> </ul>	191 (52.9%)	45 (42.5%)	39 (60.0%)	107 (56.3%)
Chemical control	184 (51.0%)	47 (44.3%)	42 (64.6%)	95 (50.0%)
Manual clearing	170 (47.1%)	41 (38.7%)	36 (55.4%)	93 (48.9%)
<ul> <li>Ecology rehabilitation</li> </ul>	168 (46.5%)	47 (44.3%)	33 (50.8%)	88 (46.3%)
<ul> <li>Use of goats or other browsers</li> </ul>	157 (43.5%)	29 (27.4%)	34 (52.3%)	94 (49.5%)
Use of fire	155 (42.9%)	38 (35.8%)	28 (43.1%)	89 (46.8%)
Other:				
Benefit of aftercare	53	14	8	31
Bush biomass products (average)	45.6%	35.2%	55.9%	47.9%
<ul> <li>Information on possible bush biomass products</li> </ul>	174 (48.2%)	42 (39.6%)	38 (58.5%)	94 (49.5%)

**1** Survey development and implementation in preparation of a De-bushing Advisory Service (DAS)

Advisory services needs	Overall	Commercial	Resettlement	Communal
<ul> <li>Economics related to bush biomass production</li> </ul>	167 (46.3%)	36 (34.0%)	36 (55.4%)	95 (50.0%)
<ul> <li>Locality and contacts for possible consumers</li> </ul>	153 (42.4%)	34 (32.1%)	35 (53.8%)	84 (44.2%)
Policy and regulations (average)	42.8%	25.8%	59.5%	46.7%
Permitting / licencing	157 (43.5%)	25 (23.6%)	42 (64.6%)	90 (47.4%)
<ul> <li>Environmental clearances</li> </ul>	154 (42.7%)	31 (29.2%)	37 (56.9%)	86 (45.3%)
<ul> <li>Laws and regulations</li> </ul>	153 (42.4%)	26 (24.5%)	37 (56.9%	90 (47.4%)
Other:				
<ul> <li>Sustainability</li> </ul>	12	5	1	6
Funding / financing (average)	40.7%	32.1%	50.3%	42.3%
<ul> <li>Financial projections</li> </ul>	157 (43.5%)	40 (37.7%)	38 (58.5%)	79 (41.6%)
<ul> <li>Sources of funding</li> </ul>	156 (43.2%)	41 (38.7%)	34 (53.3%)	81 (42.6%)
<ul> <li>Feasibility / environmental impact assessments</li> </ul>	148 (41.0%)	29 (27.4%)	33 (50.8%)	86 (45.3%)
<ul> <li>Funding for equipment subsidies</li> </ul>	148 (41.0%)	42 (39.6%)	27 (41.5%)	79 (41.6%)
Credit Schemes	141 (39.1%)	31 (29.2%)	33 (50.8%)	77 (40.5%)
<ul> <li>Socio-economic viability</li> </ul>	132 (36.6%)	21 (19.8%)	31 (47.7%)	80 (42.1%)
Other:				
<ul> <li>Funding to buy the chemicals and equipment needed</li> </ul>	31	11	5	15

The highest need over all respondents was for advice on bush control and bush clearing. It also ranked highest amongst the different tenure groups, commercial, resettled and communal respondents. It contained the sub-categories (in order of decreasing importance) professional advice on bush control which implies quality as well as payment for services, bush control methods and the training of managers and workers. Obviously, when the topic is bush control, the highest need would be for advice on how to control bush.

Three topics came out at about similar levels of importance, viz. advice needed on bush encroachment *per* se, and aftercare after initial bush control and bush biomass products. The topic on bush encroachment included the information sub-categories (in order of decreasing importance) the ecology of BE, assessment of BE, relationship of BE to biodiversity and to water. This implies that there is a great need amongst farmers to understand the ecological processes of bush encroachment and the effect it has on the environment. The topic on aftercare included the information sub-categories (in order of decreasing importance) managed grazing indicating that bush control advice has always to be given within a greater ranching perspective, chemical control, manual clearing, the ecology of rehabilitation (again, a wide perspective topic), and the use of browsers such as goats and fire in an aftercare and wanted more information on this topic. The topic on bush biomass products included the information sub-categories (in order of decreasing importance) information on possible products, economics of biomass production and information on consumers.

Advisory topics of clearly lower importance, although still selected 40% of the time or more, were policy and regulations, and funding or financing. The legal topic included the information sub-

categories (in order of decreasing importance) of permits and licenses, environmental clearance and general laws and regulations. The financing topic included the information sub-categories (in order of decreasing importance) included financial planning and projections of future costs and income, funding sources, feasibility studies and impact assessments, equipment subsidies, credit schemes and the socio-economic viability of bush control and bush biomass utilization. If 31 answers that could not be clearly related to the question on whether equipment subsidy was needed but had to do vaguely with funding for chemicals and equipment are added to those 148 answers that clearly answered this question, this need easily becomes the biggest financial need: funding for the chemicals and equipment needed to control encroacher bush.

Table 22 thus clearly indicates the most and least needed advisory needs in terms of bush control and value addition. Only 13 percentage points separated the most from the least needed advisory needs, which is not a great difference and indicates that all topics are actually quite important to most respondents. A DAS looking for content might well start with this list of advisory needs.

#### 4.6 Communication channels

Table 23 indicates that more than half of all respondents, especially amongst the commercial and resettled farmers are comfortable receiving advisory services in English. Amongst communal farmers, about equal proportions would prefer to receive advice in their mother tongue. Mother tongue preferences are in accordance with the distribution of Namibia's main population groups: Oshiwambo preference in the central north, Otjiherero preference in the central east and northwest and Afrikaans preference in commercial areas (Figure 15). It appears that DAS may be able to concentrate its advisory activities in the national language, English.

Language	Overall	Commercial	Resettlement	Communal
Total respondents	361	106	65	190
Comfortable with English				
Yes	184 (51.0%)	70 (66.0%)	48 (73.8%)	66 (34.7%)
No	90 (24.9%)	18 (17.0%)	8 (12.3%)	64 (33.7%)
Not answered	87 (24.1%)	18 (17.0%)	9 (13.8%)	60 (31.6%)
Language preference				
Otjiherero	59	1	2	56
Afrikaans	29	16	5	8
Oshiwambo	2	1	0	1

 Table 23 Analysis of respondent's language preferences





Figure 16 provides a breakdown on access to various communication means by the three categories of farmers (commercial, communal and resettlement).

By far the largest proportion of respondents have access to a cell phone with sms service and a post office box (commercial farmers more than resettled, more than communal farmers) (Fig. 16). More than 90% of commercial and nearly 60% of resettlement farmers have access to a computer with internet access, which is the leading communication channel amongst commercial farmers. Far more than 60% of the respondents are reached by radio which is the leading communication channel amongst communication channel amongst communication channel amongst communication channel amongst communication the respondents are poorly accessed by most respondents and by the look of things are on the way out. Considering how long it can take to get a posted letter delivered in Namibia, it seems that the preferred communication channels of a DAS should be the computer message, short messages on cell phones and radio messages.



Figure 16 Analysis on access to communication media by commercial, resettlement and communal farmer respondents

The preference for communication media to a large extent influences the preference for advisory service communication channels as outlined in Figure 17. Commercial farmers would mostly prefer information through email and internet/websites. Resettlement farmers, who have been exposed to the Farmer Support Programme (FSP), indicated a wide range of means, most of which are face to face type interactions (except for sms). Communal farmers prefer training courses, seminars/workshops and demonstration sites (i.e. face to face and practical/visual means).

One thing to consider in developing any web based support system is that a previous attempt, namely the Decision Support System on bush encroachment of the Polytechnic of Namibia appears not to have reached its target audience very efficiently. In fact, only 8% of respondents had ever heard about it, and only 5% reported having used it.



Figure 17 Graphics showing the respondents' preferences for advisory services communication channels

Over all respondents, most would like to receive their information and advice by training course (53%) using demonstration sites (42%), seminars and workshops (45%) and by e-mail (41%). However, important differences exist in communication preference between various tenure groups:

- Commercial farmers prefer receiving their advice and information electronically via e-mail (62%) and the internet (45%) and only 26% by conventional training course using demonstration sites (29%).
- In contrast, communal and resettled farmers still opt for traditional, face-to-face information dissemination techniques such as training courses (69% and 63%,

respectively) preferably making use of demonstration sites (51% each) and seminars and workshops (54% and 65%, respectively) to receive their information needs.

- Mentoring and coaching, sms and newspapers are also popular means of information transfer amongst communal but especially amongst resettled farmers, possibly primed by their exposure to training courses and mentoring services offered by the GIZ and AgriBank-sponsored FSP.
- <sup>6</sup> The one communication channel that is high priority for all respondents although never the first priority, are demonstration sites.

It thus appears that the DAS can utilize a wide array of communication channels and while there may be specific preferences amongst some groups of farmers, most will be reached by those mentioned above, irrespective of where they are or their type of land tenure.

All commercial farmers reported using agricultural publications on a regular basis. Communal and resettlement farmers are most likely to listen to radio regularly, and resettlement farmers also read newspapers regularly. Nearly 90% of respondents indicated that they listen to the radio regularly (at least weekly) (Figure 18), preferably to Otjiherero Radio, National Radio and Kanaal 7. About 78% of resettled and communal respondents use agricultural publications weekly, which almost all (99%) commercial respondents claim to use, mainly Agriforum. Even newspapers were read by much more than half the respondents, predominantly the Namibian, New Era and Republikein (Table 24).



Figure 18 Graph showing an indication of media used regularly (at least weekly) by commercial, resettlement and communal farmers

 Table 24 Preferred newspapers, radio stations and agricultural publications

	Overall	Commercial	Resettlement	Communal
Total respondents	361	106	65	190
Newspapers read				
Namibian	96 (26.6%)	17 (16.0%)	34 (52.3%)	45 (23.7%)
New Era	68 (18.8%)	7 (6.6%)	25 (38.5%)	36 (18.9%)
Republikein	61 (16.9%)	28 (26.4%)	12 (18.5%)	21 (11.1%)
The Namibian Sun	15 (4.2%)	1 (0.9%)	10 (15.4%)	4 (2.1%)
Allgemeine Zeitung	15 (4.2%)	15 (14.2%)	0 (0.0%)	0 (0.0%)
Confidente	4 (1.1%)	2 (1.9%)	2 (3.1%)	0 (0.0%)
Kundana	1 (0.3%)	0 (0.0%)	1 (1.5%)	0 (0.0%)
Namibia Today	1 (0.3%)	0 (0.0%)	0 (0.0%)	1 (0.5%)
Radio				
Otjiherero	118 (32.7%)	5 (4.7%)	8 (12.3%)	105 (55.3%)
National Radio	32 (8.9%)	3 (2.8%)	14 (21.5%)	15 (7.9%)
Kanaal 7	25 (6.9%)	21 (19.8%)	4 (6.2%)	0 (0.0%)
Oshiwambo Radio	18 (5.0%)	2 (0.6%)	8 (12.3%)	8 (4.2%)
NamaDamara	13 (3.6%)	0 (0.0%)	12 (18.5%)	1 (0.5%)
Hit radio	12 (3.3%)	11 (10.4%)	1 (1.5%)	0 (0.0%)
Afrikaans	11 (3.0%)	8 (7.5%)	2 (3.1%)	1 (0.5%)
Kosmos	7 (1.9%	7 (6.6%)	0 (0.0%)	0 (0.0%)
German Station	7 (1.9%)	7 (6.6%)	0 (0.0%)	0 (0.0%)
Radio wave	4 (1.1%)	4 (3.8%)	0 (0.0%)	0 (0.0%)
Kavango Radio Station	3 (0.8%)	2 (1.9%)	1 (1.5%)	0 (0.0%)
Kaisames	2 (0.6%)	1 (0.9%)	1 (1.5%)	0 (0.0%)
101.7 FM	2 (0.6%)	0 (0.0%)	0 (0.0%)	2 (1.1%)
FM 105.4	1 (0.3%)	0 (0.0%)	1 (1.5%)	0 (0.0%)
RSG	1 (0.3%)	1 (0.9%)	0 (0.0%)	0 (0.0%)
Agricultural publications				
Agriforum	130 (36.0%)	68 (64.2%)	25 (38.5%)	37 (19.5%)
Landbou Weekblad	95 (26.3%)	41 (38.7%)	22 (33.8%)	32 (16.8%)
Farmers weekly	61 (16.9%	15 (4.2%)	16 (24.6%)	30 (15.8%)
Vee plaas	10 (2.8%)	5 (4.7%)	3 (4.6%)	2 (1.1%)
Vee Boer	3 (0.8%)	2 (1.9%)	0 (0.0%)	1 (0.5%)
Wildlife Ranching	2 (0.6%)	1 (0.9%)	0 (0.0%)	1 (0.5%)
Die Boer (Republikein)	3 (0.8%)	1 (0.9%)	1 (1.5%)	1 (0.5%)

Interestingly, few respondents indicated that they would like to receive their bush control information via "specialized publications" (only 14% overall, Figure 17) whereas 68-100% of respondents claimed that they used "agricultural publications" at least weekly (Figure 18). In case this contradiction creates confusion, most farmers probably thought of a "specialized publication" as a book or technical journal and not as an "agricultural publication" like a glossy weekly or periodical journal. The latter are thus still favoured communication means.

Over all respondents, 42.7% indicated they are willing to contribute financially to advisory services (Table 25), with 39.1% of respondents not answering this question.

	Overall	Commercial	Resettlement	Communal
Total respondents	361	106	65	190
Willing to pay for advice				
Yes	154 (42.7%)	51 (48.1%)	28 (43.1%)	75 (39.5%)
No	66 (18.3%)	15 (14.2%)	17 (26.2%)	34 (17.9%)
Not answered	141 (39.1%)	40 (37.7%)	20 (30.8%)	81 (42.6%)

Table 25 Summary of responses regarding willingness to contribute financially for advisory services

Surprisingly, twice to three times as many respondents indicated that they were willing to contribute financially to personalized information on bush control (Table 25) with little difference between tenure groups, although as many again did not answer this question, possibly indicating antagonism or incomprehension (that one should pay for information). This is contrary to anecdotal evidence that farmers like to get their information for free or at least very cheaply. The one-off question on willingness to pay was not followed up by a quantitative indication of what would be considered a reasonable price of information. Also, the emphasis was on personalized information and not general information. Thus a farmer receiving information on bush density on his farm on his cell phone via sms might subscribe for the service, but not if it contains general hints of how to control bush.

Table 26 Average ranking of priority given by respondents for advisory services according to topics

	Overall		Commercial		Resettlement		Communal	
	Average	n	Average	n	Average	n	Average	n
Agronomy	3.7	211	2.8	59	3.5	45	4.3	107
Bush encroachment	4.4	233	4.2	76	4.3	49	4.7	108
Farm management	4.4	223	3.8	67	4.7	49	4.7	107
Horticulture	3.8	208	2.6	60	4.1	43	4.4	105
Livestock production	4.5	229	4.0	70	4.7	49	4.7	110
Rangeland management	4.5	225	4.0	71	4.7	48	4.7	106
Value addition	4.5	139	3.9	35	4.7	44	4.6	60

Over all respondents, livestock production and rangeland management were ranked highest in terms of advisory service needs, followed by bush encroachment, farm management and value addition (Table 26).

Table 26 also shows that there was much more distinction between advisory topics by commercial than by resettled and especially communal farmers. Also, communal and resettlement farmers generally ranked all topics higher than commercial farmers. This may indicate that communal and resettled farmers have a generally high information need on all farming topics whereas commercial farmers, having been intensively advised before, were more discriminatory in their advisory service needs and ranked rangeland management and livestock production higher than the rest. These two topics are themselves very broad topics. Topics of more relevance to a DAS like bush control and value addition were ranked lower over all respondents and especially commercial respondents. This highlights some important points:

- Firstly, even though the De-Bushing Project would prefer to create a very bush-specific advisory service, information is still required by farmers within the wider farming context to be valuable even to commercial, let alone communal and resettled producers and,
- secondly, non-bush farming topics cannot simply be ignored and left to other advisory services.

#### 4.7 Stakeholder workshop

A stakeholder workshop was convened to present the preliminary results of the questionnaire survey and discuss the way forward for a de-bushing advisory service. The list of participants is provided in Annex 3.

Following presentations on the results of the questionnaire survey, stakeholders were divided into two groups, and tasked to brainstorm what topics are priorities for a de-bushing advisory service, and what form such service should take. In addition the groups were tasked to consider for each of the topics, the target audience.

#### Priority topics

The priority topics identified fell into the following broad categories:

Bush clearing techniques

Different bush clearing techniques exist that have been used with variable success rates under a large set of conditions. Choosing a specific technique or combination of techniques is dependent on various factors that include the density of bush encroachment, the specific species that dominate the encroached area, soil characteristics especially clay contents, and affordability or budget available for the farmer. Extensive research was done by government over many years and farmers also made considerable experiences on the suitability of different methods under different circumstances. This information should be documented and used.

#### The importance of aftercare

The application of proper aftercare practices is perhaps one of the most important prerequisites that will determine the success of combating bush encroachment to restore the ecological balance and to enhance livestock production. Aftercare should be part and parcel of the contractual obligation of the farmer or company that apply for external assistance and the application thereof should be carefully monitored over time.

Restocking after bush thinning.

Following bush thinning activities a large increase in grass volume usually occurs. It is extremely important that the farmer is immediately able to utilise this "explosion" in fodder availability to start compensating for the large costs involved in combatting bush encroachment. Financial mechanisms should be put in place where the farmer can get access to affordable credit to buy additional animals to use this surplus fodder.

Sustainability

Consideration for the environment and biodiversity conservation is considered a vital component of any bush clearing activity, and thus related advisory service. There is a balance to be attained between bush thinning and bush eradication, to retain the beneficial impacts of trees and shrubs. There is a risk that a purely market driven value chain could lead to unsustainable practices, detrimental to the maintenance of biodiversity and natural environmental/ecosystem cycles. Thus information must be provided on what to harvest, what to leave, and how to monitor and maintain biodiversity.

Value chain approach

Advisory services should address all stages of a bush clearing activity, from the options available for harvesting; to the potential market and the required aftercare. The short and long-term financial / economic aspects must be included.

#### Structure for De-bushing Advisory Services (DAS)

The general conclusion on the structure for a de-bushing advisory service was that existing extension services, notably the Ministry of Agriculture, Water and Forestry's Directorate of Agricultural Production, Engineering and Extension Services (DAPEES); the GIZ/AgriBank Farmers Support Project (FSP) and the Livestock Producers' Forum (LPF) mentorship programme that is administered by the Meat Board of Namibia should be strengthened and empowered to provide more focussed advisory services on bush encroachment. It was acknowledged that there is no "one size fits all" solution.

Thus, the envisaged DAS should become the repository for information, and focus activities on providing the tools for existing extension services:

Work through existing structures

Engage existing advisory service providers, in particular DAPEES, to develop the capacity, and create the will to include bush encroachment advisory services

#### Provide training of trainers

Empower existing advisory service providers with the knowledge and information tools, through focussed training of trainers. Use a targeted approach, and provide selected training in depth. This includes providing access to information, and developing information materials and even mentoring of extension officers.

🌜 Champion technical support

Information and awareness alone will not necessarily lead to increased bush clearing activities. The DAS should actively seek mechanisms to broker technical support, such as subsidization by GRN for desired activities. DAS should also provide support to test new technologies.

Economic value addition

It is important to optimise the existing value chain. Collate and provide information on potential value chains, including the economic aspects. This includes creating a better understanding of market demand, and opportunities to link farmers to the market. This includes developing economic models that include cost/benefit analysis of available options and value chains.

Support small SME to de-bush.

In line with government policies, small and medium-scale enterprises should be supported to get involved in the bush value chain. This will create job opportunities for the poorer segment of the population.

#### Next steps

- The GIZ and AGRA ProVision project teams were tasked to facilitate the establishment of an advisory committee in order to steer the process. Key functions should be identified that this coordination body should take responsibility for, to be able to provide the services as required by the different stakeholders in the industry. Identify the organization, institution or network structure under which the unit will operate.
- Consult the existing Government Policies, Programmes and initiatives to ensure that it is concentrated and not a duplication of existing programmes. Consult the Ministry of Environment and Tourism and environmental policies for inclusion in the operational rules. Consult the Ministry of Trade and Industry in order to strategize and incorporate the aspect of industrialization. Government is prepared to support the implementation of functions and services once they are identified and provided they fall within the existing framework.
- In addition to the support from GRN and Donors there is a need to investigate other sources for financial sustainability through different mechanisms i.e. payment of levies from producers.
- Investigate the issue of land tenure and security and the impact it has on the willingness of farmers to engage in the application of bush clearing methods. Land tenure security affects all categories of farmer in one way or another; communal, resettlement and commercial. Promote the implementation of incentives to support farmers and the industry as a whole to

get involved. Innovative incentive mechanisms have to be devised, e.g. a reduction in the land tax rate for producers who implement proven sustainable land management techniques including feasible (long-lasting) bush control.

- Assess and understand the market demands in order to develop a marketing strategy. Create the demand for products and identify reliable markets.
- **6** Conduct research and facilitate acquisition of effective technology.
- Identify training needs for producers and apply a targeted approach towards capacity building.

#### 5 Summary and Recommendations

#### 5.1 The questionnaire-based survey

The questionnaire survey of commercial, resettled and communal farmers yielded 361 usable responses which were cross-checked and verified as thoroughly as possible. Roughly half of all respondents farmed communally, one-quarter commercially and one-fifth was resettled. The latter included individuals that can be assumed to have commercial objectives, and group resettlement farmers that can be assumed to farm under communal conditions. Resettled respondents thus represent a mixed group with elements of both commercial and communal farming. Where necessary, responses were analyzed separately based on the tenure system.

The land holdings of the different categories of farmers were much larger than generally assumed. While not of direct importance to a DAS, this is an interesting result.

Land use confirmed that commercial respondents were occupied mainly with cattle farming and had larger herds than communal and resettled respondents, who had more small stock than commercial respondents. Less than 10% of all respondents reported crop production, whether dry-land or irrigated. In other words, the respondents were correctly targeted to be of relevance to a DAS survey. Also, the fact that 9 out of 10 commercial respondents farmed mainly with cattle adds perspective to their responses to the questionnaire: the ideal cattle ranch probably has much less bush on it than the ideal small stock farm.

Awareness of the problem of bush encroachment is huge: nearly 8 out of 10 respondents are aware of the problem and 9 out of 10 report it on their farm. A similar proportion indicated that it affects the productivity of their farming operation negatively. DAS will therefore find a receptive audience alerted to the problem of bush encroachment and the need to control it and can just keep up the extension method to educate especially the communal farmers. Differences in the perception of the problem are nuanced, based on the background and production model of the respondent: because resettled and especially communal respondents use much more wood in their everyday farming routines and depend a lot more on goat production, they tend to see dense bush as much less of a problem and much more as a farming asset than commercial respondents, who tend to be cattle farmers. A cattle farmer has much less use of dense bush than a goat farmer. Also, farmer responses seem to indicate that wood as a farming resource is appreciated more in semi-arid areas, where it is a smaller resource, than in moister areas, where it is more plentiful. DAS will have to take cognizance of the fact that not every farmer grades bush encroachment equally seriously and negatively. To some, it is a valuable resource already, before any value addition. This also implies that not every farmer wants to thin bush or get rid of it. Some may want advice on how to use it better to further their (small stock, especially goat) production system and build better wood-based farm structures (esp. kraals, fences, etc.).

Feedback on the woody encroaching species involved does not yield any new information other than to indicate that farmers' botanical knowledge can still be improved.

Whereas awareness and perception of the BE problem is high amongst all tenure groups, there is serious divergence in its control. Two-thirds of commercial respondents controlled bush prior to this survey while more than half of resettled and communal respondents have not. This has multiple reasons but contrary to expectations, lack of knowledge does not seem to be the critical ingredient but rather lack of means (finance, equipment, untrained or too little labour). However, many respondents will appreciate increased inputs of knowledge, with a surprising 4 out of 10 respondents across all tenure groups also prepared, in principle, to pay for personalized information (although an indication of what would constitute a fair charge was not given). Any DAS should thus incorporate facilitation services to machines, equipment and finance while information transfer should include training on labour management, or even training of bush workers.

Closer investigation of the type of bush control practiced in the past largely confirmed existing (perceived) knowledge: amongst commercial respondents, chemical control was the most preferred method (despite its hefty price tag) and a priority for further information exchange. The role of unselective aerial application of arboricides needs further consideration lest serious environmental damage, in conflict with our national laws, is caused with donor funding. Resettled and communal respondents preferred more labour-intensive methods of control like manual chopping and burning which are also much less expensive, indicating less access to other means of control. Interestingly, in about 2005 it again became cheaper to treat an existing hectare of farmland against encroacher bush than to buy an additional (new) hectare. Accordingly, the survey showed an increase in bush control activities since 2005. Aftercare is essential to control encroacher bush and if not applied regularly and appropriately (chemicals are again the preferred option), causes increased dissatisfaction with the situation. Most farmers reported increased grass growth after bush control and slightly fewer also that the grass was better. However, responses indicated that farmers were not sure about their grasses and may benefit from improved knowledge of grasses and grass ecology, as well as active grass sward rehabilitation. These are certainly topics that are relevant to a DAS.

The survey tried to establish the general cost of bush control. Relatively few respondents shared this financial information and some might have misinterpreted the question or misrepresented their information, giving rise to horrendously high cost estimates that are completely out of line with established costs. Closer inspection however revealed that most commercial respondents at least manage to contain encroacher bush within the generally-accepted price range of N\$500 – N\$1,500 per hectare. However, this part of the survey also showed that very few farmers access

outside finance to control bush and that improved market penetration and accessibility of financial instruments should be one of the priorities of DAS.

The survey also showed that currently a very small proportion of farmers utilize the bush biomass for commercial purposes, and the predominant commercial use amongst those who do is charcoal production. This part of the survey also showed that in future, any questions on costs and income have to be carefully calculated together with the respondent to prevent confusion (e.g. which costs to include) and misinterpretation of data (e.g. total costs instead of cost per ton).

#### Advisory services

When it comes to advisory needs, livestock production and rangeland management were ranked highest in terms of advisory service needs by all respondents, followed by bush encroachment in particular, farm management and value addition.

Within the topic of bush encroachment and bush control, half of all respondents indicated that they had never received advice on bush encroachment and bush control before. Respondents indicated that they need specific advice on:

- bush control and bush clearing,
- the ecology of bush encroachment per se,
- 6 aftercare after initial bush control and
- bush biomass products most urgently, as well as advice on
- bolicies and regulations pertaining to bush control, and
- funding or financing of bush control, aftercare, value addition and re-stocking livestock after bush control.

However, it was made very clear by respondents that bush control advice has always to be given within a greater ranching perspective and that many other topical farming themes not directly related to bush clearing cannot simply be ignored and left to other advisory services than a DAS.

More than half of all respondents feel comfortable being advised in the English language. The media of choice are many and varied as most respondents have access to a wide variety of oral, written and visual information media and channels, with commercial respondents leaning more towards newer, electronic media (sms, e-mail, internet) while resettled and communal respondents seemed to prefer conventional, face-to-face information sites in training was made clear, although it was never a highest priority. Interestingly, the mainstays of communication technology for decades like landline telephones and faxes are in serious decline, their place rapidly being taken by electronic media.

A DAS can thus make full use of a wide range of traditional and electronic media to get its wide range of contents across to land users. Namibia is well served with information and communication media and channels of all kinds that can be used by DAS with good effect. DAS could thus decide to pass messages that need to inform farmers quickly, i.e. wood marketing and price information, on by means that communicate rapidly (e.g. sms, computer e-mail, radio) and follow-up with more in-depth discussion in those means that travel more slowly (e.g. periodicals,

training courses, workshops and seminars). The only limitation is the demand for demonstration sites, but possibly DAS could use existing MAWF research and extension stations, rural and agricultural development centers for this purpose.

#### 5.2 The stakeholder workshop

The stakeholder workshop considered the results of the questionnaire survey, and priority topics were identified that should form part of the DAS focus, including bush thinning techniques; the importance of aftercare and sustainability.

The form that a De-bushing Advisory Service might take was discussed, and recommendations were made that the envisaged DAS should become the repository for information, and focus activities on providing the framework and tools for existing extension services, as well as becoming a broker of information and access to financial and technical support. Most notably, it was agreed that advisory services to farmers should be channeled through existing extension service structures. Furthermore, the focus of the DAS should cover the full value chain and should not be restricted to providing advice only to the land user. The DAS should also be structured in such a way to ensure its continued existence beyond the lifespan of the GIZ Debushing Project.

#### 5.3 Recommendation on organizational aspects of DAS

Organizationally, it is recommended that DAS be comprised of a small and focused core group of staff, under an institutional home, either in the private sector or a Parastatal that will ensure that the unit continues to exist beyond the lifespan of the GIZ funded De-bushing Programme (Figure 19). Government structures are considered too inflexible to easily absorb a new function, although relevant government units should remain an integral component of the overall programme through the steering committee.

The DAS should report to and receive its direction through a steering committee comprised of representatives from a range of stakeholders. In this regard, consideration should be given to expanding the scope of the already existing NRMBEF (Namibia Rangeland Management and Bush Encroachment Forum – chaired by the Directorate of Forestry) appointed Advisory Committee. This Advisory Committee is transformed into the Steering Committee for the EU supported NRMPS project and could serve the same purpose for a DAS if its terms of reference and membership were revised to serve this purpose. The advantage of such an expanded NRMBEF steering committee is that it counters fragmentation of an already small pool of Namibian producers, experts and entrepreneurs, joins forces to reach critical mass earlier and exploits synergies.



Figure 19 Proposed organizational structure for DAS.

Institutions that could offer a home for a thus DAS include the following:

- Private institutions (such as Agra ProVision) that already provide professional advice to
  producers could easily be expanded to house a DAS. The private sector is generally quick
  to react to industry requests, but consideration needs to be given for mechanisms for cost
  recovery, as otherwise the additional cost burden may not make it cost-effective or
  sustainable to the parent company in the long term.
- Parastatal organizations such as AgriBank enjoy greater budget security as they can request additional funds from parent ministries, but many have become inefficient and sluggish. AgriBank already houses and half-funds the FSP and could easily adjust this department to incorporate a DAS. This move would combine functions, improve efficiency and create synergies but also creates a monolith which, in the absence of competition, may become unresponsive to industry needs.
- Farmer-based institutions such as the NAU or NNFU could also be a logical home for a DAS as the wood producer is also the union member and DAS client, thus ensuring maximum efficiency and minimum overlap. However, it could be that their administrative

structures would need strengthening, and as with the private sector institutions, financial sustainability would need to be a consideration.

• State institutions such as MAWF, which has the mandate to inform producers but may not be willing to shoulder additional responsibilities in this regard. Adjusting personnel structures in Government can take much too long, and could eventually be limited by available funding as it has to compete with other Government priorities.

It is also noted that the Forest Act (12 or 2001) as amended through the Forest Amendment Act, 2005, makes provision for a Forest Council, whose function is to advise on general forestry matters; the preparations and implementation of the national forest policy; and on any other forestry related matter. However this would not be an appropriate body in which to position an operational service such as the envisaged DAS.

Since the envisioned DAS should operate more as a knowledge centre, broker and networker rather than a traditional agricultural extension officer and advisor, it would need only a small core of specialist staff to facilitate contact with a larger body of professionals who supply specific contents and services (equipment, finances, inputs, etc.) under the supervision of a De-Bushing Project manager. Embedding these services in an appropriate industry organization that can continue these functions post-Project is vital to achieve sustainability.

It is recommended that the core team consist of a Coordinator/Facilitator who should be a professional with experience in bush encroachment and business development, as well as project management. This should be complemented by an Information/data Management Specialist with technical expertise in GIS, data management, website maintenance, and good communication skills, and someone to provide administrative support. A possible fourth position that could be considered would be an industry/business development specialist, given the importance given to value addition in driving bush clearing activities.

#### 5.4 Mandate / portfolio of DAS

Figure 20 provides an overview of the recommended mandate and scope of the DAS. The core team must take responsibility for the overarching coordination of the programme, and act as the central repository of information, networking and brokering linkages. Certain activities lend themselves to be outsourced to service providers, to avoid over burdening the DAS structure.

Thus, the main functions are seen as:

#### Metworking

DAS will serve as a knowledge and contacts broker that connects demand and supply, farmer and industry, resource and processor. Thus, DAS must keep abreast of all related activities, in order to fulfil the coordinating role, and to keep synergies in place. Part of the networking will be to maintain a comprehensive register of all stakeholders and professional service providers involved along the entire value chain.



Figure 20 Mind map showing the proposed focus for the De-bushing Advisory Service, where green denotes responsibility of DAS core staff, purple those activities that lend themselves for outsourcing, and orange refers to existing or new research sites.

#### Information Resource centre

Collecting and maintaining a comprehensive information resource centre that will be a central repository of bush encroachment and value chain literature and data, accessible to the industry. Information must be continuously updated and availed as required, and DAS must facilitate an on-going monitoring and evaluation of activities in the sector.

Add dedicated technical material to the extension library in various formats easily understood by commercial and communal farmers. This includes written, verbal (radio) and picture (short films, TV) messages produced in vernacular languages and various other user-friendly formats. A comprehensive GIS (Geographic Information System) must be developed and maintained with new data as it is generated, from activities on the ground and research. Data and information gaps will be identified, and will feed into the process of facilitating research.

Information must be accessible through a website and online library, and an interactive messaging and information service.

Facilitate research to fill gaps

Based on the information and data available and collated for the information resource centre, gaps will be identified, and research must be facilitated to fill these gaps. This could include the testing of new technologies, as well supporting services to undertaken impact monitoring of interventions, and re-evaluation of planning (promoting an adaptive management / learning approach).

**6** Complement/strengthen existing advisory services

Rather than compete with the existing extension services by adding another staffed extension service, DAS must help the existing services to live out their mandate effectively, identify what limits them and establish if and how the Project could help overcome these hurdles. This is much more cost-effective and sustainable than another staffed extension service. This will be done through helping groups of and individual extension officers and advisors to live out their job description and reach their potential by, amongst others, targeted training and mentoring of advisors in how to extend agro-technical messages to farmers effectively.

Develop training materials and training tools to help extension and advisory service providers in their efforts.

Holding farmer information days, seminars and workshops together with other extension services that deliver knowledge (theoretical, classroom setting) and skills (practical, experiential learning) and use model situations to create awareness and exposure (demonstration sites). Some of these model situations (e.g. semi-mechanized bush harvesting and efficient charcoal kilns) would first have to be created by the Project if they do not exist already.

Organize and offer training courses to various stakeholders on different bush clearing and wood utilization topics adapted to their level of understanding, e.g. institutional level (NCPA, electricity sector, farmer association), farmer/manager level and worker level. Preferably, such training should be NTA accredited.

Complement existing extension messages by adding what is currently not part of the extension library, e.g. wood use and value addition, marketing of wood products, etc.

It is recommended that an institutional analysis of existing advisory service providers be undertaken to help structure the support required and the modalities, and to provide recommendations for adjustments as may be required.

#### 6 Financing and support

The questionnaire survey identified a need for improved financial and technical support to land users in bush clearing. DAS should act as a facilitator/broker for access to financing and technical support services. This also includes providing financing and support institutions with links to appropriate application and compliance services that can help minimize their risks.

#### 🌜 Value Chain

The economic value chain of bush biomass is considered to be one of the driving forces that will incentivize land users to undertake bush clearing activities. DAS must therefore act to create the linkages/brokerage to promote value chain development; to support industry development; as well as to support SME development in this sector. The value chain includes the whole range of activities, from inputs, production, processing, distribution, marketing and consumption).

#### Policy/legal framework

Concerns were raised at the stakeholder workshop that the management of invader bush is not covered by existing regulations or policies, thus making any enforcement of negative practices impossible. And assessment of the existing legal framework should be undertaken and recommendations made to support good rangeland management (including bush clearing) practices.

#### 5.5 Way forward

It is proposed that the introduction and development of the DAS should follow the following steps:

- Communicate the final recommendations to all stakeholders, including existing extension service providers such as DAPEES, DoF and FSP, to ensure buy-in
- Identify the institutional home. This could initially be the GIZ De-bushing project whilst processes are followed to appoint the eventual institutional home
- Appoint key personnel at the very least the Coordinator and Information Management specialist, who can commence with:
  - Building up the information resource centre, including the GIS
  - Oversee the development of the website and online library
  - Networking to keep abreast of all related activities and build up the register of stakeholders and professional service providers.

These activities can be initiated within three months, and would result in the foundation to expand to other components of the DAS portfolio. The building up of the information resource center, including GIS will be an ongoing exercise, but it could be expected to take at least six months to collect, collate and catalogue the majority of existing information (both hard copy and digital, including GIS databases).

Thereafter, work could commence on the other activities:

Complement/strengthen existing advisory services

This will entail developing a detailed work plan and overseeing the outsourcing of activities.

- 5 Undertake the value chain analysis, and pursue linkages (including to the Namibia Biomass Industry Group N-BIG).
- 5 Policy framework outsource the assessment of the policy framework and recommendations to ensure the management of invader bush is suitably covered by policy.
- Identify research gaps and facilitate research.

### 6 References

- **Bester, F.V.** 1999. Major problem bush species and densities in Namibia. Agricola 1998/99, No.10-2.
- **De Klerk, J.N.** 2004. Bush Encroachment in Namibia. Report on Phase 1 of the Bush Encroachment research, monitoring and management project. Ministry of Environment and Tourism, Government of the Republic of Namibia. John Meinert Printing.
- **Ministry of Agriculture, Water and Forestry.** 2008. Ministry of Agriculture, Water and Forestry Strategic Plan 2008/9 to 2012/13. Government of the Republic of Namibia.
- Ministry of Agriculture, Water and Forestry. 2011. Ministry of Agriculture, Water and Forestry A forest research strategy for Namibia (2011-2015). Government of the Republic of Namibia.
- Namibia's Fourth National Development Plan: 2012/13 to 2016/17. National Planning Commission. Office of the President. ISBN 978-99945-0-055-0
- Rothauge, A. 2014. Baseline Assessment for the de-bushing programme in Namibia. Report for De-bushing Programme in Namibia. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
- Vision 2030, Policy Framework for Long-Term National Development, Government of the Republic of Namibia, 2004

#### 7 Annexes



Annex 1: De-Bushing Advisory Services Questionnaire

### Annex 2: Travel undertaken for collecting DAS questionnaires

Date	Locality	Event	Enumerator
26/01/2015	Windhoek	FSP pre and post settlement training	Michael Dege
02/02/2015	West Nest Lodge	FSP pre and post settlement training	Angelina & Erastus
02/02/2015	Hardap - Farm Haribes	FSP pre and post settlement training	Wessel Visser
09/02/2015	Omaheke - Sandveld	FSP pre and post settlement training	Michael Dege
09/02/2015	Gellap Ost	FSP pre and post settlement training	Jaco van Zyl
18/02/2015	Hardap - farm Daweb	FSP pre and post settlement training	Jaco van Zyl
23-27/02/2015	Outjo	FSP pre and post settlement training	Erastus Ngaruka
02-06/03/2015	Tsumeb	FSP pre and post settlement training	Michael Dege
11/02/2015	Outjo	Farmers meeting - Excelsior and Otjikondo	Fonnie Bruwer
12/02/2015	Gobabis	Agribank stakeholder meeting	Angelina Kanduvarisa
18/02/2015	West Khomas	Farmers association meeting	Frank Wittneben
20/02/2015	Aroab	Information day	Frank Wittneben
21/02/2015	Namib	Farmers association meeting	Frank Wittneben
24/02/2015		Travel to Okashana	Angelina Kanduvarisa
25/02/2015	Okashana	FSP Stakeholder Meeting	Angelina Kanduvarisa
26/02/2015		Return to Windhoek	Angelina Kanduvarisa
04/03/2015		Travel to Okahao	Angelina & Frank
05/03/2015	Okahao	Farmers day	Angelina & Frank
06/03/2015	Oshifo	Farmers day	Angelina & Frank
09/03/2015	Otjetjekwa s.c.	Farmers day	Angelina & Frank
10/03/2015	Opuwo	Farmers day	Angelina & Frank
11/03/2015		Return to Windhoek	Angelina & Frank
02/03/2015	Epukiro	Travel from Windhoek	Erastus Ngaruka
03/03/2015	Otjinene		Erastus Ngaruka
03/03/2015	Okondjatu		Erastus Ngaruka
04/03/2015	Okakarara		Erastus Ngaruka
05/03/2015	Otjituuo		Erastus Ngaruka
06/03/2015		Return to Windhoek	Erastus Ngaruka

Annex 3: List of workshop participants