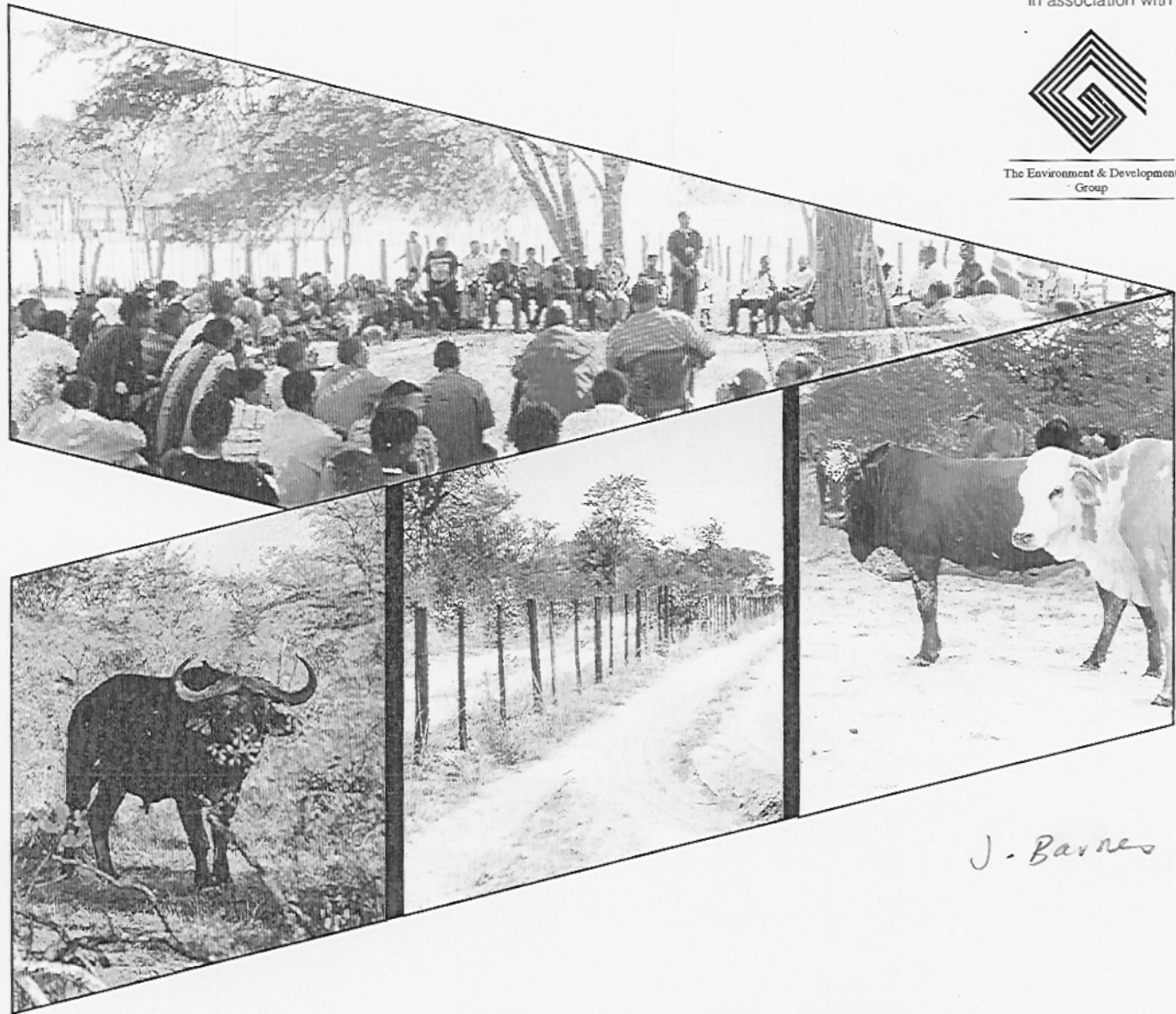




in association with



The Environment & Development Group



*J. Barnes*

# Environmental Assessment of Veterinary Fences in Ngamiland

Prepared for:



**Volume 6:**

in collaboration with:

Consultation Plan and Methodology



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**ENVIRONMENTAL IMPACT ASSESSMENT OF VETERINARY  
FENCES IN NGAMILAND**

**VOLUME 6**

**CONSULTATION PLAN AND METHODOLOGY**

**FOR**

**THE GOVERNMENT OF BOTSWANA**

**JOINTLY FUNDED BY  
DEPARTMENT FOR INTERNATIONAL DEVELOPMENT  
AND  
THE GOVERNMENT OF BOTSWANA**

**FINAL REPORT**

**September 2000**

**Scott Wilson  
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## EXECUTIVE SUMMARY

The *Consultation Plan and Methodology Report*, Volume 6, provides the details of the progress of the EIA study between June 1999 and October 2000. It also provides details of the processes and methods used by each of the sub-teams in carrying out the study.

**The Principles of Consultation and Representation** are outlined, highlighting the need for consultation in a study such as this. It is obviously not possible to consult with everybody, and so some form of representation by the different stakeholders and communities is essential. The EIA developed a model of good practice in the design and implementation of such a consultation exercise. Special efforts are made to consult with particular groups that may not be able to express their views under normal circumstances, e.g. women and youth groups, and minority groups, e.g. Basarwa communities.

**The Phases of Consultation** included **initial stakeholder meetings** to inform the stakeholders and begin the process of interaction with them, e.g. process workshop, launch workshop, Maun *kgotla* meeting and the establishment of the Communities Consultative Committee. This was followed by the **dry season consultations** involving village *kgotla* meetings, and detailed field studies, meetings of the consultative committee, focus group meetings with stakeholder groups such as the BWMA, HATAB and the CBNRM trusts, and an interim stakeholder workshop.

The **wet season consultations** were similar to the dry season field studies and were designed to gather additional information and confirm the earlier findings, and to test the reactions and preferences to changes in fence alignments. This was carried further during a special **consultative committee study tour** in which the members of the committee visited a number of the key fences to discuss the impacts on the spot with the affected communities.

**Meetings with the Reference Group**, which is made up of the principal governmental and non-governmental stakeholders, have provided valuable opportunities for sharing knowledge and experience. For example, working sessions were held to discuss specific issues such as policy interactions and fence route options. It became apparent that as the participants worked closely together, they developed a shared understanding of the issues and a consensus on possible solutions.

The process was completed with a **final stakeholder meeting**, at which the conclusions and recommendations of the study were presented to the stakeholders.

Various **issue papers** have been prepared to allow groups with particular interests to express an opinion in written format. These have included issue papers on archaeology and cultural resources, indicators of wildlife-fence interactions, wildlife-friendly fences, and fences with regard to community natural resource management.

There have been efforts to publicise the study, starting with a press release, a **poster and information sheets** distributed, and various **radio announcements**. In addition, a **journalist** was engaged to prepare a series of six articles for publication in the newspapers during the course of the study.

A record of the methods used by the different sub-teams for the study is provided. These included the HACCP method for livestock disease risk assessment, assessment of wildlife and rangeland impacts, including aerial survey and analysis of populations, analysis of bush fire scars from satellite imagery, fence surveys, land use assessment from satellite imagery and development of characteristics for assessing the land use potential for agriculture and for tourism and natural resource use. Also included are the method used for selecting the field sites for socio-economic studies, the method for cost-benefit analysis and the rapid impact assessment matrix for comparing the different fence route options.

The appendices provide lists of the persons consulted, communities attending the Maun *kgotla*, the minutes of that *kgotla* meeting, membership of the consultative committee and the study tour, the persons consulted, a record of consultation with Basarwa communities, and copies of the newspaper articles published.



## 1. INTRODUCTION

The UK Department for International Development (DFID) is providing assistance to the Department of Animal Health and Production (DAHP), Ministry of Agriculture, Botswana to strengthen the capacity of the DAHP to implement new animal health and production policies which are cost effective, promote the integration of wildlife and livestock and maximise the sustainable use of Botswana's rangeland.

In response to the publicity generated by the construction of a number of veterinary fences to control the outbreak of Contagious Bovine Pleuro-Pneumonia (CBPP) in 1995, DFID agreed to support the assessment of the environmental impacts of the fences upon wildlife populations and the implications this has for conservation and natural resource management in Ngamiland.

A scoping exercise was carried out in 1997, which defined the terms of reference for the full environmental assessment of the fences in Ngamiland. The contract to undertake this work was put out to tender in late 1998, and Scott Wilson in collaboration with The Environment and Development Group were awarded the contract in May 1999.

As part of the Terms of Reference, a Consultation Plan was specified towards the end of the process in order to discuss the findings of the environmental assessment. However, from the outset, the study team considered that the consultation process was too fundamental to the whole exercise for this to be left until the final stages. It was therefore decided to develop a Consultation Plan within the first phase of the study in order to clarify the process in our own minds and to make it transparent to the Reference Group and stakeholders.

The draft Consultation Plan issued in September, served as a first discussion document, from which this final Consultation Plan was developed as a record of the process. It is hoped that the final Consultation Plan will in due course serve as a model for future consultations on environmental and natural resource use issues, both for fences and other developments.

This final Consultation Plan also provides the opportunity for recording in one place, the methodologies used by the other sub-teams for assessing the risks and impacts of the fences.



## 2. PRINCIPLES OF CONSULTATION & REPRESENTATION

The EIA developed a model of good practice in the design and implementing of a consultation exercise: it was tasked with producing EIA guidelines, and consultation with stakeholders is a key element of a successful EIA.

Consulting the stakeholders is a priority in this process, and in the case of this study the stakeholders ranging from neighbouring governments, sectoral interests such as the cattle and tourism industry to the communities affected by the fences. All members of the study team are involved with the consultation process in one way or another, discussing with the persons and organisations that can add to the body of knowledge about the situation and express their views. The Social Team is primarily interested in consultation with communities in the study field sites, and the approach and the mechanisms used will ensure as full and as representative a consultation as possible.

Representativeness is needed to reach social groups who may be marginalised and who may not be obvious to outsiders. Such groups may be reticent about expressing their views if approached without the support of leaders, but whose views may be significantly different from those of the majority. However, all the viewpoints in the community are inter-dependent, and as such they are critical to the quality and credibility of the findings. Consultation with community leaders is therefore essential to ensure that such groups are not missed.

- The findings must be representative of how the fences are affecting livelihoods, and the scale of this impact - in terms of how widespread the impact is in the project area, and in terms of severity on livelihood strategies in a field site.
- Representative findings are dependent on field sites being selected that are representative of livelihood strategies in the area and of livelihoods affected by the fence/s in that area.
- Selecting representative field sites requires consultation with and the agreement of traditional leaders, VDC members and other leaders (for example the chairs of CBNRM trusts).
- It is not necessary that this group be representative of all social groups affected by fences in the project area, what is important is that it selects field sites that are representative of the various impacts of the fences.
- But in the field sites we must include and consult with all social groups. This demands that we have our own knowledge of what social groups are at risk of being left out of the field work consultation, for example women, youth, and hunter/ gatherers, and ask that they be included.

In this study there are several points where representation is dependent on consultation, and consultation dependent on representation. These include the Maun Kgotla at which the selection of the Consultative Committee took place, and the village kgotla meetings, described below.

### 3. PHASES OF CONSULTATION

The consultation process fell into several phases, each with their different characteristics, purpose and timing. These are described below.

#### 3.1. *Initial Stakeholder meetings*

The purpose of the initial stakeholder meetings was to inform the different stakeholders about the Environmental Assessment and to begin the process of interaction with them in ways most appropriate to the different groups. A listing of stakeholders and their representative groups is provided in Appendix 1.

The following meetings were arranged during the first three months of the study:

1. **Process Workshop** - held in Gaborone at the end of June 1999. Invitees consisted of the main government and non-government stakeholders. The process of the study and the structure of the team was outlined. Comments were received and incorporated into the Inception Report. The members of the Reference Group were selected, bearing in mind the principal stakeholders, apart from the affected communities, who were to be represented by the Tribal Administration through Kgosi Tawana II.
2. **Launch Workshop** - held in Maun in the second week of July. This workshop was used to present the study and to introduce the study team to the institutional stakeholders based in and around Ngamiland. The comments from the participants in a wide-ranging and open discussion contributed significantly to the development of this plan. The proceedings from the Launch Workshop were prepared and distributed to participants.
3. **Maun Kgotla Meeting** was held in the Maun Kgotla at the beginning of September. This meeting brought together participants from the communities throughout Ngamiland. Invitations were issued through the Tribal Administration to Chiefs and village headmen, chairpersons for the VDCs, Farmers Committees and Community Trusts from 25 different communities (listed in Appendix 2). The purpose of this meeting was to introduce the study to the community leaders, to obtain initial comments, and, most importantly, to select a Consultative Committee for the study which would be representative, both of the different communities and of the different issues. The selection of the Consultative Committee described below marks the beginning of the second phase of consultation. Not every social group was adequately represented at the meeting – only four out of the 80 participants were women; there were few youths; discussion was dominated by pro-fence individuals, and the representatives of poorer and more marginal communities said little or nothing. The first speakers were pro-fence and set the tone of the meeting and those that spoke out in criticism of the fences appeared to be subtly intimidated.

However, the decision by the kgotla to have the Consultative Committee formed from VDC and trust members, who theoretically will have more time for assisting the study than the chiefs and their assistants, and have fewer conflicts of interest, was a helpful step in the process. The minutes of the meeting, in Setswana, are attached in Appendix 3.

4. **Consultative Committee** - The committee was formed with approximately 30 members, listed in Appendix 4a. At first glance it seems to be lacking members from the hunting and gathering groups in the western communal lands and members from villages close to the Caprivi fence to the east of the river. Two field sites that are representative of the impact of each fence were selected by the Consultative Committee. Villages affected by the Caprivi fence therefore were included, and the only social group not adequately represented by the selection of field sites was hunter/gatherers: the inclusion of Caecae was suggested by the team and agreed by the Consultative Committee. The team also suggested Tsodilo Hills (a national heritage site) be included, and this was agreed.

In addition to the formal meetings, many individual meetings were held between members of the team and different government and non-government stakeholders, laying the foundations for the next phases. The lists of people and organisations consulted during the process by the different sub-teams are included in Appendix 5. The study team members are listed in Appendix 11.

### **3.2. Dry Season Consultations**

The Dry Season Consultations consist of different sets of activities:

1. **Village kgotla meetings** took place in mid-September 1999. The purpose of these meetings, which follow on from the Maun Kgotla is to introduce the field study team to the communities where they will be working, and to explain the nature of the studies and their timing. As with the Maun kgotla it cannot be assumed that those present represent the interests of all social groups. Therefore it is important to ask the kgotla how groups that are not represented, for example women, youths and poorer and more marginalised groups, can be consulted and included. As far as possible the advice of the kgotla should be followed, and in this way the team should work with their consensus.

Contrary to popular belief that the Kgotla is no longer the forum through which effective community participation/consultation can be fostered, we found that, although it has lost its relative importance, it remains the best way to initially engage the communities in dialogue.

2. **Detailed field studies** in selected communities. The process of selection of the field sites with the Consultative Committee is described in section 7.4. The field study team stayed in or nearby the villages and hold discussions and participatory exercises designed to gather information about the village and its situation and the livelihoods of the people, and their views and opinions. The field team developed a check-list of information required, which can be found in the Social Issues team Methodology Pack. Groups that are missed out of such discussions and PRA exercises were consulted with separately.

The Chiefs, VDC members and government extension staff in each field site assisted the team members identify focus groups so that a broad range of community members with different livelihoods and at different stages of life could be consulted. Specifically the team asked for groups of youths, the elderly, women to include female headed households, cattle farmers, small stock owners, arable farmers, hunter-gatherers, fisherfolk, veldt product collectors and people involved in tourism activities. This promoted the inclusion of the views and opinions of a broad spectrum of stakeholders. At each field-site visits to nearby cattleposts, farms and settlement areas were undertaken where possible to ensure that people in marginal areas were also included in the consultation process.

3. **Meetings of the Consultative Committee.** In addition to ensuring a greater representativeness of the field site selection, the Consultative Committee was a key part of the process - the main linkage between the team and the communities after the field studies have been undertaken. They were important for reviewing and validating the information received and the interpretations by the social issues team. The Consultative Committee were invited to the Interim and Final Stakeholder workshops. In addition the field studies team arranged a final meeting of the committee immediately after the consultative committee study tour (see below) on 14 February.
4. **Focus Group meetings** - The purpose of the focus group meetings was to present the study and team to groups with particular sectoral interests. The views of the participants at these meetings was noted and incorporated in the findings; and further leads for additional contacts and information followed up. The following groups were identified:

- Botswana Wildlife Management Association (BWMA),
- Hotels and Tourism Association of Botswana (HATAB),
- Community Based Natural Resource Management (CBNRM) Trusts

The EIA team leader made presentations about the study at the Annual General Meetings of the BWMA and HATAB and invited comment and discussion about the issues from the participants at these meetings.

A special meeting for representatives of the CBNRM trusts was held in Maun on 2 February 2000. This was well attended and is reported on in the Issues Paper on CBNRM.

5. **Interim Stakeholder Workshop** in Maun on 12 November 1999. The purpose the interim stakeholder meeting was to involve the stakeholders in the process of assessing impacts. Information gathered during the dry season was presented and participants invited to comment and discuss the interpretation of the findings and the proposed wet season studies. This meeting was well attended and a report on the proceedings prepared.

### 3.3. *Wet Season Consultations*

The purposes of the wet season consultations were:

1. To gather information specific to wet season conditions.
2. To consult with persons and groups in communities who might not have been present at the time of the dry season consultations
3. To validate the previous information and impressions gathered
4. To test reactions and preferences to options for changes in the fencing alignments

The wet season consultations took place visiting the same communities as the dry season and using the same field study team as before, between 15 January and 2 February 2000.

### 3.4. *Community consultative committee study tour*

At the request of the community representatives, a study tour was arranged to enable them to understand and appreciate the concerns and impacts experienced by different communities adjacent to the fences. This was organised between 7 – 14 February 2000. A report was circulated to the Reference Group in May 2000.

Following the confirmation of the availability of funding assistance for the tour by the Department for International Development (DFID), invitations to participate in the study tour were routed through the Tawana Tribal Administration office in Maun. A spot announcement on Radio Botswana was also made to inform members of the Committee about the dates of the study tour, the pick-up points and other logistics.

A total of eighteen Community Consultative Committee members participated in the study tour (see Appendix 4b). The study tour delegation included representatives from the communities of Gunotsoga, Beetsha, Seronga, Gudigwa, Ikoga, Gumare, Nokaneng, Semboyo, Makakung, Kareng and Makalamabedi. In addition to the formal meetings held with member of the community in each village visited, informal meetings in the evenings were held over dinner.

Due to financial and other constraints, not all the sites selected for the social issues fieldwork could be visited. The communities and fences visited included in the study tour were:

Name of Village	Fence
Gunotsoga – Gudigwa	Northern Buffalo Fence, Caprivi Border Fence
Samochima	Samochima Fence
Ikoga	Ikoga Fence
Semboyo – Makakung	Setata Fence
Caecae	Setata Fence (western side), Western Border Fence

### **3.5. Consultation with Basarwa Communities**

In order to ensure that the voice of Basarwa communities was heard, the study team did all that they could to follow an inclusive approach, i.e. these minorities were included in all of the community consultations. A record of the meetings with the communities and organisations representing Basarwa interests is provided in Appendix 6.

### **3.6. Reference Group Meetings**

The Reference Group was made up of representatives of the major stakeholders. The list of persons on the Reference Group is presented in Appendix 7. During the course of the field work a total of six meetings of the reference Group were held – on 7, 16 and 28 July, 28 September, 11 November 1999 and 2 February 2000. Thereafter Reference Group Meetings were held in April, May and July 2000 to review the reports.

In addition two meetings were held to specifically consult with the Reference Group on 28 September 1999 and 3 February 2000 in order to brainstorm the policy options and to develop strategies for disease control. The reports of these meetings were circulated to the team and Reference Group. The full list of reports of meetings, issue papers and project reports is provided in Appendix 8.

### **3.6. Final Stakeholder meeting**

After the wet season studies have been completed and the draft reports compiled and reviewed by the Reference Group, the findings will be presented at the final stakeholder meeting. Participants will be sent out copies of the reports and the English/Setswana summary in advance. The final stakeholder meeting will take place in June 2000.

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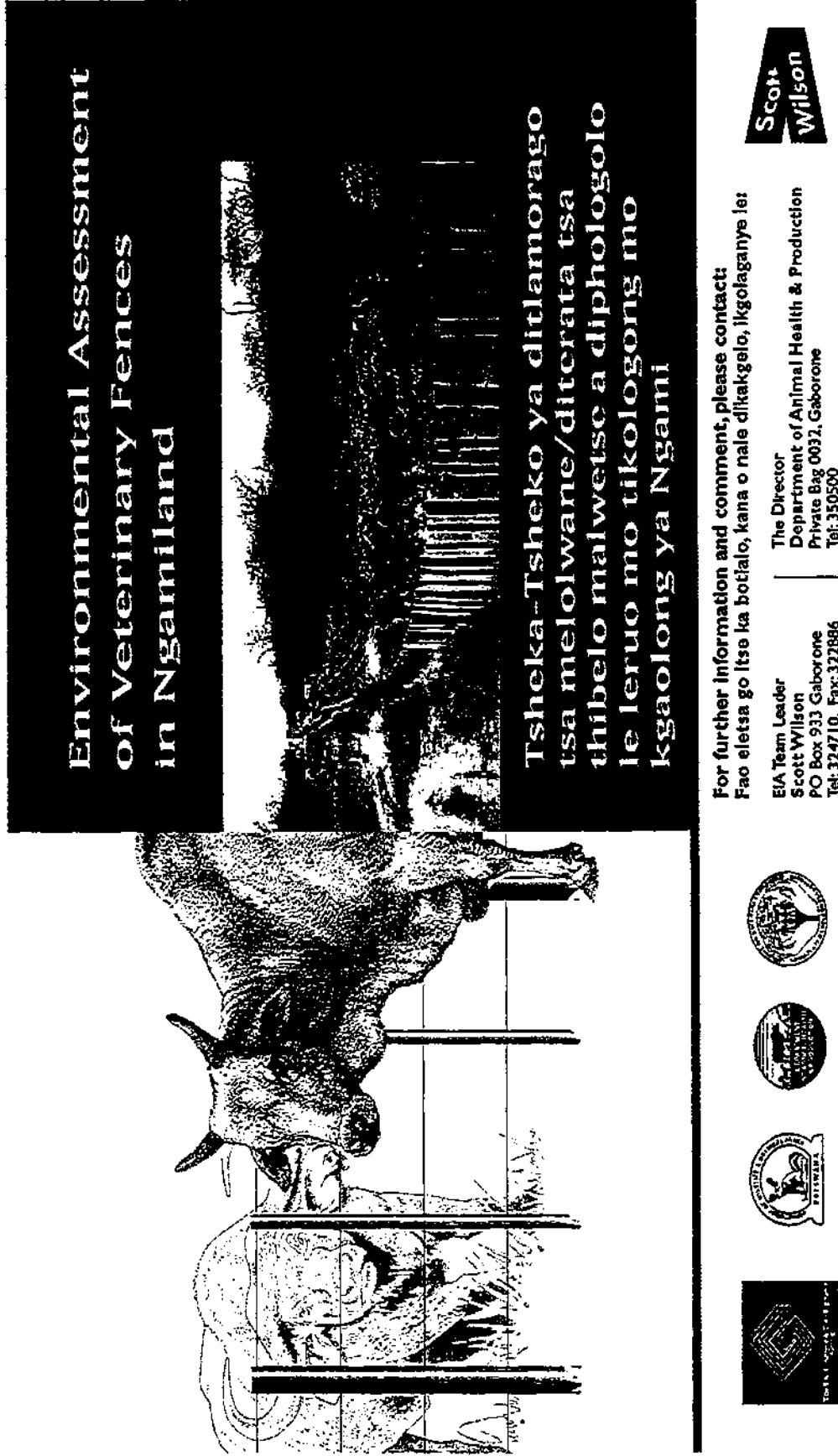
## 4. ISSUE PAPERS

In the Scott Wilson proposal, the idea of commissioning about four issue papers was put forward. A small budget item has been included for these papers. The purpose of such papers was to inform the study team reasonably early in the studies about particular issues and sectoral viewpoints. In the event, two papers were commissioned by specific authors, and two were prepared by members of the team based upon discussions and meetings. Two others were planned, on the perceived impacts upon tourism and the impacts upon the management of the Okavango Delta as a Ramsar Site, but no contributions were made by interested organisations and so these were dropped. These issue papers would be public documents in addition to the final reports. The following topics were covered:

- **Issue Paper No. 1. Impacts of Fences upon Archaeology and Cultural resources** - the paper identifies the principal archaeological and cultural sites in Ngamiland, highlighting any that might be affected by the routes of existing or proposed fences. A second section identifies in general terms the damage that can occur during the erection and maintenance of fences and ways of mitigating these. Ms. Sarah Dingalo of the National Museum kindly prepared this paper.
- **Issue Paper No. 2. Indicators of wildlife/fence interaction** - This paper is intended to be a guide for fence monitoring teams of the different signs and indications of interactions between wildlife and the fences. It would include a guide to the interpretation of spoor and trails alongside the fences as well as the direct evidence of damage to the fences and mortality of wildlife. This would be an extension of the fence monitoring workshop. Mr. Dan Muhghogho of the Department of Wildlife and National Parks was asked to prepare this paper. It was presented to the Reference Group in May 2000.
- **Issue Paper No. 3. Wildlife Friendly Fences** - this paper, prepared by Dr. Keith Lindsay of the study team, is based upon reviews of the literature, interviews and discussions with interested people and organisations. It presents a pragmatic way forward in developing the concepts of Wildlife Friendly Fences. It was presented to the Reference Group in May 2000.
- **Issues Paper No.4. Fences and Community Based Natural Resource Management** - this paper was prepared by Mark Murray, the CBNRM specialist on the study team, based upon the interviews and discussions with existing and potential CBNRM enterprises, and the results of the workshop on CBNRM issues held in Maun on 2 February 2000. It was presented to the Reference Group in May 2000.



Figure 5.1. Poster Publicising the Environmental Impact Assessment of the Veterinary Fences in Ngamiland







## 5. PUBLICITY AND THE MEDIA

The role of publicity and the media in an exercise of this nature is to draw the attention of the wider public to the debate and to inform and to encourage comment. Through doing so, people may wish to contribute their own ideas and experiences. Whilst individual contributions may not be representative of any one group, the body of comment generated as a result of publicity is an indicator of public opinion. It is also important from the point of view of transparency that the activities and findings of the study are publicised.

Publicity can be double-edged, and care is needed in its management in order not to polarise public opinion and hence pre-judge the situation and the study. The following activities were organised:

### 1. Poster and information sheets:

- A poster was prepared and distributed notifying people about the study and giving contact details for the study team and the DAHP. The poster was given to each participant at the Maun Kgotla, and several copies were given to each member of the Consultative Committee to put up at key points in their communities. (see Fig.5.1) The field teams have taken posters for display in other villages and public places. In addition about 20 - 30 copies of the poster has been distributed to the DAHP and DWNP offices and fence maintenance camps in Ngamiland. The poster was distributed to participants at stakeholder and focus group meetings. Hotels and tourism operators were asked to display them in their hotels and lodges.
- A one-page information sheet in English and Setswana has been prepared and similarly distributed. This is attached in Appendix 9.
- The few comments and letters received from the general public in response to these requests were sent a letter of thanks and copies of the proceedings of the Interim Stakeholder Workshop.
- At the end of the study a summary will be prepared in English and Setswana highlighting the findings.

### 2. Radio and broadcasting:

- A spot announcement was made on the radio for three days prior to the Kgotla in Maun giving notice that this meeting was being held.
- Information and Broadcasting department were present at the Maun Kgotla and filmed some of the proceedings for later use.
- Round Table: Radio Botswana have been approached by the NCSCA to organise the broadcast of a Round Table discussion on the issue of veterinary fences. This discussion would include members of the Reference Group and the study team – Mr. S. Monna (NCSCA), Dr. K. Masupu (DAHP), Mr. J. Mathlare (DWNP), Mr. I. Magole (Conservation International) and Ms. K. Molokomme (Study team).

### 3. Newspapers:

A reliable journalist, Mr. Dan Peke, was identified and approved by the Reference Group to write a series of six articles about the issues of fences for publication in the national press. The newspaper, Mmegi, was chosen as the paper with the largest circulation and an interest in environmental issues. These six articles would cover the topic in the following aspects:

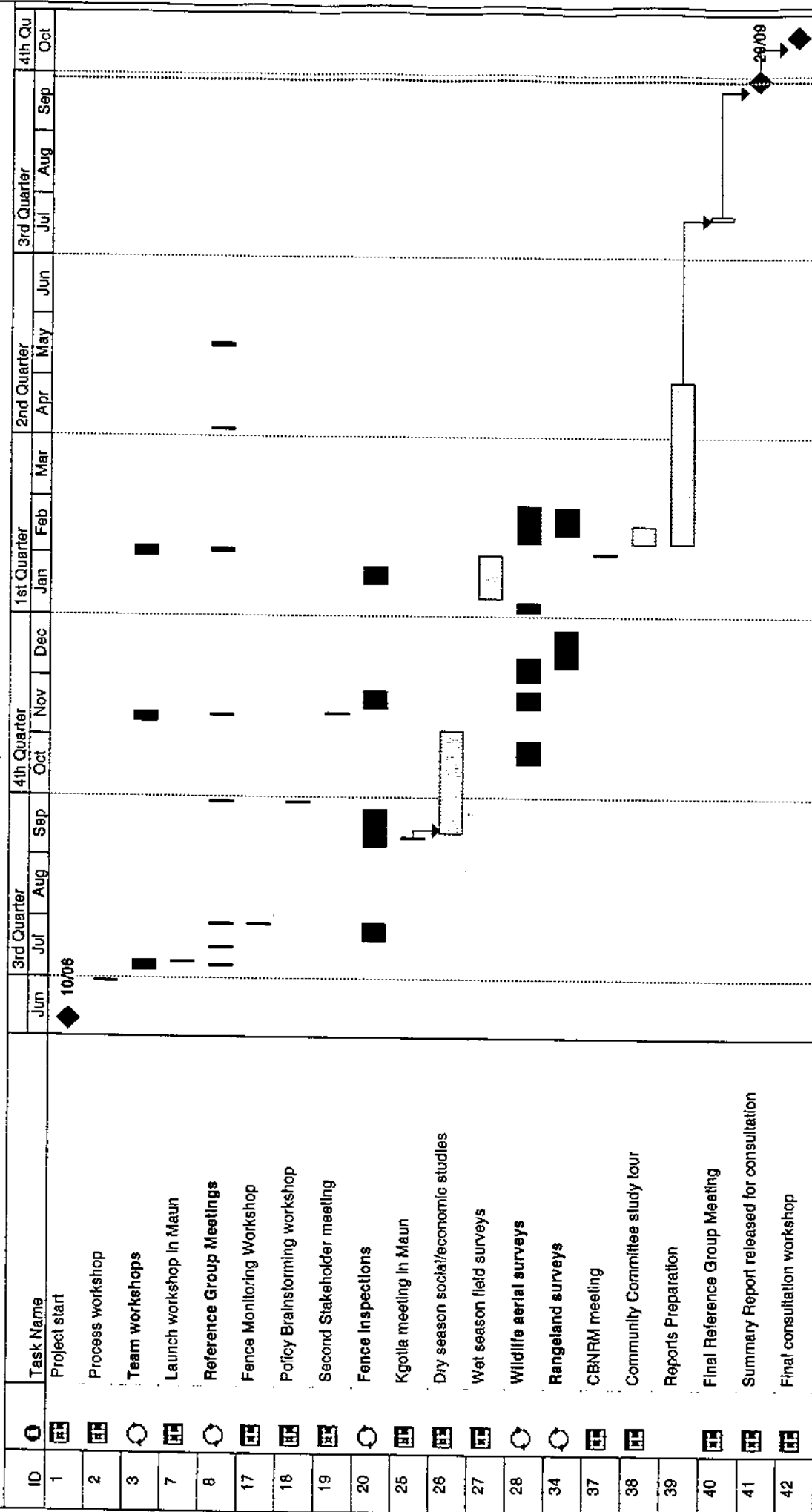
- Overall process of the EIA
- Livestock perspectives
- Wildlife and tourism perspectives
- Social and community perspectives
- Economic perspectives
- Overall findings of the study to be published after the final stakeholder workshop

The articles published to date are attached at Appendix 10.

## **6. TIMING AND IMPLEMENTATION**

The schedule of events forming this consultation plan is shown in Figure 10.2.

EIA of Veterinary Fences in Ngamiland  
Consultation plan timescale



Project: Consultation timetable  
Date: Thu 28/09/00

Task: [ ] Milestone: ◆ Summary: [ ] Rolled up task: [ ]

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## 7. STUDY METHODOLOGIES

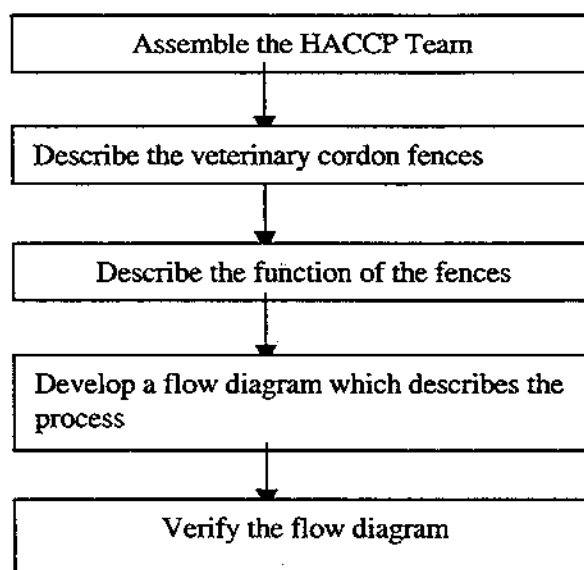
This section provides a record of the methodologies used by the sub-teams in their fieldwork, analysis, and risk and impact assessments.

### 7.1. *Livestock disease risk assessment*

The methods used for assessing the quantitative risks of animal disease are described in the text of volumes 1 and 3. A comparative analysis of the risks of disease and their control by use of veterinary cordon fences was made using an adaptation of Hazard Analysis Critical Control Point (HACCP) Methodology. HACCP is a systematic approach to the identification, evaluation, and control of hazards based on the following seven principles:

- Conduct a hazard analysis
- Determine the critical control points (CCPs)
- Establish critical limits
- Establish monitoring procedures
- Establish corrective actions
- Establish verification procedures
- Establish record-keeping and documentation procedures

#### PRELIMINARY TASKS IN THE DEVELOPMENT OF A HACCP PLAN



#### **Hazard Analysis**

Hazards, and their likely occurrence and severity, were identified by the animal health team.

#### **Critical Control Points**

A CCP is a step at which control can be applied and is essential to prevent or eliminate a hazard or reduce it to an acceptable level. CCPs were determined and CCP decision trees were produced.

#### **Critical Limits**

Where possible, critical limits (maximum and/or minimum value to which a parameter must be controlled at a CCP to prevent, eliminate or reduce to an acceptable level the occurrence of a hazard) were determined to distinguish between safe and unsafe operating conditions at a CCP.

#### **Monitoring procedures**

This assignment has required the identification of disease hazards and critical control points to enable judgements to be made on the efficiency of the present fences in controlling disease and to make

comparisons with the Status Quo and the alternative disease control options A and B, produced by the EIA. However, this is only the first step of a HACCP procedure, the next is to establish a monitoring procedure which determines and warns when there is a loss of control at a CCP. Monitoring provides written documentation for use in verification.

#### **Corrective actions**

When there is a deviation from established critical limits, corrective actions are necessary. They should: determine and correct the cause of non-compliance; record the corrective actions that have been taken. Specific corrective actions should be developed in advance for each CCP and included in the HACCP plan.

#### **Verification procedures**

Verification is those activities, other than monitoring, that determine the validity of the HACCP plan and that the system is operating according to the plan. The major science in a HACCP system centres on proper identification of the hazards, CCPs, critical limits and instituting proper verification procedures. A comprehensive, unbiased verification of the HACCP system should be conducted by an independent authority.

#### **Record keeping and documentation procedures**

These need to be defined and in place to implement the HACCP process. The analysis is based on expert opinion and quantitative data where it can be obtained and is reliable and appropriate. In the analysis, control points and hazards are scored, the scores are weighted according to expert opinion on the relative value of the CCPs and the severity of the hazards.

Separate analyses have been made for CBPP and FMD as the risks are different. The analyses indicate areas of increased risk, level of risk and the degree of control in place to counteract the risk.

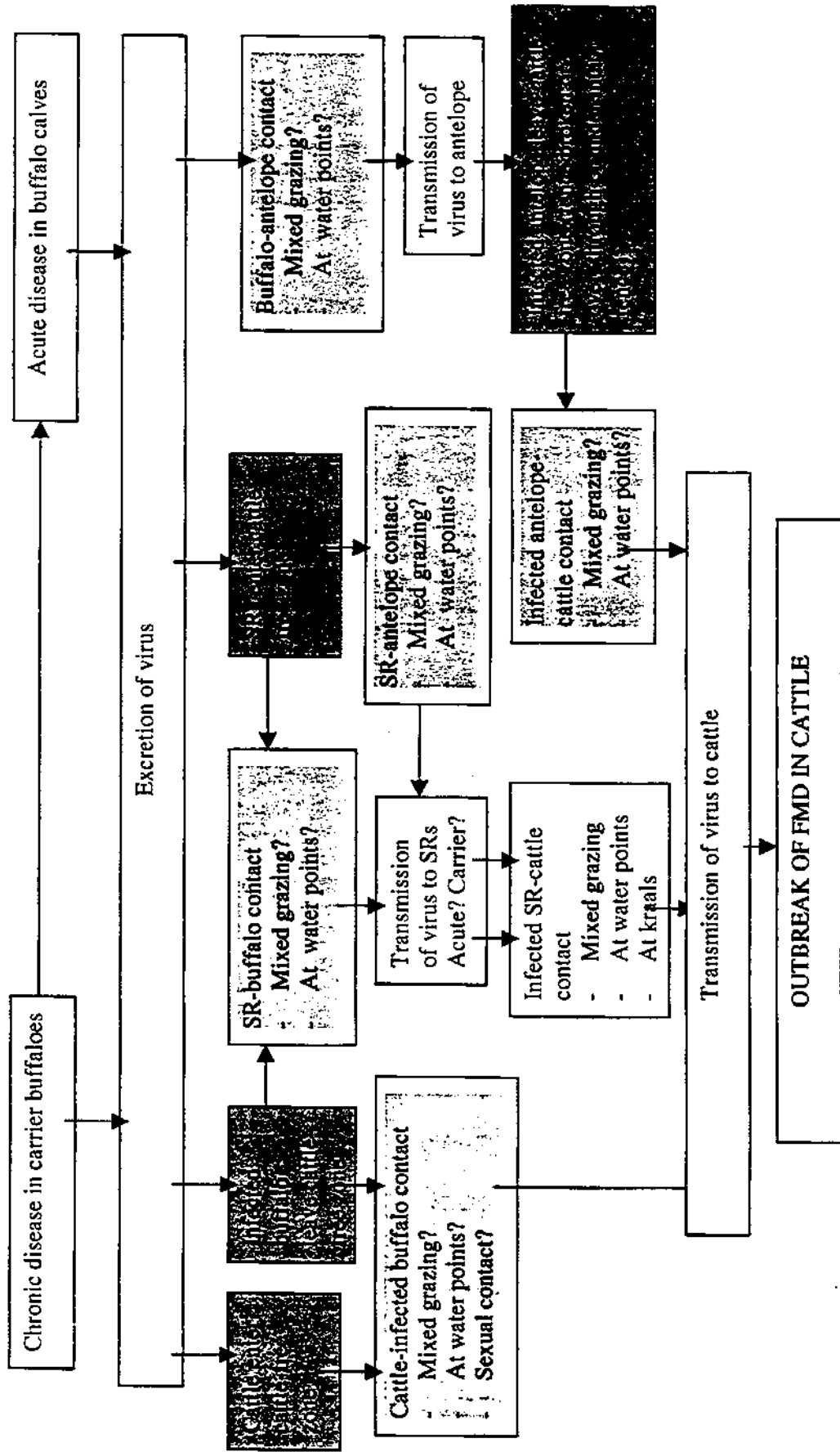
The fences, surveillance, and their level of maintenance are assessed according to observations made on field trips by the EIA team, with one exception: the parts of the Setata Fence which have been laid down have not been taken into account in the evaluation of the Status Quo, because this is a mitigation that has been implemented to accommodate stakeholders in advance of the results of the EIA.

The methodology has been useful to evaluate the disease risks and their control according to the different scenarios. We believe that it can also be useful to DAHP as a methodology to continue the evaluation of veterinary cordon fences and any proposed modifications, and to monitor their continuing effectiveness and efficiency.

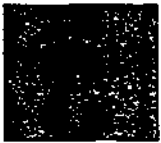


Figure 1 shows a scheme of the hazards of transmission of FMD from buffalo to cattle and the CCPs. Figure 2 shows a similar scheme for transmission of CBPP from cattle outside Botswana and the CCPs. Tables 1 and 2 describes which CCPs may be used for FMD and CBPP respectively.

Those hazards and control points which could be observed and, where possible, measured during the field work of this EIA, are recorded and scored with respect to each fence, with regard to FMD and CBPP.

**FIGURE 1. HAZARD: TRANSMISSION OF SAT FMD ENDEMIC IN AFRICAN BUFFALO POPULATION IN OKOVANGO DELTA AND IN NAMIBIA (MAHANGO AND BWABWATA NATIONAL PARKS) TO CATTLE**



**Table 1. FMD Control points**

	<p>Control by fencing:</p> <p>Impact of wildlife on fence:</p> <p>Recorded level of damage to fence:<sup>1</sup></p> <p>Recorded level of repairs to fence:</p> <p>Monitoring and maintenance of fence:</p> <p>Distance between monitoring and repair camps</p> <p>Cattle close to fence:</p> <p>SRs close to fence</p> <p>Presence of vaccination zone</p> <p>Presence of surveillance zone</p>	<p>Single 1.4m Single 1.4m with buffalo cable Double 1.4m with buffalo cable Double 1.4m with buffalo cable and electrification Double 2.6m with buffalo cable and electrification (impermeable barrier) Other options?</p> <p>Breaks/10km Repairs/10km</p> <p>Weekly Monthly Other?</p> <p>Kms</p> <p>0 - +++</p> <p>0 - +++</p> <p>yes/no</p> <p>yes/no</p>
	<p>Level of surveillance</p> <p>Capacity of DAHP and DWNP to keep wildlife and livestock apart</p> <p>Vaccination</p>	<p>0 - +++</p> <p>0 - +++</p> <p>None Once yearly Twice yearly Three times yearly</p>
	<p>No critical control points</p>	

<sup>1</sup> It may be possible to calculate rate of damage to a fence: for example, rate of damage over the entire life of the portion of fence examined would be:

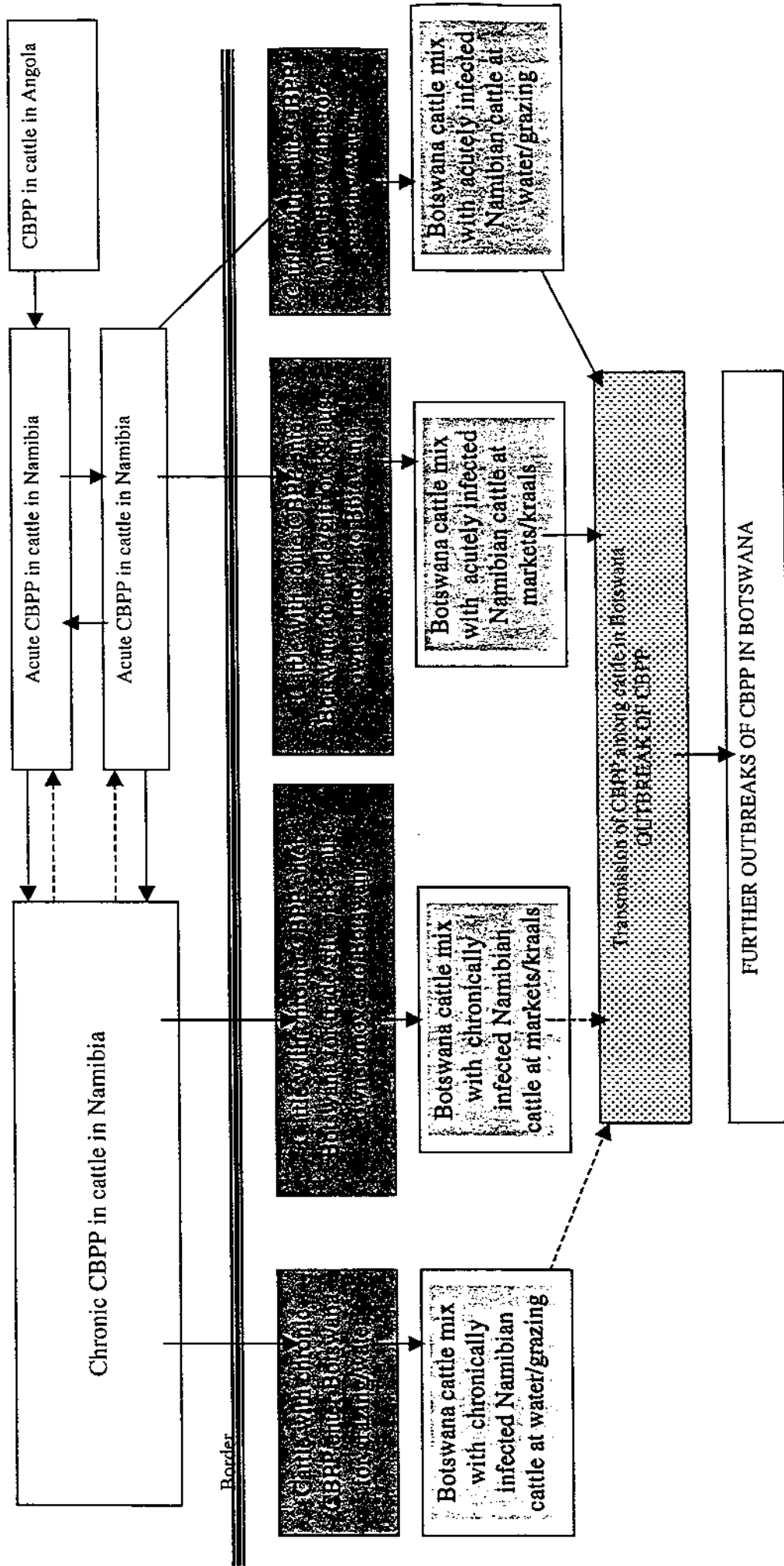
Breaks per 10km + Repairs per 10km/days since fence was erected = damage rate per day.

Recent damage to portion of fence examined would be:


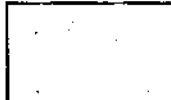
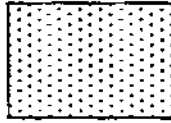

Breaks per 10km/days since last maintenance visit = recent damage rate per day.



**FIGURE 2. HAZARD: TRANSMISSION OF CBPP FROM CATTLE IN NAMIBIA TO CATTLE IN BOTSWANA**



**TABLE 2. CBPP CONTROL POINTS**

	<p>Control by border fencing:</p> <p>Impact of wildlife on fence:</p> <p>Recorded level of damage to fence:<sup>2</sup> Recorded level of repairs to fence:</p> <p>Monitoring and maintenance of fence: Distance between monitoring and repair camps</p> <p>Cattle close to fence on Namibian side:</p> <p>Cattle close to fence on Botswanan side:</p> <p>Presence of vaccination zone</p> <p>Presence of surveillance zone</p>	<p>Single 1.4m Single 1.4m with electrification Double 1.4m Double 1.4m with electrification Other options?</p> <p>Breaks/10km Repairs/10km</p> <p>Weekly Monthly Other?</p> <p>Kms</p> <p>0 - +++</p> <p>0 - +++</p> <p>yes/no</p> <p>yes/no</p>
	<p>Level of surveillance: At grazing and water points and kraals At markets and checkpoints</p>	<p>0 - +++ 0 - +++</p>
	<p>Control by CBPP fences</p> <p>Cattle close to fence on north side:</p> <p>Cattle close to fence on south side:</p>	<p>Single 1.4m Single 1.4m with electrification Double 1.4m Double 1.4m with electrification Other options?</p> <p>0 - +++</p> <p>0 - +++</p>
	<p>No critical control points</p>	

<sup>2</sup> As for Table 1.

## 7.2. *Wildlife and Rangeland methodologies*

The project asks a set of different but related questions about the impacts upon wildlife populations of the veterinary cordon fences in western Ngamiland. The Audit of existing CBPP and FMD fences asks us to estimate the impact of fences from 1995 to the present day. The EIA of the proposed link between the Northern and Southern Buffalo fences asks us to describe the current situation in the area and to speculate about the effects of establishing a new fence. The SEA of disease control options asks us to compare the potential impacts of different disease control options to the *status quo*. To approach these questions, we have had to make use of data collected in the past by other researchers and compare them to data collected by the present wildlife/ rangeland sub-team. The other sources of data include reports from DWNP biologists who undertook aerial surveys, radio-tracking or ground-based studies and researchers working for NGOs such as Conservation International and the Okavango Peoples Wildlife Trust. In some cases these data were collected for purposes which were different from those of the present study, such as for setting offtake quotas by DWNP, while in other cases the studies were directed at the same ends, but using different methods

The questions asked by the Audit, EIA and SEA, in respect of their different target fences, include:

1. Have major habitat types been dissected by any of the fences?
2. Have there been changes in vegetation composition or biomass, related to changes in use intensity of forage, competition between livestock and wildlife over forage or in the frequency and extent of veldt fires?
3. Have there been changes in wildlife numbers that appear related to the fences?
4. Have there been changes in wildlife distribution and movements, including wildlife movements to key resources, caused by the fences?
5. Have there been increases in wildlife mortality related to direct contact with the fences?
6. Has there been an increase in wildlife mortality due to an increase in
  - the level of wildlife-human conflict and PAC activities
  - the incidence of illegal hunting
  - predation rates
  - transmission rates of disease from livestock to wildlife
7. Has there been an increase in the likelihood of any of the above impacts due to subsidiary fencing developed alongside the veterinary fences?

### 7.2.1 Dissection of habitat types

This broad-level question is not difficult to evaluate. It can be approached by reference to existing vegetation maps and in the case of specific localities, satellite imagery and ground-based observations.

### 7.2.2 Vegetation changes

A fence can impact upon the vegetation of the surrounding area in three main ways:

- by creating a 'hard edge'
- by changing fire frequencies and occurrence,
- by displacement wildlife populations

It is important to emphasise that fences do not directly change vegetation types or structure. Such changes may however result indirectly from the fact that rural communities tend to aggregate along fences because of the access provided by the fence maintenance roads. Consequently, the fence may over time provide a 'hard edge' between contrasting land uses (eg. livestock versus wildlife), with paired samples along the fenceline providing a valuable framework for establishing the environmental impact of differing land uses. Unless the fence alignment follows a natural ecological boundary, the changes to the vegetation can be usefully assumed to have resulted from the different types of land use.

A 'hard edge' is necessary for such a study and along the fences studied in the EIA simply does not exist, simply because the fenceline contrasts in land use are not well defined. For example, while to some extent disputed, the nearest cattleposts to the westernmost portions of the Setata fence are more than 30kms away.

Vegetation floristic composition and cover was assessed in transects oriented at right angles to the fence line and spaced at 2.5 km intervals. These observations were taken at the same time as spoor records (see 7.2.4 below)

The most likely way in which fences may impact upon the vegetation is in fact by changing the frequency and extent of fires. Quite simply, by increasing vehicular access into formerly remote areas, fences have led to increasing fire frequencies within the region. Increased fires may also result from the burning of vegetation cleared from the fence by maintenance crews, which may subsequently get out of control and burn a much wider area. However, fences may also be argued to effectively act as firebreaks, particularly when the maintenance roads are graded on a regular basis. In this respect, the effect is clearly the opposite to that above.

In order to address this issue the data generated by the burn scar mapping project within the Department of Meteorological Services, within the Botswana Range Inventory and Monitoring project (BRIMP) was consulted. In particular it can be established whether most fires appear to start or terminate at a fenceline, simply by the nature of the burn scar. For example, fires tend to start from isolated point sources and branch over increasingly wider areas according to the prevailing winds.

### 7.2.3 Changes in wildlife numbers, distributions and movements

Although there is anecdotal material (much of which cannot be substantiated) to indicate that some species may have been affected, the only scientifically collected data available come from the DWNP aerial surveys. It is not possible to definitely implicate the fences because the survey data were not collected as part of an experiment to test that hypothesis. It is questionable whether an experiment could in fact have been designed to establish effects of the fences, as it would require a control area that might not be available. An experiment cannot be set up after the fact and the comparison of survey information can only provide evidence of change, not identify causes.

However, it is equally true that the evidence does not exonerate the fences as a possible cause of impact on wildlife populations. This is distinct from the conclusion that would have been reached if no changes had been detectable, in which case one would have to assume that the impact of the fences was minimal.

#### Trends

Areas of interest were digitised to make polygons:

“SBLOCK”: the area between the Setata Fence and the Kuke Fence from the Namibian border to a vertical line along 22°34'E.

“NBLOCK”: the area between the Setata Fence and the Ikoga Fence from the Namibian border east to follow the southern buffalo fence.

“NBUFF”: the area between the northern buffalo fence and the Namibian border and bounded on the west by a vertical line along 22°24'E.

The numbers and variances were calculated for each area for major species. These were zebra, giraffe, eland, gemsbok, hartebeest, wildebeest, springbok and ostrich for western Ngamiland and zebra, roan, sable, buffalo for the NBUFF area.

DWNP aerial surveys provided data from 1987, 1990, 1991, 1993, 1994, 1996, 1997 and 1999 (Calef 1988, Bonifica 1992, Craig 1991, DWNP 1993, ULG 1993, ULG 1994a, ULG 1994b). Additional high intensity surveys undertaken by the wildlife sub-team provided extra “post-fence” in November, December 1999 and February 2000.

The significance of differences between estimates before and after the erection of the CBPP fences were tested using Student's *t* test.

### **Additional examination of trends**

The data from surveys were fitted to exponential regressions to determine whether there were trends prior to the fence erection that may have been continued after 1995 and given that there were significant statistics found by the t tests.

### **Simulation of trends**

The identical boundaries as SBLOCK and NBLOCK were placed in 20 random positions in the southern Kalahari (south of 21°S) and estimates and variance calculated for the species in which differences between population sizes before and after 1995 were statistically significant in Ngamiland.

The value of this exercise is questionable as the results are not strictly comparable with those from Ngamiland because:

- the ecosystems are different
- there were fewer data available for this exercise as less surveys have been undertaken in the southern part of Botswana than in the north (only 3 before and 3 after 1995).

### **Aerial surveys - sample counts**

Aerial surveys providing the data for this project all follow the sample method of "Standard Reconnaissance Flights" (Norton Griffiths 1987) and Jolly's (1969) method number two for analysis of unequal sample unit sizes. The DWNP surveys have been described in detail in Bonifica (1992) and ULG (1995). Basically this entails flying at a constant height (300 ft above ground level using a radar altimeter) along transects within strata defined by distributions of the major wildlife species. Accurate navigation is maintained using GPS. Observers on each side of the aircraft count the animals in a single fixed strip demarcated by rods or streamers attached to the lift struts. The strip is about 150m wide on each side and this is calibrated for each observer (and for every new survey) by flying over numbers marked on a runway at 10 metre intervals to provide an empirical measure of the strip width. The DWNP surveys follow the same transects every year to facilitate continuity. These are all orientated north-south

The surveys undertaken specifically for the present project used the same basic techniques to permit direct comparison of results. However they differed in that transects were positioned according to a randomly chosen point in each stratum and each survey and some transects were orientated east-west or at other angles to allow sampling across important ecological features in smaller strata. The area was stratified into smaller blocks than used in DWNP surveys (Figs 7.4.1 and 7.4.2) according to previous wildlife distributions and sample intensities were considerably higher than DWNP surveys.

Sample surveys of Ngamiland were undertaken in November, December and January (although the last had to be abandoned due to bad weather). An additional survey in February sampled Ngamiland and the whole Delta to provide a view of the overall ecosystem for the season in terms of wildlife numbers and distributions and also as further background for EIA should changes be made to the fences.

### **Aerial sample counts by Conservation International**

Four aerial sample counts have been carried out on behalf of Conservation International during July – September 1999 in the area bounded by the Okavango Delta, the Kwando River and the Namibia-Botswana border (Burm & Griffin 1999). The methods employed on these surveys were similar to those of the wildlife sub-team, but sufficiently different in significant details that their results are not directly comparable. It is hoped that, at the very least, we can use the results of the CI surveys for an indication of relative distribution and movements of wildlife in the area of the Northern Buffalo Fence.

### **Survey of sitatunga**

The possibility of linking the northern and southern buffalo fences made it important to establish the status of the sitatunga population in and around the region of the gap as this species could be adversely

affected by such a link. The species range is restricted by its very specific habitat preferences and it is vulnerable to over-hunting, disturbance and habitat destruction.

The species has been counted using sample techniques in the past but it has been found that these methods are not likely to provide very accurate estimates of their numbers because of the habitat and secretive habits of the animals. A "total" count of sitatunga in the "panhandle" and northern Delta was therefore conducted using a helicopter. Flights were routed along guidelines about 700 m apart, but areas that were obviously unsuitable for sitatunga were omitted and areas where animals were thought to have been missed were searched repeatedly or circled. It is quite likely that despite this effort, a number of animals were missed because they are extremely difficult to find if they lie in thick papyrus and they tend to hide during the day and can only be seen easily in the very early morning and late afternoon. Nevertheless, the survey provided a minimum number and is probably more accurate than previous sample surveys.

### **Radiotracking of buffaloes**

The DWNP District Biologist based in Kasane has been carrying out radiotracking of buffaloes since 1995 in the Okavango and Kwando-Linyanti systems. He has made the data available to the wildlife sub-team for inclusion in the analysis (Vandewalle 2000).

### **7.2.4 Blocking of access to key resources and direct wildlife mortality on fences**

Fences are undoubtedly responsible for wildlife deaths through entanglement or contact related injuries. Photographs of individuals caught in fences, for example giraffe (*Giraffa camelopardalis*) and ostrich (*Struthio camelus*) all too graphically illustrate the inability of wildlife to pass through the fencing barriers and provide conclusive evidence of their most damaging impacts. However, there are several vital questions that need to be answered in order to assess objectively the mortality and/or blocking impact of fences:

- how many individuals are affected?, for example is it tens or hundreds of individuals?
- are only certain sections of the fence affected?
- over what length of time do such impacts prevail, for example, do individuals of a population 'learn' to avoid fencelines over time?

If the latter is correct, one may expect a fairly high initial period of impact/wildlife mortality upon the fence, which then declines over time, as wildlife populations 'adjust' their movement patterns to compensate for the fence's presence. Clearly this is only possible if home ranges can be adapted to accommodate for such a loss of habitat, which requires that the fence alignment takes full cognisance of wildlife's access to key resource areas. A failure to do so, would result in wildlife impacts continuing to occur long after the fence has been erected.

Monitoring over a long period of time is clearly essential to the objective assessment of both of these impacts, with the collection of wildlife mortality and fence impact data occurring at least on a monthly basis, to ascertain if the fences disrupt seasonal or migratory movements by cutting across essential ecological resources. Regrettably, these data do not exist at present. Along the Setata fence early fenceline monitoring studies were carried out on the ground (e.g. Albertson 1998, DAHP/ DWNP/ OPWT/ CTT 1998, Masunga & Kegoeng 1998, Masunga 1998, Albertson & Monggae 1999) and by aerial reconnaissance (Mughogho 1998). More recently, fence monitoring protocols initiated under this project have allowed the DAHP fencing crews and DWNP patrol staff to record fence impact data on a regular basis on specially designed forms. However, inevitably these represent only snapshots rather than a coherent set of scientific data.

Initially it was hoped that the number of bent droppers and broken fencing wire would provide a useful surrogate measure of the extent of wildlife impact, and entanglement, with the fence. Indeed, perhaps a link, albeit tenuous, could also be established between the frequency of fence damage and wildlife mortality/ injury. However, variation in fencing materials, namely the use of wooden as well as metal droppers, together with the fact that identifying individual fence impact occurrences is extremely difficult, led to the abandonment of such an index. Gemsbok in particular were reported to cause

considerable damage to the westernmost sections of the Setata fence, which together with the lack of maintenance along such portions, meant that it was in fact easier to assess the undamaged portions of fence.

The rangeland component of the EIA study has therefore sought to supplement the existing data by carrying out:

- vegetation surveys along the CBPP and Northern Buffalo fences
- systematic spoor counts along the fences and along 100m transects into the surrounding rangeland on either side of the fence.

The early fenceline surveys on the Setata fence used a distance of 5kms spacing to systematically site the spoor transects. The EIA team used a distance of 2.5kms along the westernmost portion of the Setata from Reronde to the border, with additional observations made at dropped sections of the fence - mainly to see if animals were making use of the opportunity to cross the fence. Major breakages in the fence, and/or unusual spoor sightings were also noted if they occurred in between these site transects. Provided a full day is devoted to sampling it is possible to cover the entire fence in a single day, which is important if double counting is to be avoided - eg. elephants can travel large distances at night.

Where possible, the knowledge of local trackers, eg. the Ju/hoan trackers at Caecae, should be used by them accompanying the fence survey team and forming an integral part of the data collection exercise, as their knowledge and tracking ability far surpasses those of even the most qualified 'professional'. The fenceline monitoring surveys undertaken during the EIA sought to use the available hard scientific data, from fenceline surveys, and also the view of the affected local communities. Along the Setata fence this meant the involvement of key informants at Caecae established via meetings with the kgosi and the VDC. Spoor counts were made along the westernmost 45kms of the Setata fence using wildlife trackers from Caecae and the location of key resource areas discussed, both within the field and later at a meeting at Caecae.

Using the spoor data from the above, and animal impact data from the earlier fenceline surveys, an environmental file will be generated, and compared with the floristic data from the vegetation surveys. Using the CANOCO program (ter Braak, 1988) the question as to whether certain sections of the fences are more highly impacted upon others can be statistically tested. This mainly applies to the Setata fence and the Northern Buffalo fence.

#### **7.2.5 Changes in wildlife mortality due to changes in wildlife-human conflict, illegal hunting, predation rates and transmission of disease from livestock to wildlife**

The DWNP office in Maun has been contacted about providing information from their records on PAC activities, illegal hunting and reported predation. This contact will be followed up to assess whether quantitative results can be extracted from them, or whether less precise "guesstimates" must be applied.

The wildlife sub-team will be advised by the veterinary sub-team on the level of risk posed by different fence configurations on the transmission of disease from livestock to wildlife.

#### **7.2.6 Subsidiary fencing**

The wildlife sub-team will be advised by the land use sub-team on whether subsidiary fencing has developed or is likely to develop under different fencing regimes. They will then take a view on whether any such fencing is likely to increase the intensity of any of the previously noted impacts.

### **7.3. Landuse Potential assessment methodology**

#### **Approach to Present and Potential Land Use Mapping**

The primary activities required from the land use section were to:

- Assess current and potential land use for the different areas affected by fences.
- Make recommendations for the erection, re-routing and decommissioning of all the fences in Ngamiland, and the environmental management plan.

- Provide inputs into the assessment of the impacts of different policy options
- Contribute to the audits, EIA and SEA.

The land use data were compiled in a GIS using ArcView. The GIS was convenient as it allowed for the combining and assessment of large data sets.

#### Types and Availability of Data

Initially a number of data sets, useful in detailing present and potential land use, were identified. Three approaches to generating coverages for the different types of data were adopted. These were:

- Compilation of existing digital or hard copy data coverages (these were usually Government of Botswana data although some data were supplied by the Namibian Government).
- Compilation of coverages from studies carried out during this consultancy.
- Generation of new coverages (largely through the use of Landsat TM data).

The coverages compiled for use in the analysis are listed in Table 1, below.

**Table 1: Coverages used in the land use analysis**

Sector	Coverage
Climate	o 550 mm rainfall isohyet
Groundwater	o Borehole distribution
Surface water	o Areas of permanent swamp o Ephemeral surface drainages
Soils	o Potential of soils for arable agriculture
Gazetted Land Use	o Gazetted use of CHAs. o Designated area of wetlands of international importance.
Community land use	o CHAs being used for CBNRM activities
Physical land use	o Existing agriculture
Human settlement	o Villages and cattleposts
Livestock	o Pre CBPP distribution of cattle
Forestry	o Areas of high potential for forestry
Wildlife	o Biomass of wildlife per CHA. o Distribution of charismatic wildlife species
Cultural	o Key National Museums sites
Sites of high tourism potential	o Rocky outcrops and other sites identified during this study

#### LandSat TM Coverages

At the start of the study only two sets of remote sensing data were available, both of which are pre CBPP fences and Northern Buffalo Fence erection (1:50,000 aerial photographs (1991 and 1990) and Landsat TM (1994) three bands). It was therefore necessary to obtain suitable imagery. Six 1999 scenes (7 bands) were purchased, georectified and compiled into a mosaic. The bands were combined to produce false colour and a NDVI (Normalised Difference Vegetation Index) views of Ngamiland. These data were used for the generation of some of the coverages.

Apart from being essential to the land use interpretation these data were available for the ecological aspects of the study. The Ngamiland mosaic will also form the base of the Regional Management Plan. Details on the imagery are available in Appendix 12

#### Combining Data Sets (Land Use and Land Use Potential)

##### Existing Land Use

Details on existing land use were obtained through key persons interviews, existing map data and interpretation of the LandSat imagery.

##### Potential Land Use

Land use potential was generated for two scenarios:

- Agricultural (livestock and arable agriculture), and
- Tourism, CBNRM and Wildlife

These scenarios are closely linked to gazetted land use.



Agricultural potential was generated by combining coverages after assigning values (ranks) to information in each coverage as described below (Table 2).

**Table 2: Data used to generate the Agricultural Potential Map**

Sector	Coverage	Rankings	Origin of Data and Comments
Climate	550 mm rainfall isohyet	>550 = 1 <550 = 0	BRIMP rainfall map of Botswana
Groundwater for livestock	Borehole distribution buffered for 4 km	All boreholes used for livestock were ranked "2"	Ngamiiland Waterpoint Survey (industrial, urban and village water supply, mining, research, wildlife and monitoring boreholes were excluded)
Soils	Potential of soils for arable agriculture	< moderate = 0 moderate = 2 moderately high = 3	MOA/FOA/UNDP Soil map of Botswana. Digitised by BRIMP, Soil potential map generated by this project
Gazetted Land Use	Gazetted use of CHAs	WMA = 0 Pastoral/Arable/Res.= 1 Agricultural specific (BLDC, TGLP) = 2	IFAD, updated by this study
Physical land use	Existing agriculture	Soils with high irrigation potential = 4, molopo farming = 3, dryland arable = 2	This study and Landsat imagery
Human settlement	Villages and cattleposts buffered by 5 km, large villages by 10 and towns by 20	All buffered settlement ranked 2	Point data from 50,000 maps, IFAD
Livestock	Pre CBPP range of cattle	0 - 49 cattle/100km <sup>2</sup> grid square = 0; 50 - 999 = 1; 1000 - 2299 = 2; > 2300 = 3	DWNP aerial census data. Averages for surveys.

Tourism potential was generated in a similar manner to agricultural potential using the following coverages (Table 3).

**Table 3: Data used to generate the Tourism and NRU Potential Map**

Sector	Coverage	Rankings	Origin of Data and Comments
Gazetted Land Use	Gazetted use of CHAs	Pastoral/Arable/Res.= 0 Agricultural specific (BLDC, TGLP, etc) = 0 Forestry = 2 CBNRM areas = 3 WMAs and Sanctuaries = 4 National Parks and Game Reserves = 5	IFAD, updated by the CBNRM/socio team from this study
Gazetted Land Use	Designated area of wetlands of international importance	Ramsar site = 2 Non Ramsar sites = 0	This study digitised onto Landsat. Description from Ramsar website and NCSA
Water/wetlands	Areas of swamp	Permanent swamp = 3 Seasonal swamp = 1	From Landsat unsupervised classification.
Forestry	Areas of high potential for forestry	High tree biomass on Kalahari sands = 1	From Landsat unsupervised classification. Key areas digitised. Field survey
Wildlife	Biomass of wildlife per CHA	<0.1 tons/km <sup>2</sup> = 0 0.1 – 0.5 = 1 >0.5 – 3 = 2 >3 – 10 = 3 >10 – 35 tons/km <sup>2</sup> = 4	DWNP census data 1992 – 96 (total wet and dry averages for years surveyed)
Wildlife	Distribution of charismatic wildlife species	Distribution of lion, elephant, buffalo = 4 Giraffe, zebra, sable roan and hippo = 3 Gemsbok = 1	DWNP census data 1992 – 96 (total wet and dry averages for years surveyed)
Cultural	Major National Museums sites/ proposed World Heritage Site	Museum sites = 4	Land use maps.
Undeveloped tourism potential	Rocky outcrops and other sites identified during this study	Rocky hills with moderate to low potential = 2 Hills and other sites with high potential = 3	From national soils of Botswana and this study. All sites buffered by 5 km

**Audits, EIA and SEA**

When assessing the impacts of existing and proposed fence and animal disease control strategies on land use, the existing and potential land uses were taken into consideration. Most analysis was undertaken on the GIS using the land use coverages with a Landsat mosaic as backdrop.

#### 7.4. Process for Selection of Field Sites

The table below sets the primary criteria, and the secondary criteria used in field site selection. A total of 14 were selected that are representative of the impact of the fences on:

- livelihood strategies;
- land use management;
- options to improve animal health, and
- access to sites of cultural importance.

**Bold** = primary criteria for site selection as required by the Terms of Reference.

These are Samochima, Ikoga, Setata and Northern Buffalo fences, and Shishikola/ Gudigwa.

*Italics* = preliminary secondary criteria. Most of these were presented in the Terms of Reference for the EIA. One criteria, arable areas, was added by the Consultative Committee, and sites of historical/ cultural significance, was added at the suggestion of the EIA team. With the exception of the last, all these are livelihood strategies.

- Tourism/ wildlife areas;
- Livestock areas;
- Mixed cattle/ buffalo areas;
- Hunting and gathering areas;
- Fishing areas,
- Arable areas and
- Sites of cultural significance.

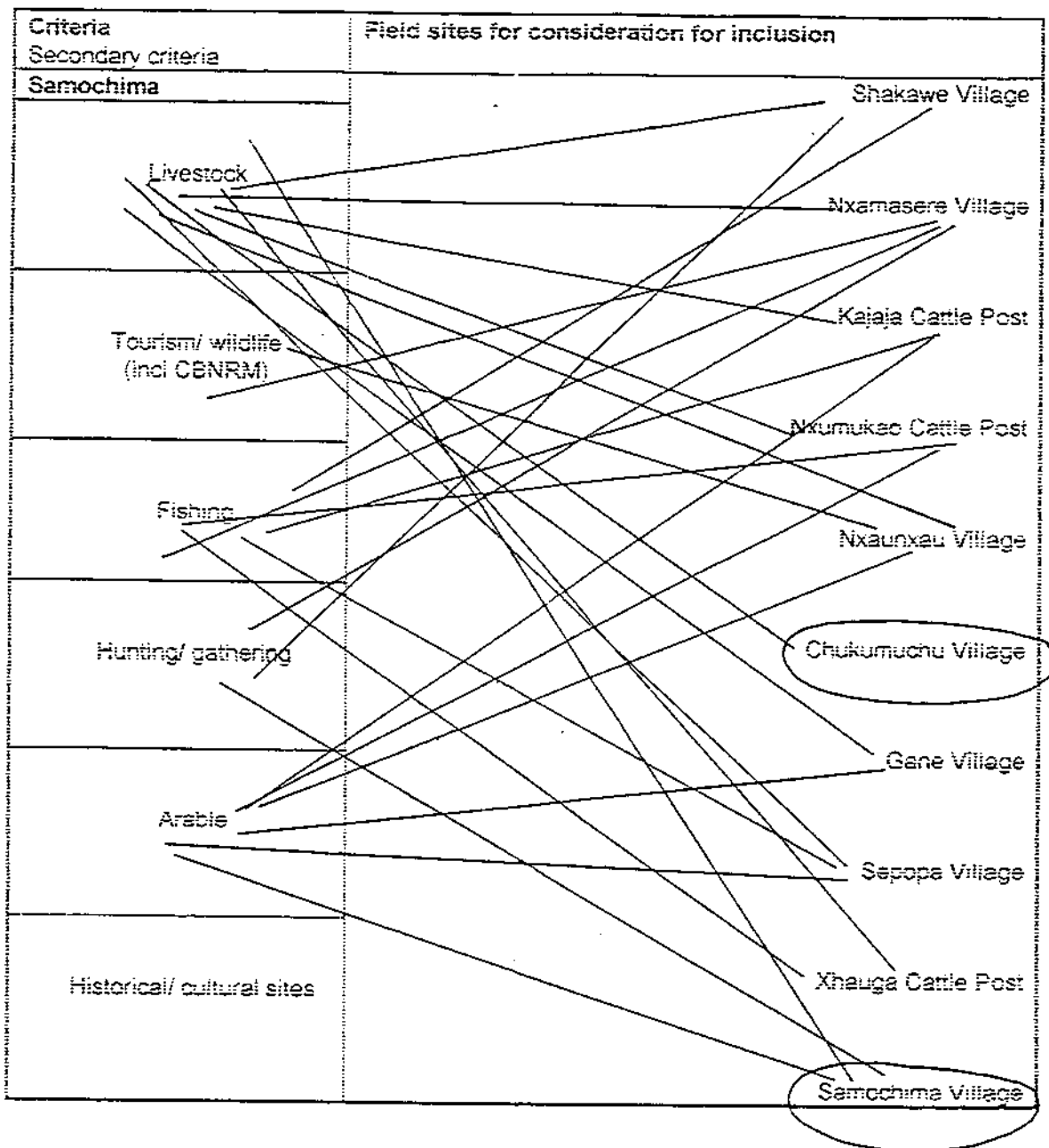
The results of the field site selection process are presented below in tabular form. The Consultative Committee at the Maun kgotla selected the field sites on the 10 September 1999, using the following process:

- All places affected by each fence were listed by fence.
- Where appropriate places were grouped, for example villages and seasonal cattle posts.
- What secondary criteria applied to each place was noted.
- Two field sites were selected for each fence, plus Shishikola/ Gudigwa as directed by the ToR; Tsodiilo because of its historical significance and its development as a national heritage site and Qwangwa as a village in the remote west. Caecae was added by the EIA team as a centre of hunter/ gatherers and because the Setata fence bisects their WMA, and the possible re-alignment of the fence to the north would reduce the viability of the WMA.

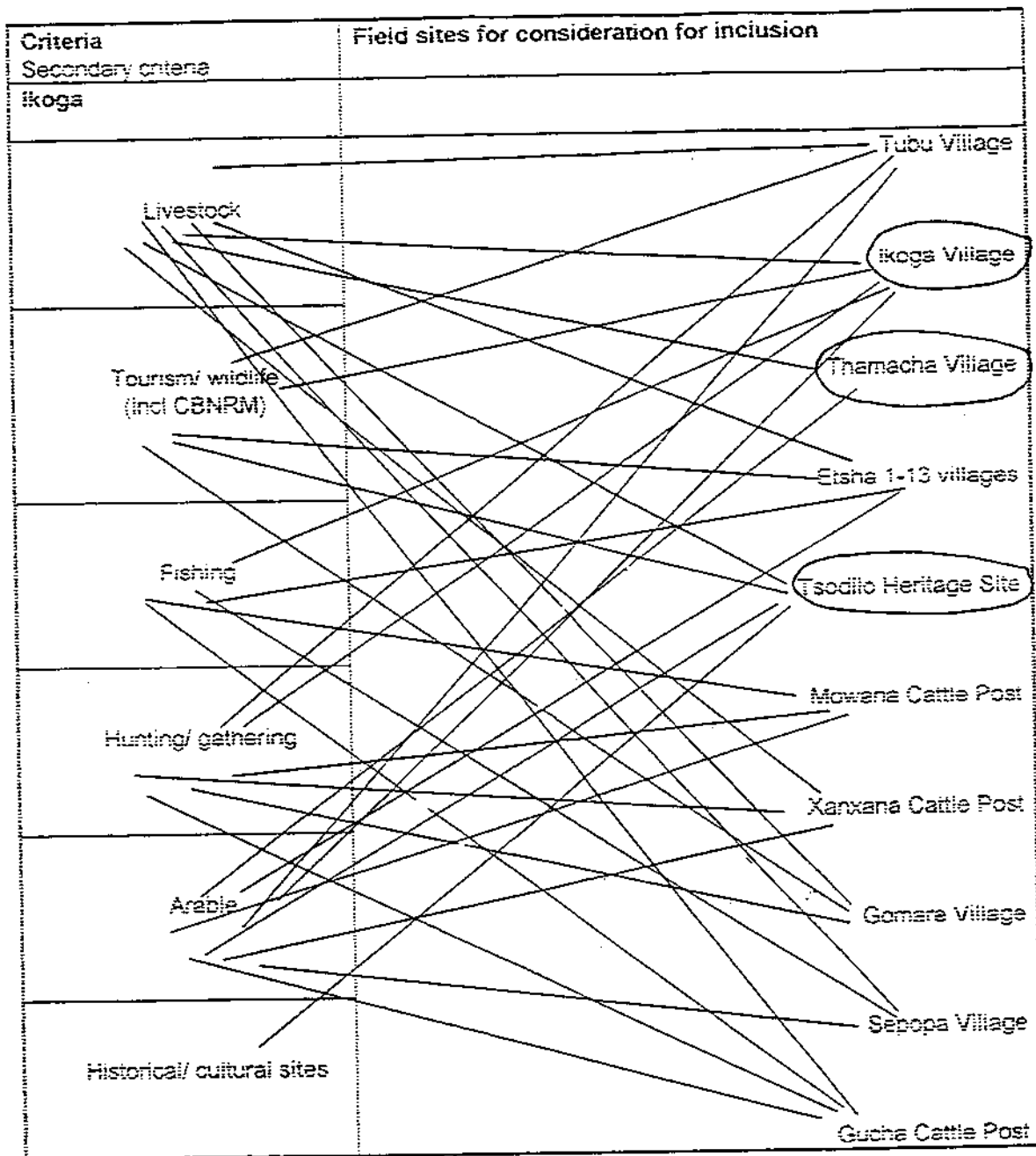
The term field site refers to the geographical area selected for field work, this varies from a settlement to several villages. It is used inclusively to include households in the field site area.

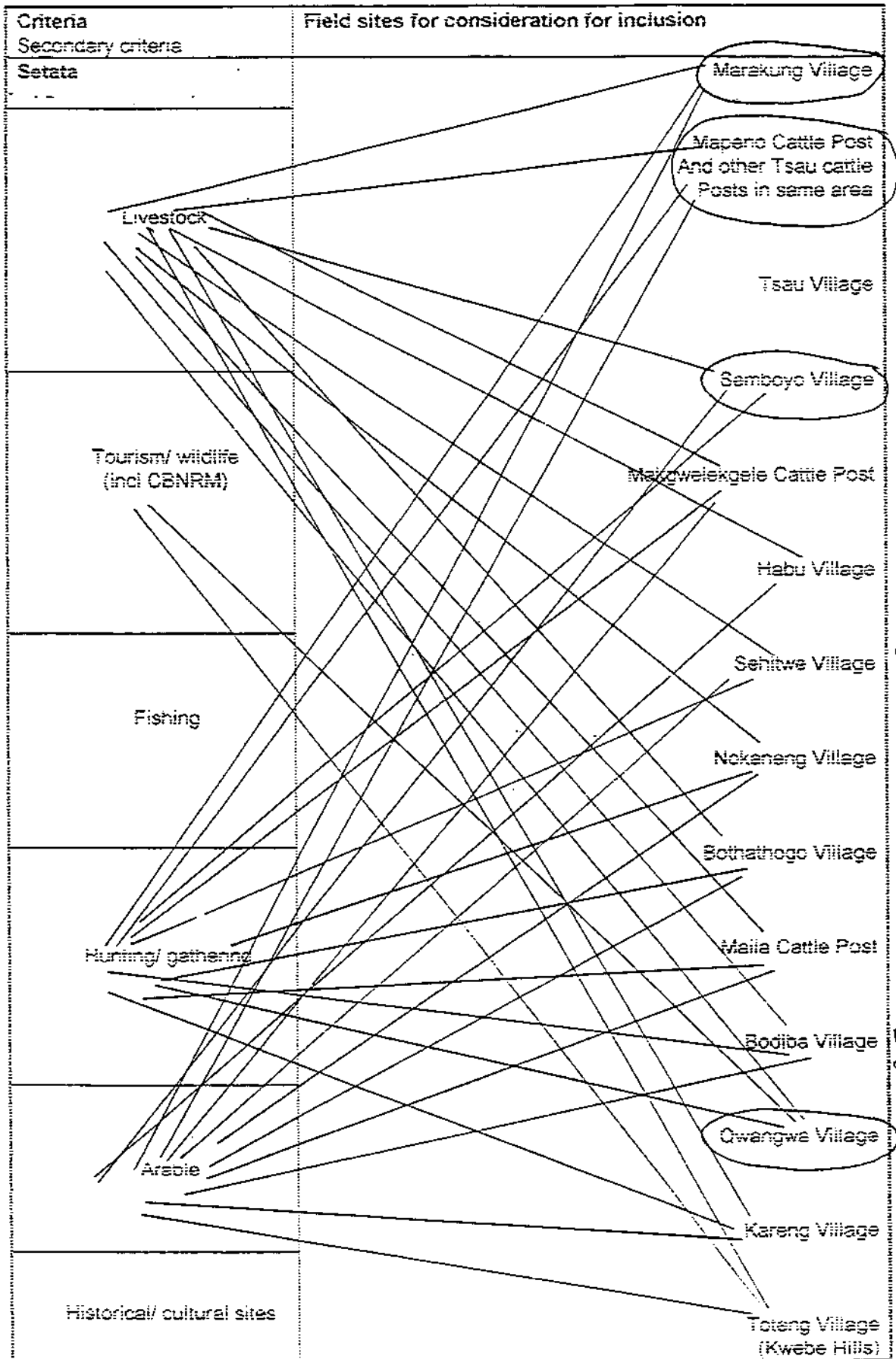
Households in most areas have several sources of income, and therefore there is considerable overlap in the secondary criteria. But the primary purpose of the secondary criteria was to ensure all groups whose livelihoods are affected by the fences were included in the selected field sites, and therefore the field sites are representative of the wider population affected by the fences. People in each field site will be consulted about the impact of the fence/s on their livelihoods, land use management, grazing and livestock movement (and therefore productivity), and access to sites of cultural importance.

The linkage diagrams, which show how the most appropriate villages were chosen, follow this section.



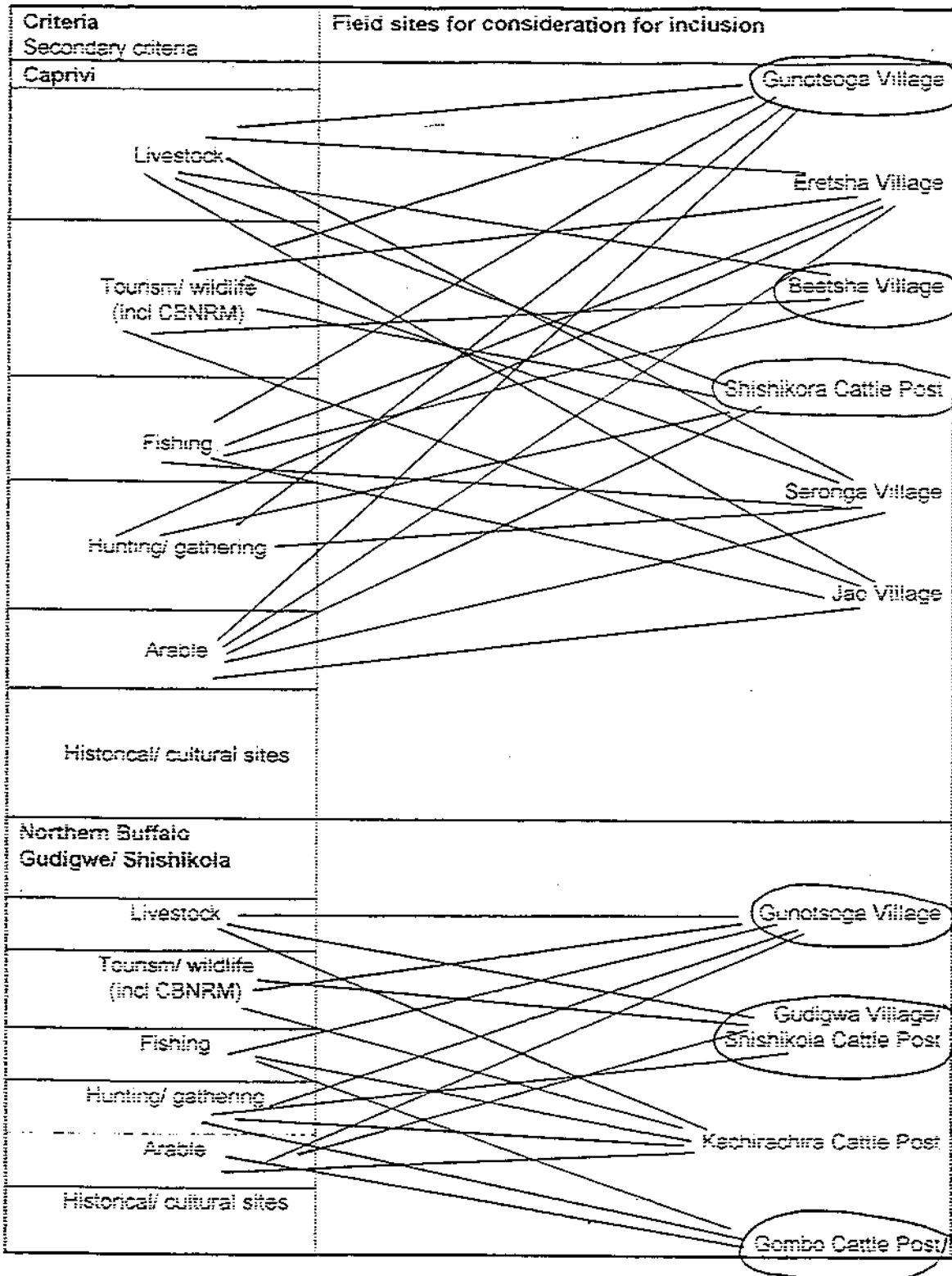
○ sites selected





Plus quarry

Plus quarry



See Gudigwa below.

## 7.5. *Economic assessment methodology*

The following methodology for the economic analysis of animal disease control policy options in Ngamiland was developed by the economics sub team in consultation with project colleagues. A framework for the analysis is given in figure 1 and linkages are further explained below. Bullet points give principle variables to be assessed for each linkage. This methodology represents the ideal that the team is aiming to achieve. It will to some extent be dependent on data availability and may be further refined as the assessment progresses.

### 1. **Impacts of changes to status quo on ecology of affected area in terms of:**

- Changes in wildlife numbers by species
- Changes to wildlife migratory patterns and distribution
- Changes in possible use of affected area by livestock farmers

### 2. **Impacts of changes to status quo on conditions for rural livelihoods in terms of:**

- Numbers of cattle that can be accommodated in the affected areas/carrying capacity
- Number of other livestock that can be accommodated in the affected areas/carrying capacity
- Changes in risk of cattle diseases
- Likely impact on arable land use
- Changes in access to resources such as veldtt products and water/mobility of households

### 3. **Impacts of changes in ecology on the socio-economics of the affected areas**

This is where some of the key analyses will be undertaken on the affected areas. We will look at:

- Impacts of changes to wildlife numbers/species on numbers of visitors and length of stay
- Income from Wildlife Management Areas
- Impacts of above changes on employment in providing tourism services and sales of crafts etc.
- Impacts on numbers of cattle and other livestock in the affected areas

These impacts will be assessed for a period of 20 years (to 2020), based on underlying macro economic data about economic growth, likely prices of cattle versus alternative sources of income and forms of wealth.

### 4/5 **Relationship between changing conditions for rural livelihoods and rural household behaviour.**

This will analyse the effects of the primary changes in rural livelihoods as identified in (2) above, on the following:

- Number of cattle held in normal conditions.
- Number of other livestock held in normal conditions.
- Areas under arable cultivation.
- Income from other sources – work in local urban areas, tourism, veldtt products, crafts as identified in (3) etc.

The analyses of the numbers of cattle are significantly affected by what happens to the beef market nationally/internationally and this will be taken into account in the time profile. Furthermore, the linkages between cattle holdings and cattle income is complex, with off-take rates affected by drought, income level of the household and other factors. Hence an increase in holdings does not translate simply into an increase in income.

The assessment will estimate the changes in household incomes in normal (and drought) conditions, and how these are affected when there is a disaster such as a cattle disease outbreak.

As the chart shows, this analysis will make use of rural household behaviour models relevant to Botswana, as well as the information collected from the baseline survey.



**6. Assessment of economic impacts for different groups.**

The results from (5) will be used to identify the changes in welfare – net income in different states of nature – for different groups of rural households. Groups to be looked at include those defined by:

- Level of household consumption or income
- Sources of Income
- Area
- Gender (female headed households)

In addition to income the analysis will look at issues of equity, sustainability and employment.

**7/8. Impacts of above changes on populations in the affected areas.**

The number of people in the affected areas will be influenced by the changes in household welfare estimated under (6). An assessment will be made of the likely migration resulting from a given option, because conditions have improved, or worsened. Households that move out will be assumed to go to urban areas, or possibly to other rural areas. In either case the change in welfare for them will be taken to be negative and some estimate will be made of how much worse off they are. Conversely if households move into the affected areas, they do so because they are better off and we will attempt to estimate the improvement in their welfare.

The analysis of population movements is complex. As the figure shows, many factors impinge on it and hence we would expect to do some scenario analysis .

Note that these are movements induced by the project. Normal migration patterns from rural to urban areas will remain and will affect the aggregate economic impacts (Linkage 9). Also note that there are feedbacks. If induced population movements are very large this affects the welfare of the remaining households. We will try to take account of this, even if it is at a judgemental level.

**9. Aggregate economic impact.**

This will bring together the benefits/costs of the impacts of the options, spread out over 20 years.

**10. Not shown in figure.**

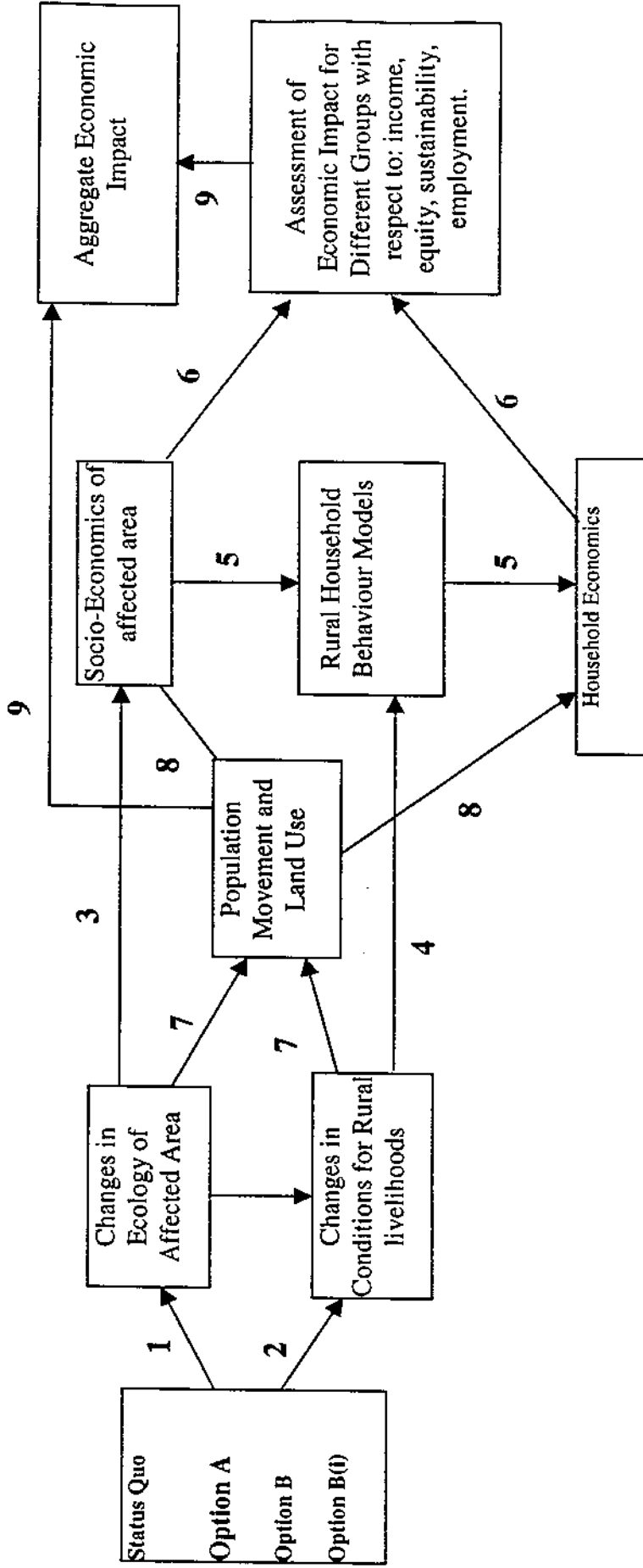
The final analysis will compare impact costs/benefits with the costs of the options (removing/constructing fences, acquiring land, other disease control actions, etc.). Included in the impact cost will be an estimate for expected cost of a disease outbreak based on the risk assessment of the options from the veterinary team team. Also included in impact cost/benefit will be an estimate for non-use value of wildlife/natural environment. Results will be reported in Net Present Value (NPV) Terms with discount rates of 10% and sensitivity analyses will be carried out to see what parameters the results are most sensitive to and what minimum values of benefits generate a positive NPV. The comparison of options will also be reported in terms of a number of key parameters including:

- Distribution of benefits/equity
- Leakages of benefits (extent to which benefits accrue to local population)
- Key sustainability indicators
- Employment levels

This analysis will be used to assess the impact of the options for the main stakeholder groups defined by occupation/income sources including: cattle farmers, arable farmers, commercial tourist operators, Community based organisations, etc.

As a result of the overall economic analysis, an assessment will be made of the impact of the options on government subsidy to the area. This will include the costs of subsidy to the livestock sector, assistance schemes such as the drought relief programme and any proposed compensation payments to negatively impacted stakeholders.

**Framework for Economic Analysis of Animal Disease Control Policy Options**



### **7.5. Impact assessment methodology**

The methodology to be used is based upon the Rapid Impact Assessment Matrix (RIAM) for EIAs put forward by Pastakia, C. and Jensen, A. in *Environmental Impact Assessment Review* (1998) 18, No 5. This claims to be a replicable and transparent methodology, so that judgements about the impacts can be seen and understood. The system has been adapted for the Fences audits, EIAs and SEA by using the SWOT analysis as a starting point, and developing a series of potential impacts which are to be given scores for each fence. The scores attributed should be based upon professional judgement and assessment of the data collected. These impacts are grouped into three phases:

1. Construction
2. Operation and Maintenance
3. Decommissioning

The potential impact matrix is attached and is to be applied to each of the fences, or route options in turn. It may be necessary to ask the same set of questions of different parts of the fence, if the nature of these parts is very different. However, ultimately we will need to develop a composite for the whole fence.

In assessing the particular impacts, we will draw upon our combined knowledge of each fence, and the detailed information we have been collecting. The SWOT analysis gives some indications of the aspects considered with each impact, and the sources of information. In developing the criteria for judging significance of each impact, there are NO international standards for us to use, so we will have to state clearly the reasons why we have assessed the impact in a particular way. Some of the impacts are quite complex, e.g. contribution of the fence to national economy, and may only be answered when the economic analysis has been completed. Or we may wish to disaggregate the contributory impacts. Others may require a detailed analysis of the different components, e.g. changes in wildlife populations - we will need to assess which populations are affected and ask the same questions for each different affected species, before we can assess the general impacts.

For each potential impact we will need to answer five criteria which are grouped and scored as follows:

Group	Code	Criterion	Scale	Description	
A. Criteria that are of importance to the condition, that individually can change the score obtained	A1.N	Importance of Condition	1	Important to national/ International interests	
	A1.D		1	Important to district interests	
	A1.S		1	Important to sub-district interests	
	A1.L		1	Important only to the local condition	
			0	No importance	
	A2	Magnitude of change/ effect	+3	Major positive benefit	
			+2	Significant improvement in status quo	
			+1	Improvement in status quo	
			0	No change/status quo	
			- 1	Negative change to status quo	
			- 2	Significant disbenefit of negative change	
			- 3	Major disbenefit or change	
	B. Criteria that are of value to the situation, but should not individually be capable of changing the score obtained	B1	Permanence	1	No change/ Not applicable
				2	Temporary
			3	Permanent	
B2		Reversibility	1	No change/ Not applicable	
			2	Reversible	
			3	Irreversible	
B3		Cumulative	1	No change/ Not applicable	
			2	Non-cumulative/ single	
			3	Cumulative/ Synergistic	

In order to do the calculations, first the A1 criteria – importance of the condition to the area of impact – are added together. This gives equal importance (i.e. a score of 1 point each to the national/international, district, sub-district and local levels. By adding these points we can get a weighting which reflects the importance. It is possible to score one point only at the national/international level, but be of no importance at the local level.

1. Add  $(A1.N+A1.D+A1.S+A1.L) = A1$
2. Multiply  $A1 \times A2 = AT$ ,
3. Add  $(B1 + B2 + B3) = BT$
4. Multiply  $AT \times BT = ES$

The Environmental Score (ES) for all the questions are then summed for the whole fence for the particular aspects, e.g. Livestock issues, Wildlife or Social issues. The scores for the component aspects will show the sensitivity of the fence to different issues.

The next step is to calculate the Range Band for each impact. The Range Band shows the overall significance of the changes occurring as shown below:

Environmental Score	Range Band	Description of Range Band
+ 72 to +108	+ E	Major positive change/impacts
+36 to + 71	+ D	Significant positive change/ impacts
+19 to +35	+ C	Moderately positive change/ impacts
+10 to +18	+ B	Positive change / impacts
+1 to +9	+ A	Slightly positive change / impacts
0	N	No change/ Status quo/ Not applicable
-1 to -9	- A	Slightly negative change / impacts
- 10 to -18	- B	Negative change / impacts
-19 to -35	- C	Moderately negative change/ impacts
-36 to - 71	- D	Significant negative change/ impacts
-72 to - 108	- E	Major negative change/impacts

Within each of the major categories of impact, the range bands can then be grouped, and the numbers of times in which each range band is recorded. This is presented in the Summary table for each fence or option. This gives an indication of the scale of overall impact and orientation (positive or negative) of the fence in question. It also highlights what are the most significant types of impact. Use of a bar chart can show this graphically.

#### Applying the methodology to the fences

The attached matrix shows the potential impacts of fences developed from the SWOT analysis. They may need “tweaking” for application to the Audits, EIAs, and Route options. For the latter assessment of the route options, we will use the matrix for rapid assessment in order to choose the most suitable ones for the detailed assessment. The fence routes with the highest positive scores should be the ones selected, unless there are other reasons, e.g. political or social unacceptability why a route should not be chosen.

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## APPENDIX 1 - LISTING OF PRINCIPAL STAKEHOLDERS

### Government Departments

- Department of Animal Health and Production
- Department of Wildlife and National Parks
- National Conservation Strategy Coordinating Agency

### Local Government

- District Administration
- Tribal Administration
- Tawana Land Board
- District Council
- District Development Committee

### Development Assistance Agencies

- Department for International Development (UK)
- Delegation of the European Union
- USAID

### Communities and CBOs

- Communities (listed in Appendix 2)
- Village Chiefs
- Village Development Committees
- Farmer's Committees
- Okavango Community Trust
- Sankuyo Tshwaragano Management Trust
- Caecae Tlhabololo Trust
- Mababe Zokotsama Development Trust
- Kuru Development Trust
- Okavango Kopano Mekoro (Poler's) Trust
- Jakothsa Community Trust
- Gudigwa Conservation Trust

### Sectoral Associations

- Hotel and Tourism Association of Botswana (HATAB)
- Botswana Wildlife Management Association (BWMA)
- Botswana Meat Corporation
- Botswana Farmers Union
- Fishermen's Association
- Rancher's Association

### NGOs and Development Programmes

- Conservation International
- Kalahari Conservation Society
- Acord
- SNV
- Remote Area Dweller Programme (Gumare)
- Okavango Research Centre
- Okavango Liaison Group
- Botswana Christian Council



## **APPENDIX 2 - COMMUNITIES INVITED TO MAUN KGOTLA**

Shakawe  
Seronga  
Sepopa  
Gumare  
Nokaneng  
Tsau  
Sehitwa  
Shorobe  
Makalamabedi  
Etsha 6  
Toteng  
Qwangwa  
Beetsha  
Gudigwa  
Ikoga  
Tubu  
Xai-Xai  
Sankoyo  
Maun  
Mababe  
Khwai  
The Heinaveldt Farmer's Committee  
Shishikola  
Pepere  
Xaudum

## APPENDIX 3— MINUTES OF THE MAUN KGOTLA

### PHUTHEGO YA KGOTLA YA DI 10 SEPTEMBER 1999

Phuthego e ne e buisiwa ke ba maphata-ka go farologana jaaka ba lephata la Veterinary, Conservation, International, le ba lekoko le le ikemetseng ka nosi la Scott Wilson. Phuthego e ne e tseneletswe ke dikgosi, maloko a V.D.C, Farmers Committee, P.T.A le dikomiti tse dingwe jalo ka go farologana go tswa mo metseng yotlhe ya Ngamiland.

Sebui Rre Masoko, o ne a tthalosetsa phuthego fa tota maikaelelo a go bitsa phuthego tsatsi leo e le go tlo go itibaganya kana go seka seka seemo sa ditirata tsa taolo malwetse a leruo. O tthalositse fa go batlilwe bo maitseanape go tswa mafatsheng a sele go tla go itibaganya le seemo ba dirisanya le morafe.

#### JOHN

Go tswa mo lekokong la Scott Wilson company o ne a tthalosa fa bone ba tihapilwe ke lefatshe la England go tla go kopanela tshaka tshoko e le Batswana ba ba amegang, o rile ba tla a bo ba itibagantse le ditirata di tshwana le tsa Setata, Buffalo Fence le tse dingwe, a re ba tla a bo ba patlaganetse tiro e le mangwe maphata a ga goromente jaaka ba lephata la botsogo ja leruo le mangwe a a amegang, o rile go tla nna le lekgotla le le tla a dirang le tsa matshelo a batho mo gas, a re le bone ba tla akaretsa kgaolo ya Ngami, mme ba tla gasa molaetsa ka go buisa diphuthego, a re ba tla seka seka le gore lefatshe le tla amega jang. A re ba ne ba kopana mme ba dumalana le gore ba tle go tshwara phuthego e mo Maun mme morago go dirwe jalo mo mafelong a mangwe. A re go ya ka tibelopole ya bone ba solofetsa go wetsa tiro e ka April mme sechaba se utlwe pego morago. O rile o batla go utlwa megopolo ya sechaba mabapi le kgag e mme morago ba ithophele maloko a komiti e ba tla bo ba dira le yone mo boemong jwa morafe. O ne a akgela mabapi le setshwantsho se seneng se filwe morafe a ba a re morafe o se sekaseke.

Mabapi le molaetsa wa phuthego morafe o ne wa ema bongwe ka bongwe ba botsa-dipotso bangwe ba ntsha maikutlo a bone ka go akgela.

#### RRE K.G. RAMOKWENA

O ne a kopa batsamelela phuthego ka ene go bua ka molusuo o bu phuthogile mme o rile go akgela a re e ne o dumalana le ditirata ka lebaka la go di laola malwetse a leruo, o ne a fa sekai a re bolwetse ja lekgwfu bo gaetse dikgomo tsa Batawana ka go ne go thoka ditirata. O rile fa kgang e bua ka leruo ithoka tibelo pele ka e bile matshelo a Batawana a ikaegile thata mo leruong. O rile tirata ga halae dikgomo fela di ka swa fa di sa e tlhwaela.

#### RRE KWEREPE

Le nna feia jaaka Ramokwena o dumalana le tirata, a ba a re feia ba thoka therisanyo ka e bile batho bangwe ba dumela fa kgomo e le bothokwa go gaisa phologolo bangwe le bone ba dumela fa phologolo e gaisa kgomo.

## MR GOMOSIE

O rile e ne o batla dipolasi tse ba di solofeditsweng, tse go tweng ba tla di agelwa, mme gape o ne a re go thatafadiwe ditirata tse di teng.

## P. DITSHEKO

O rile ditirata di a senya ka e bile di sa babalela matshelo a diphologolo e a di bolaya a ba a re tirata e tshwanelwa ke go ntshiwa.

## DIKARABO KA MR JOHN

E rile a ema go araba dingwe tsa dipotso Rre John yo o ne a emetse Scott Wilson Company o ne a re o iumeletse dipotso le dikakgelo ka go farulogana ga tsone, o ne a tswelela a re o ka re morafe o na le dipelaelo mme fela ga gona kang e e bofitlha fa morafe o akanya. O rile jaaka morafe o kopile ba lefatshe la Namibia ba rerisiwa mme e re mo phuthegong e tlang ba mme-teng, a re ba tla a tswelela go dira ditsheka tshoko tsa bone le maphata a a amegang go bona gore a ditirata di na le maduo a a batlegang, a re ba tla a leka bojotlhe ja bone go dira tiro ya bone ka kelothoko.

## SEBUI NO. 2 DOCTOR MASOKO

O rile jaaka bangwe ba akgetse go rolagantswe gore-go tsewe-bangwe go ya go bona ditirata gore e re fa go buiwa ka tsone bangwe ba kgone go tinaoganya botoka, o rile ditshokatsheko tse di tla a akaretse le dile dingwe tse re di tshogileng mme di tswelitse ka go dirafala jaaka bagwebi bangwe ba ba gwebang ka mafelo a rona e seng ka fa molaong ba tsaya ditshwantsho. O rile re tshaloganye gore tirata e e ya go dirwa ko kae, ka goreng ke gore go tshotomisiwa ka go dira ditshokatsheko, o rile maduo a ditirata a teng seka jaaka go setse go iwantswetswe bdiwetswe jwa tshoko le molomo le a mangwe, a re e bile Botswana bo setse bo rekisa dikgomo kwantle ka ha kganna go laola bolwetse jo. A re ditirata dingwe di tswelitse ka go tsengwa motlakasi fa go tshokafala. A re lekoko le le tla ntsha pego ka ditshokatsheko tsa lone e fetisediwa kwa go goromente, goromente o tla a seka seka le ene mme morago a begele sechaba ka fa ditshokatsheko di tsamaileng ka teng.

## THULAGANYO YA KOMITI MME MOLOKOMME

Ba ne ba tshalosa fa bone tota lekoko la bone le itebagantse le go sekaseka ditlamorago tsa ditirata tse mo matshelong a batho, a re ba tla a buba lebetse barui, bajanata, batshwari ba ditlhapi, batsumi le ba papadi ya maungo a naga le tse di ngwe. O rile tshokatsheko e ba tla e dira mo metseng e ka tshwara 10 go ya ko go e 15 e e amiwang ke ditirata tse, ba dira dipatlisiso jaana, mekgwa ya itshetso, tiriso ya lefatshe, metsamao ya diphologolo, le tse dingwe jalo jalo, mafelo a a botlhokwa le dingwe tse morafe o tla a eletsa go di bua. A re ba akantse go dira komiti ya tshisanyo go ba ema nokeng mo tirong e. Komiti e e tla rutoetsa tshisanyo mmogo bone le sechaba, e tla a ba tsho go thopha mafelo a a amegang, o ne a fetsa ka gore o kopa thuso ya go thopha komiti eo mo tsatsing leo.

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O ne a ema le ene a tihalosa bo mosola jwa tirata a dumalana ka e bile e le mongwe wa barui ba dipolasi.

**K.B. LEMPADI**

O rile ditirata tse di teng di ba siametse jaaka Setata, Samochima le tse dingwe a re ga ba batle dipe gape kwantle ga tseo.

**RRE BOSEKWANG**

Le ene o rile tirata e bolaya diphologolo, jaaka dithutwa e bile ka lebaka leo ditirata ga a di tloke le ya Buffalo Fence e ntshiwe.

**M. SENNYE**

E ne o rile o kopa gore ditirata di okediwe jaaka ko Chukumuchu-le mafelo a mangwe, Rre Marumo le ene o rile ditirata tse di kgaogangwe ka mafelwana jaaka dipolasi di dirilwe.

**B. DITHAPO**

O rile ke mongwe wa batho ba ba sa dumalaneng le go okediwa ga ditirata o rile fa e le gore ba akanya go dira jalo ba batlelwe lefelo go sele.

## DIPOTSO LE DIKAKGELO

M. Moremi, ba tshalosedibe gore maloko a tshwaneiwa ke go nna a mafelo a a farologanyeng kana jang.

Mma Molokomme o rile tota ba-ne ba-eletsa go ka tlohpehiwa batho ba ba tla a kgonang go kopana kgapetsa kgapetsa e bile ba batla tiro ya bone e simologa beke e tiang.

Phuthego e ne ya dumelana ka bongwefela jwa pelo go tlopha komiti teng foo; ene ya dumalana go tlopha maloko mo metseng e megolwane mme ba emela metsana e e ka fa tlase ga yone.

Phuthego e ne ya tlopha mafelo jaana:

<u>LEFELO</u>	<u>MAINA A MALOKO</u>
SHOROBE	KOBAMELO SIMBALOMBA OLAPENG TEBALO MOHUMANEGI BAGWASI
MAKALAMABEDI	SEABELO MOROKOTSO GAAMANGWE IKAGENG
SERONGA	MARUTA MORIRI MICHAEL TSIMA
SEPOPA	MOTLHAEDI SIYAYO DONTSHANG SIANGA ISAAC MOSHETI
SHAKAWE	KEHELETWE SAMAKENA
GUMARE	NDOBA BOSEKWANG MALEPE MOSAROZE
NOKANENG	DIPHERO DIKORO LELEJWANG SENYAMA BUSH KOKOME
SEHITHWA	GOSIAME SEHERA BOJOSI GABAITSEKGOZI BATSWELEDI RAMATLHODI
TSAU	MAKHANGA SARENGORO OSIA LETSWENG PELOSERA LEKURU
MAUN	MOTLHABANE MAKGETHO BENSON L. KUTI

Kgosi Mathiba o ne a phatlalatsa phuthego ka pula!

Recorded by: M. Kadizora

PULA! PULA! PULA! PULA! PULA! PULA!

**APPENDIX 4A - MEMBERS OF CONSULTATIVE COMMITTEE**

Name	Address	Village	Position	Fence
1. Bohumanegi, Bagwasi		Shorobe		
2. Bosekwang, Fingers	PO Box 9 Gumare	Gumare	South Chair VDC	Ikoga
3. Diphefo Dikoro, M		Nokaneng/ Qwangwa		
4. Duramo, Simon		Seronga		
5. Gabatbekgosi, Bajosi		Sehitwa		
6. Ikageng, Gaamangwe		Makalamabedi		
7. Isheko, Michael		Gomare		
8. Juramo, S	Private Bag 103 Seronga	Seronga	Chair Farmers' Committee	BF
9. Kakome, Bush		Sehitwa		
10. Lekuru, Pelosera		Tsau		
11. Kuti, Benson L.		Maun		Setata BF
12. Lotswee, H	PO Box 151 Sehitwa	Semboyo	Chair VDC	Setata
13. Makgetho, M	PO Box 20310 Maun			Setata BF
14. Moriri, Marota	Private Bag 111 Beetsha	Beetsha	Vice Chair OCT	BF
15. Morokotso, Seabelo		Makalamabedi		
16. Mosarozze, Malepe		Gomare		
17. Mosheti, Isaiah	PO Box 103 Maun	Sepopa	Secretary VDC	Ikoga
18. Ramathodi, Batweledi		Sehitwa		
19. Samakena, K	PO Box 36 Shakawe	Letoko	VDC	Samochima
20. Saringu, Makhanga		Tsau		
21. Seanaga, Bonishang		Sepopa		
22. Sehera, Gosiam	PO Box 102 Sehitwa	Kareng	Chair Farmers' Association	
23. Senyama, Lelejwa				
24. Siana, Motlhaedi		Sepopa		
25. Simalomba, K	PO Box 433 Maun	Sankuyo	Dep. Chair Farmers' / Vet Association	BF
26. Telalo, M	Private Bag 01 Maun	Mababa	Vice Secretary	BF
27. Tsheko, M	PO Box 64 Etsha	Etsha 6	Chair Farmers' Association	Ikoga
28. Tshwenyo, Dimapa		Seronga		
29. Tsima, M		Seronga		BF

## **APPENDIX 4B - MEMBERS PARTICIPATING IN STUDY TOUR**

- 1.. Mr D. Dikoro - Nokaneng
- 2.. Mr. H Letswee - Semboyo
- 3.. Mr J. Seabelo - Gunotsoga
- 4.. Mr M. Moriri - Beetsha
- 5.. Mr S. Juramo - Seronga
- 6.. Mr F. Bosekwang - Gumare
- 7.. Ms G. Mosweu - Nokaneng
- 8.. Mr M. Tsima - Gudigwa
- 9.. Mr B. Kakomee - Kareng
- 10.. Mr G. Sehera - Kareng
- 11.. Mr I. Mosheti - Ikoga
- 12.. Ms G. Ikageng - Makalamabedi
- 13.. Ms A. Monnaatsie - Makalamabedi
- 14.. Mr B. Kuti - Maun

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## APPENDIX 5 – PEOPLE AND ORGANISATIONS CONSULTED

### Veterinary Sub-Team

- Dr M.V. Raborokgwe, Director, DAHP
- Dr K.V. Masupu, Deputy Director DAHP
- Dr M.M. Mannathoko, Executive Chairman BMC
- Mr B.A. Molatshiwa, DAHP
- Mr E. Kebakuile, LAC Superintendent DAHP
- Dr R. Mkandawire, State Veterinarian, Katima Mulilo, Namibia
- Mr R. Diggle, Rural Nature Conservation, W.W.F., Namibia
- Dr A. Toto - State Veterinarian, Rundu, Namibia
- Dr P. Kitching, Animal Health Institute, Pirbright Laboratory, UK
- Dr P. Suttmoller, FMD and risk assessment specialist, USA
- Dr H. Jaeger, CBPP expert, South Africa
- Dr L. Tyler, VEES, DAHP
- Mr M. Kolanyane, DAHP
- Mr G.R. Mullins, VEES, DAHP

### Wildlife Sub-Team

#### BOTSWANA

##### DWNP

S. Modise	Director
J Mathlare	Deputy Director
R Mojaphoko	Head, Research Division
J Broekhuis	Head, Parks Division
C Taolo	Senior Wildlife Biologist, Gaborone
M Vandewalle	Senior Wildlife Biologist, Kasane
K Alexander	Wildlife Veterinarian, Kasane
T Jonas	Senior Game Warden, Head M&U Division, Maun
D Muhghogho	Senior Wildlife Biologist, Maun
G Masunga	Wildlife Biologist, Maun
L Rotina	Wildlife Biologist, Maun

##### DAHP

Dr. Raborokgwe	Director
Dr. K.V Masupu	Deputy Director
E Anderson	Wildlife Veterinarian, Wildlife Unit
N Mapitse	Veterinary Officer, Wildlife Unit

##### Ministry of Finance

T Farrington	Technical Assistant to NAO of EDF
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##### BWMA

M Kyriacou  
D Peake

##### HATAB

K Leo-Smith                      Kwando Wildlife Experience

R Kays

##### Conservation International

K Ross                              Director  
I Magole                            Okavango Programme

##### DFID

T Barrett  
D Brew



**EC Delegation**

G Ring

**Other**

N Ellenbogen	Artistic Director, Theatre for Africa
A Albertson	Rangeland Consultant
B Masilo	Executive Officer, Botswana Agricultural Union
W Philips	Tour operator, entrepreneur

**NAMIBIA****Ministry of Environment and Tourism**

Dr. Peter Tarr Director, Environmental Affairs

Dr. Colin Craig Scientific Services

**Ministry of Agriculture, Water and Rural Development**

Dr A Norval Deputy Director, Veterinary Services

**WWF LIFE Project**

Chris Weaver Chief of Party

**ZIMBABWE**

B Cawood Cattle Producers' Association of Zimbabwe

C Foggin

**Social and Community Sub-Team****COMMUNITY BASED NATURAL RESOURCE MANAGEMENT PROJECTS INPUTS**

ATTENDANTS: CBNRMP WORKSHOP - 1ST FEBRUARY 2000 - SEDIA HOTEL, MAUN  
TRUST, CBO and NGO Members Present:

Name	Organisation	Position
Benn, Mr. J.	NW District Council	Chairperson
Dikgobe, Mr. L.	OJCT / Etsha 13	Rural Dev. Advisor
Dimbuugu, Mr. R.	ACORD	Community Dev. Advisor
Ditshupelo, Ms. O.	STT / Sankuyo	Treasurer
Dumedisang, Ms. R.	DWNP / Maun	Comm. Liaison Officer
Gabojese, Mr. M.	CCTT/Caecae	Manager
Hasler, Dr. R.	ORC / Maun	Research Fellow
Juramo, Mr. S.	OCT / Seronga	Member
Kamana, Mr. A.	OJCT / Ikoga	Vice Chairperson
Kavumbe, Mr. K.	VTC / Ikoga	Member
Kebuelemang, Ms. L.	MCDT / Mababe	Secretary
Kgosiekae, Mr. K.	VTC / Jao	Chairperson
Kwamuvu, Mr. M.	OCT / Seronga	Secretary
Magole, Mr. I.	CI / Maun	Director
Maswibilli, Mr. O.	DO / Maun	Ppl. Lands Officer
Moriri, Mr. M.	OCT / Beetsha	Vice Chairperson
Mosesane, Mr. P.	MCDT / Mababe	Chairperson
Mothowakgosi, Ms. S.	MCDT / Mababe	Treasurer
Motshidisi, Ms. C.	NWDC / Maun	Secretary
Motshidisi, Mr. S.	Land Board/Maun	TSP
Motshubi, Mr. C.	CCTT/Caecae	NR Mgmt. Advisor
Mpofu, Mr. K.	ACORD / Gumare	NR Mgmt. Advisor
Mueze, Mr. C.	OJCT / Etsha 13	Chairperson
Mwezi, Mr. M.	OPT / Seronga	Trustee
Ndado, Mr. D.	Gudigwa	Headman
Ngorokwe, Ms. G.	VDC / Seronga	Secretary

Refedile, Ms. S.	STT / Sankuyo	Secretary
Renge, Mr. M.	VDC / Etsha 1	Member
Sainsbury, Ms. S.	OPT / Seronga	Manager
Sakega, Mr. S.	OPT / Seronga	Chairperson
Seabelo, Mr. J.	OCT / Gumotsoga	Chairperson
Sephuma, Ms. O.	OLG / Maun	Coordinator
Sharp, Mr. P.	OCT / Seronga	Manager
Soriya, Mr. K.	CCTT/Caecae	Chairperson
Thaenda, Ms. S.	OJCT / Etsha 6	Secretary
Thakosheka, Mr. D.	OJCT / Etsha 1	Board Member
Tihande, Mr. K.	OJCT / Jao	Secretary
Tsietso, Mr. L.	OCT / Seronga	Treasurer
Tsima, Mr. M.	VDC / Seronga	Vice Chairperson
Tshubelo, Mr. O.	OPT / Seronga	Secretary
Yatwiya, Mr. M.	VTC / Beetsha	Chairperson

## LIST OF OTHER PEOPLE CONSULTED:

<u>Name</u>	<u>Position</u>	<u>Location</u>
Albertson, Mr. A.	Researcher	Maun
Barnes, Mr. J.	NRMP Economist (LIFE)	Windhoek
Benn, Mr. J.	NWDC Chair / BWMA	Maun
Berger, Ms. D.	CBNRM Advisor, Nyae Nyae	Namibia
Booth, Mr. V.	EIA Scoping Report	Harare
Broekhuis, Mr. J.	Asst. Dir., Parks, DWNP	Gaborone
Buzzard, Ms. C.	NRM Advisor, USAID	Gaborone
Cassidy, Ms. L.	Sociologist (CBNRMP)	Gaborone
Charalambous, Mr. H.	Dir., Nemesis Safaris	Maun
Chite, Ms. I.	P.G.W., WMAs, DWNP	Gaborone
Collins, Mr. C.	Dir., Game Safaris	Maun
Driver, Dr. P.	EIA Scoping Report	UK
Drotsky, Mr. J.	Tourist Camp Manager	Shakawe
Flatt, Mr. D.	HATAB Representative	Maun
Hartley, Mr. R.	Resource Economist	Gaborone
Hasler, Dr. R.	Research Fellow, ORC	Maun
Hitchcock, Dr. R.	Anthropologist	Gaborone
Jansen, Mr. R.	Dir., IUCN, Botswana	Gaborone
Jemmings, Mr. S.	Manager, ACORD	Maun
Kyriacou, Mr. M.	BWMA	Maun
LeRoux, Mr. B.	Kuru Development Trust	Shakawe
Lindsay, Dr. K.	Wildlife Team Leader, EIA	Maun
McFarlane, Mr. R.	Dir., Vira Safaris	Maun
Mathare, Mr. J.	Asst. Dir., Research, DWNP	Gaborone
Modise, Mr. S.	Director, DWNP	Gaborone
Modo, Mr. A.	Senior Game Warden, DWNP	Maun
Mojaphoko, Ms. R.	Principal Biologist, DWNP	Gaborone
Monna, Mr. S.	NCSCA	Gaborone
Monyadzwe, Ms. C.	Comm. Liaison Officer, DWNP	Gaborone
Owen-Smith, Mr. G.	CBNRMPs in No. Namibia	Palmweg
Parry, Mr. D.	Land Use Planner / EIA	Gaborone
Passmore, Mr. J.	NWDC Tourism Advisor	Maun
Patterson, Dr. L.	Consultant / Veterinarian	Gaborone
Peake, Ms. D.	Bots. Wildlife Mgmt Assoc.	Maun
Perkins, Dr. J.	Range Monitoring Team / EIA	Gaborone
Rann, Mr. J.	Dir., Rann Hunting Safaris	Maun
Rantshabeng, Mr. V.	Pr. Officer, Laands (MLGLH)	Gaborone
Ross, Dr. K.	CEO, Asst Dir., CI	Maun

Rozemeier, Mr. N.	CBNRMP Monitoring, SNV	Gaborone
Sharp, Mr. P.	Manager, OCT	Maun
Sheller, Mr. P.	Tourist Camp Manager	Maun
Van der Jagt, Mr. C.	CBNRMP Monitoring, SNV	Gaborone
Wilmot, Mr. L.	Tourist Camp Manager	Shakawe
Wynter, Ms. P.	(former) Sociologist, DWNP	Gaborone

### Land-use and policy Sub-Team

Name and Position	Land Use Issues
Dikobe (Leonard) Kuru Development Trust Environmental Officer	Land use issues and planning for the Jakotsa Trust for NG/24
Kgori (Patrick), Tsetse fly Control Officer Maun	TFC policy, location of targets, control programme, concerns relating to tsetse distribution
Maswibili Senior Lands Officer, Maun	Cattle ranch fencing policy and areas designated for ranches
Ntogwe (Mr) Forestry Officer, Maun	Forestry projects and potential for community projects in the north-eastern panhandle area. Woodlots
Passmore (John) Council Community Tourism Officer	Outline of community use of CHAs
Segolodi (Bonang) Undersecretary Tawana Land Board	Land use and land leases.

### Economics Sub-Team – persons consulted

Mr J.F.Broekhuis (Assistant Director (Parks), DWNP)  
 Ms. Rebecca Dumedisang (Community Liaison Officer, Department of Wildlife and National Parks)  
 Mr B. Fidzani (Monitoring and Evaluation Unit, Ministry of Agriculture)  
 Mr D. Flatt (HATAB Chairman, Maun)  
 Mr B.J. Galekgurwe (District Agricultural Office, Gumare)  
 Mr L. Gaoetswe (DAHP, Gumare)  
 Ms. M.C. Kalikawe (Senior Tourism Officer, Department of Tourism)  
 Mr R.N. Kenneth (Principle Livestock Marketing Economist, Ministry of Agriculture)  
 Mr B. Khupe (Dept of Water Affairs)  
 Mr Kgokso (District Agricultural Office, Shakawe)  
 Mr P.Kirby (Park Manager, Mokolodi Nature Reserve)  
 Mr Kolanyane (Veterinary Epidemiology and Economics Section, DAHP)  
 Mr K. Leo-Smith (Kwando Wildlife Experience)  
 Mr LL. Magole (Conservation International)  
 Ms E. Makopo (DNWP)  
 Dr M.M. Mannathoko (BMC, Executive Chairman)  
 Mr S.C. Modise (Director, DNWP)  
 Mr.B.A. Molatliwa (DAHP)  
 Mr. S. Monnawatshipi (Okavango Kopano Mokoro Trust)  
 Ms. Poppy Monyatsi (Community Service Division, DWNP)  
 Mr. M Mothoagae (Director, HATAB)  
 Dr G. Mullins (Veterinary Epidemiology and Economics Section, DAHP)  
 Dr. K.V. Masupu (Deputy Director DAHP)  
 Mr T. Ntingana (Tawana Land Board)  
 Okavango Poler's Trust, Seronga  
 Mr. D.Okullo (IFS Coordinator, Dept. of Industrial Affairs)  
 Mr G. Ott (Botswana Tourism Development Programme, Department of Tourism)  
 Parks and Reserves Reservation Office (Department of Wildlife)  
 Ms. Debbie Peak (BOPHA)

Mr. Seleka ( District Officer-Lands, Ngamiland District Council)  
Dr H.K. Sigwele (Director, DAPS, Ministry of Agriculture)

During the field work for the household survey the economics sub team also consulted with a wide range of unnamed stakeholders, including VDC members, in the village communities of: Beetsha, Chukumuchu, Gudigwa, Gunotsoga, Ikoga, Makakung, Mapeno, Qwangwa Semoboyo, Thamacha, Tsodilo and Caecae.

## APPENDIX 6. RECORD OF CONSULTATION WITH BASARWA COMMUNITIES

### 1 Overview

Below is an account of the recorded meetings held with Basarwa communities, membership and representative organisations. The team did everything they could to ensure an inclusive approach and that the voice of the Basarwa was heard. I am confident it has and the results of this come out clearly in the report. Option B would safeguard the interests of the Basarwa, and wildlife. It is difficult to add up numbers, but it would appear that the number of Basarwa consulted exceeded what would be expected pro rate (in terms of population).

### 2 Meetings with organisations representing the interests of the Basarwa

Organisation/ meeting	Dates
Acord	Ketsile met with Acord staff many times.
CBNRM workshop	Feb 1, 2000. Attended by Acord, Cgae Cgae Thabologo Trust, Gudigwa Conservation Trust and Jakotsha Community Trust. KDT represented by Leonard Dube and Jakotsha Community Trust.
Cgae Cgae Thabologo Trust - Mosimanegape Taunyane	Sept. 23, 1999 (Ketsile)
Conservation International - Sehanyi Tlotlego (Shakes) and Oral Tsimba.	July 12, 1999. And several times during the course of field work. (Ann)
Jakotsha Community Trust	Oct. 6, 1999 (Ketsile). During a KDT run workshop.
Kuru Development Trust - Bram Leroux	Sept. 20, 1999 (Ann and Ketsile) Ann called by Leonard Dube of KDT at its offices in Shakawe on Jan 28, 2000 to check whether KDT were coming to the CBNRM workshop.
November stakeholder meeting.	Nov. 12, 1999. Attended by Acord. KDT invited but did not attend.
Maun kgotla	Cgae Cgae Thabologo Trust and Gudigwa Conservation Trust represented. Jakotsha may have been as well.

There may also be meetings that Ketsile had that I do not have a note of.

### 3 Field Site Selection Process

**Establishment of the Consultative Committee at the Maun Kgotla on 10 September 1999.** Not every social group was adequately represented at the kgotla— only four out of the 80 participants were women; there were few youths; discussion was dominated by pro-fence individuals, and the representatives of poorer and more marginal communities said little or nothing. But the decision by the kgotla to have the Consultative Committee formed from VDC and trust members, who had more time for assisting the study than the chiefs and their assistants, and have fewer conflicts of interest, was a helpful step in the process of consultation. We were able to ensure Basarwa communities were included in the field sites.

**Primary criteria** for site selection as required by the Terms of Reference.

These are the Sarnochima, Ikoga, Setata and Northern Buffalo fences, and Shishikola/ Gudigwa.

**Secondary criteria.** Most of these were presented in the Terms of Reference for the EIA. One criteria, arable areas, was added by the Consultative Committee, and sites of historical/ cultural significance, was added at the suggestion of the EIA team. With the exception of the last, all these are livelihood strategies.

- Tourism/ wildlife areas;
- Livestock areas;
- Mixed cattle/ buffalo areas;
- Hunting and gathering areas;
- Fishing areas,
- Arable areas and
- Sites of cultural significance.

The Consultative Committee selected the field using the following process:

- All places affected by each fence were listed by fence.
- Where appropriate places were grouped, for example villages and seasonal cattle posts.
- What secondary criteria applied to each place was noted.
- Two field sites were selected for each fence, plus Shishikola/ Gudigwa as directed by the ToR; Tsodiio because of its historical significance and its development as a national heritage site and Qwangwa as a village in the remote west. Cgae Cgae was added by the EIA team as a centre of hunter/ gatherers and because the Setata fence bisects their WMA , and the possible re-alignment of the fence to the north would reduce the viability of the WMA.

The term 'field site' referred to the geographical area selected for field work, this varied from a settlement to several villages. It was used inclusively to include households in the field site area.

Households in most areas have several sources of income, and therefore there was considerable overlap in the secondary criteria. But the primary purpose of the secondary criteria was to ensure all groups whose livelihoods are affected by the fences were included in the selected field sites, and therefore the field sites are representative of the wider population affected by the fences. People in each field site were consulted about the impact of the fence/s on their livelihoods, land use management, grazing and livestock movement (and therefore productivity), and access to sites of cultural importance.

Below is a copy  field site meetings.

4 Field work: communities met and representation by ethnic group.

<p><b>Beetsha</b></p> <p>Dry season:          Kgotta – 32 women and 30 men (21/10/99)          Men 1 – 20 men, mostly farmers and also gatherers (21/10/99)          Women 1 – (21/10/99)          VDC – chair and 3 members, all men (21/10/99)          Chief –(21/10/99)          Health – nurse and FEW (21/10/99)          Youth 1 – 8 boys (21/10/99)          Youth 2 – 3 girls (21/10/99)</p> <p>Wet season:          Men 1 – Mr Oja (Chair OCT), Mr Maruta Moriri (CC member) and three men. Notes in AM's notebook.          OPT – Sue Sainsbury, Osimihwe Tshabelo and Tsogo Sarezo. Notes in AM's notebook.          One meeting with six youths. Nothing to add to the DS notes. Team notes.</p>	<p>Ethnic groups in area and participation in field work.</p> <p>Bahambukushi and Bayei.</p>
<p><b>Cgae Cgae .</b></p> <p>Dry season:          Kgotta – 12 men and six women. Mixed. (22/9/99).          Group 1 – five men and five women (Baserwa – Ju/hoansi and Babanderu).          Group 2 – one man and eight women, all Ju/hoansi (22/9/99).          Group 3 – two Babanderu women (23/9/99)          Taunyane – Mosimanegape Taunyane, assistant advisor, Cgae Cgae Thabologo Trust (23/9/99)          CV – Cultural Village in the Aha Hills - four Ju/hoansi men (23/9/99).          Ju/hoansi Guide – (23/9/99)          CF – Babanderu cattle farmer (23/9/99)          Bausfield – Ralph Bausfield of Unchartered Africa (22/9/99).          Balesitsi – Mampati Balesitsi, RADO, Gumare (22/9/99).          CTT Management Plan</p>	<p>Ethnic groups in area and participation in field work.</p> <p>About 90% of the population are Ju/hoansi and 10% are Babanderu. Because the Basarwa Ju/hoansi do not like to meet with the Babanderu, after Group 1 separate meetings were held with family groups from each social group.</p> <p>The chief of Cgaecgae is a Babanderu. The VDC chair is also a Babanderu although he speaks both languages. In a S&amp;CD meeting prior to the kgotta Ju/hoansi complained they could not understand Setsawana, officials said they could. But whether they could or not this was a statement about their marginalisation.</p>

<p><b>Chukumuchu.</b></p> <p>Dry season:  Kgotta – 51 people, about 70% women (6/10/99)  Women – 32 women (6/10/99)  Men – 18 men (6/10/99)  Tjitemisa – Agricultural demonstrator for Sepopa and Chukumuchu, has cattle (7/10/99)  Tonki, Kavekotaka – farmer (6/10/99)</p> <p>Wet season:  Group1 – 25 people - 7 women, 11 men and 7 youths.  Group 2 – group of 3, 2 women and one man, all Bahambukushu.  Tjiripi – male Baherero cattle farmer.  Men 1 – six, five were Baherero.  Women 1 – 21 women, only one Baherero.  Men 2 – group of six young Bahambukush and Baherero men.  Youth 1 – 6 boys.</p>	<p>Ethnic groups in area and participation in field work.</p> <p>Babanderu, Bahambukush people. Only one !Kung man present (who was in the village for medical reasons). Arable farmers and women well represented. [Observation]</p>
<p><b>Gombo</b></p> <p>Dry season:  Group 1 – 22 men, women and youths.</p>	<p>Ethnic groups in area and participation in field work.  Bayei/ Bahambukush - 20 HHs.</p>
<p><b>Gudigwa</b></p> <p>Dry season:  Kgotta – 52 men and 48 women (18/10/99)  Men 1 – 9 men, 7 had cattle (1-11 head) and only 2 had no livestock, (19/10/99).  Men 2 – all youths (19/10/99)  Chief (19/10/99)  Group 1 – 52 men and 50 women, gatherers and basket weavers (19/10/99)  VDC – 3 members (20/10/99)</p> <p>Wet season:  Chief. AM met with chief to discuss the impact of the re-alignment of the NBF for Shishikola. See Shishikola notes.  Men 1 – group of eight men. Little to add to the DS notes. Team notes.</p>	<p>Ethnic groups in area and participation in field work.</p> <p>This is a predominantly Basarwa settlement. Chief is Basarwa.  Gudigwa is a center point of CI's community development/ CBNRM programme.  In addition to this field work the team has access to CI's PRA exercise conducted in August 1999.</p>



<p><b>Gunotsoga.</b></p> <p>Dry season:  VDC – two men and one woman (15/9/99)  Kgotla - 60 women and 30 men (16/9/99)  Men – 24 middle aged and elderly (16/9/99).  Women – 60 all ages (16/9/99)  Youth – 25 men and women (16/9/99)  Boys in Gunotsoga (small boys, not youths, 16/9/99).  Xao 1 cattle post – nine women and one man (17/9/99).  Xao 2 cattle post – four elderly men and two women (17/9/99)  OCT village committee vice chair (17/9/99).  OCT staff in Seronga (17/9/99).  Mwezi (poler in Gunotsoga 16/9/99)  Polers, group of four at Gunotsoga (17/9/99).  OPT staff in Seronga (15/9/99 and 17/9/99)  FHE (Family Health Educator, 17/9/99)</p>	<p>Ethnic groups in area and participation in field work.</p> <p>Very good turn out from the Gunotsoga itself for the kgotla. Not a good turn out from Xau 1 and Xau 2 cattle posts – but separate visit made by the team to Xau 1.</p> <p>The groups of middle aged and elderly males included arable and livestock farmers, fisher folk and veld users. This groups included representatives of OCT, the VDC and the Farmers' Committee. One elderly man from Dzao was also present.</p> <p>Youth – no numbers of men and women, but good representation from each.</p> <p>Gunotsoga is Bayei and Bahambukush.</p>
<p><b>Ikoga .</b></p> <p>Dry season:  Kgotla – 22 women and 33 men (8/10/99).  Women 1 – 18 women between 20 and 75 years of different levels of education and social status. The majority were FHHs (8/10/99).  Women 2 – 12 women, all basket weavers (11/10/99).  Group 1 –11 people, mostly men (8/10/99).  Men 1 – 7 men, livestock and arable farmers (9/10/99)  Youth – 6 boys and 4 girls from Itsoseng Youth Committee  Jakotsha Community Trust – 4 men and 1 woman (9/10/99)  Fishing – 8 fisherman (9/10/99)  Mmopi, Mr – FEW (9/10/99)  Galebolae, Therisano – kiosk woman (11/10/99)</p>	<p>Ethnic groups in area and participation in field work.</p> <p>Bahambukush and Bayei  Delta Basarwa in Jao.</p>
<p><b>Makakung.</b></p> <p>Dry season:  Kgotla (27/10/99)  Chief – (27/10/99)  Women 1 – 15 women, Babanderu and Batawana. 927/10/99)  Men – 16 farmers (27/10/99)  Enumerator (28/10/99)  Group 1 – VDC chair and others. (28/10/99)</p> <p>Wet season:  Women 1 – 9 women, is Babanderu, Batawana and Basarwa.  Men 1 – 15 farmers, mixed ages and wealth groups.  VDC – 4 members.</p>	<p>Ethnic groups in area and participation in field work.</p> <p>Babanderu  Women were of different ages and status.</p>

<p><b>Mapeno</b></p> <p>Dry season: Men – 3 cattle herders who also own cattle.</p>	<p>Ethnic groups in area and participation in field work. Very – there are only three households!</p>
<p><b>Qwangwa</b></p> <p>Dry season: Kgotla – about 20 men and 20 women. Predominantly Babanderu, some !Kung, Baxei and Batawana. Mostly cattle farmers and a few arable farmers and hunter-gatherers. (24/9/99) Group 1 – 4 elderly and 1 middle aged man. One was Babanderu, rest were !Kung. Two had livestock. (26/9/99) Group 2 – four men, incl chief and VDC chair, all Babanderu and Batawana. (27/9/99) Dobe – 20 men and 11 women, mainly !Kung with some Babanderu women (25/9/99) Mahito cattle post – one Batawana family of 1 man and 4 women (26/9/99) Kaikabererwe – Babanderu cattle owner, 17 cattle and 20 goats. (26/9/99) Gakekgosi, Isaac – Babanderu/ !Kung man with eight cattle. (27/9/99). Pakkii – Babanderu livestock/arable farmer. (27/9/99) Segopolo – Babanderu business woman with a bakery (24/9/99) Youth - 4 boys, 1 girl (24/9/99)</p> <p>Wet season meetings: Group 1 – group of 3 cattle owners, all Babanderu.</p>	<p>Ethnic groups in area and participation in field work.</p> <p>Qwangwa kgotla meeting – Basarwa !Kung interests under-represented. Surrounding settlements are !Kung, and Qwangwa is predominantly Babanderu. The Babanderu and use the outlying settlements as cattle posts.</p> <p>Good coverage achieved by visiting outlying settlements.</p>

<p><b>Samochima</b></p> <p>Dry season:  Kgotla (9/10/99)  Women 1 – 8 women selling reeds and thatching grass (9/10/99)  Group 1 – 8 men and 2 women, farmers (9/10/99)  Group 2 – 6 male farmers, one working p/t (9/10/99)  Dingara, Mangondo – male arable farmer, Mbukushu, Basarwa (9/10/99)*  MOHETO, Tshotlo – male arable farmer, Mbukushu (9/10/99)  Fishing – 2 men, Mbukush (10/10/99)  Carpenters – 2 men, Mbukush (9/10/99)</p> <p>Wet season:  Youth 1 – 20.  Men 1 – arable/ cattle farmer. Bahumbakushu.  Men 2 – two arable farmers.  Women 1 – 38 women.  Elderly 1 – group of 25 people, 18 women and 7 men  Chief  VDC – chair and vice chair, both men.</p>	<p>Ethnic groups in area and participation in field work.</p> <p>Samochima is a mixture of Bahambukush and Basarwa</p>
<p><b>Semboyo</b></p> <p>Dry season:  Kgotla – 27 men and 36 women (26/10/99)  Men 1 – 34 male farmers (26/10/99)  Men 2 – councilor and social worker (27/10/99)  Men 3 – 2 farmers (26/10/99)  VDC – 7 members, (26/10/99)  Women 1 – 36 women (26/10/99)  Girls – 12 girls (26/10/99)  Chief – (26/10/99)</p> <p>Wet season:</p>	<p>Ethnic groups in area and participation in field work.</p> <p>Babanderu and Batawana?</p>
<p><b>Shishikola</b></p> <p>Dry season:  Group 1 – 8 men and 6 women (16/9/99)  Group 2 – 5 men and 5 women, (20/10/99)  Women – 5 women, gatherers and basket weavers (20/10/99)  Men – 5 men, herdsman and farmers (20/10/99)</p> <p>Wet season:  We were unable to reach Shishikola – vehicles got stuck on the road, one over night. This information is from the Chief at Gudigwa and Oral Tsimba of CI. We also tried to meet with Madala Dubu, one of the owners of cattle at Shishikola who lives in Ngaranga. But he was in Shishikola</p>	<p>Ethnic groups in area and participation in field work.</p> <p>Basarwa. There are only 6HHs in Shishikola.</p>

<p><b>Tamacha</b></p> <p>Dry season:  Kgotla – 22 women and 8 men (15/10/99)  Leaders – chief, VDC chair, vice chair and village leader, all men (15/10/99)  Women 1 – 23 women, farmers and basket weavers (15/10/99)  Youth – 5 young men, only one had livestock, (15/10/99)</p>	<p>Ethnic groups in area and participation in field work.</p>
<p><b>Tsodilo</b></p> <p>Dry season:  Group 1 – 11 women and 13 men, about 75% Bahambukushu and 25% !Kung (6/10/99)  Group 2 – 4 women and 2 men, all !Kung (7/10/99)  Chief Mareka – and his wife, livestock farmers (8/10/99)  Women – 3 !Kung young women (8/10/99)</p>	<p>Ethnic groups in area and participation in field work.</p> <p>Basarwa !Kung and Bahambukush.  !Kung spoke at all meetings.  Chief is Bahumbakushu.  There was no sign of the serious tensions evident in Cgaecgae. Bahambukushu and !Kung concerns do not come across as so far apart - everyone fed-up with the Museum.</p>

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**APPENDIX 7 – MEMBERS OF THE REFERENCE GROUP**

<b>NAME</b>	<b>ORGANISATION</b>
Mr. S.C.Monna, (Chairman)	PNRO, NCSCA
Mr. Maswibibili (Deputy Chairman)	District Administration
Dr. K.V. Masupu	Deputy Director, DAHP
Mr. I.C. Tema	Senior Lands Officer, Department of Lands
Mr. B. Fidzani	DAPS, Ministry of Agriculture
Mr. J. Broekhuis	AD(Parks), DWNP
Mr. Tom Barrett	DFID
Mr. E. G. Ring	Delegation, European Union
Mr. F. Monngae	Kalahari Conservation Society
Dr. Karen Ross	Conservation International
Mr. M Mothoagae	Director, HATAB
Mr. M. Kyriacou	BWMA
Kgosi Tawana II	Tribal Administration
Mr. T. M. Ntingana	WMA's
(later Mr. A. Pitse)	Co-ordinator Tawana Land Board

**APPENDIX 8 – LIST OF REPORTS AND PAPERS PRODUCED**

<b>TITLE</b>	<b>DATE</b>	<b>DISTRIBUTION</b>
<b>Inception Report</b>	July 1999	Reference Group
<b>Launch Workshop Report</b>	July 1999	Reference Group & Stakeholders
<b>Fence Monitoring Workshop</b>	August 1999	Reference Group and DAHP and DWNP
<b>Social Issues Team Methodology Pack</b>	September 1999	Reference Group
<b>Policy Options and Strategic Environmental Assessment, Brainstorming Workshop Report</b>	October 1999	Reference Group
<b>Interim Stakeholder Workshop</b>	November 1999	Reference Group and participants
<b>Policy Options – Reference group meeting included in minutes of Reference Group meeting 2/3 February</b>	February 2000	Reference Group
<b>The use of Veterinary Cordon Fences to control diseases of animals in Botswana and surrounding countries – a review of selected literature</b>	February 2000	Reference Group
<b>Assessment of animal disease outbreak risks for different fencing options</b>	February 2000	Reference Group
<b>Report on the Ngamiland Fences EIA Consultative Committee Study Tour</b>	March 2000	Reference Group
<b>Issues Paper No.1. Potential Impacts of Veterinary fences on the Archaeology, Historic Monuments and cultural resources</b>	February 2000	Reference Group and Public
<b>Issue Paper No. 2. Indicators of wildlife/fence interaction</b>	July 2000	Reference Group & Public
<b>Issue Paper No. 3. Wildlife Friendly Fences</b>	May 2000	Reference Group and Public
<b>Issues Paper No. 4. Fences and Community Based Natural Resource Management including Workshop report</b>	May 2000	Reference Group and Public
<b>Report 1. Strategic Environmental Assessment of the Livestock Disease Control in Ngamiland</b>	July 2000	Reference Group & Public
<b>Report 2. Environmental Audits of the Setata, Ikoga Samochima, Northern Buffalo and Caprivi Cordon Fences</b>	July 2000	Reference Group & Public
<b>Report 3. Environmental Impact Assessment of fencing the gap between N. &amp; S. Buffalo Fences</b>	July 2000	Reference Group & Public
<b>Report 4. Environmental Management Plan for fences in Ngamiland</b>	July 2000	Reference Group & Public
<b>Report 5. Guidelines for Environmental Impact Assessment of Veterinary Cordon Fences</b>	July 2000	Reference Group & Public
<b>Report 6. Consultation Plan and Assessment Methodology</b>	July 2000	Reference Group & Public
<b>Report 7. Summary Report</b>	July 2000	Reference Group & Public

## APPENDIX 9 - ENGLISH AND SETSWANA INFORMATION SHEET

Scott Wilson Kirkpatrick & Partners  
Plot 14437, Kudumatse Drive  
Gaborone West  
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Telephone 324710  
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### ENVIRONMENTAL ASSESSMENT OF VETERINARY FENCES IN NGAMILAND

The proposed independent Environmental Assessment on the Veterinary Fences in Ngamiland sponsored by the UK Department for International Development (DFID) on behalf of the Government of Botswana has recently started with the arrival in Botswana of the international team of consultants coordinated by Scott Wilson Kirkpatrick. A Launch Workshop for key stakeholders in Ngamiland was held in Maun on July 9 1999.

The Environmental Assessment study follows the Scoping Exercise which was undertaken in July 1997. This was in response to growing concerns over the likely impact of veterinary fences which have been constructed in Ngamiland following the outbreak of CBPP. The Objective of the Scoping Exercise was to identify the main issues upon which the EIA should be focused and to prepare the Terms of Reference for this present Environmental Assessment.

The process of the environmental assessment includes a number of interrelated tasks including:

- Environmental audits of the existing CBPP fences, Northern Buffalo fence and Caprivi Border fence
- Environmental impact assessment of the proposed extension to the Northern Buffalo Fence between Tubu and Pepere Island
- Strategic Environmental Assessment of the fencing and cattle disease control policies in Ngamiland
- Guidelines for future EIAs of fences
- Environmental Management Plan for the fences in Ngamiland.

There will be studies to assess the effectiveness of the fences and risks associated with different disease control strategies, a programme of aerial wildlife surveys, and socio-economic surveys and economic analysis. We will be undertaking an extensive consultation programme, holding Kgotla meetings and discussions with communities and other stakeholder groups between now and the end of the year. The studies will take place in both dry and wet seasons, and a final report will be produced based upon a presentation of the findings at consultative workshops in November 1999 and April/May 2000. There will also be consultations with Namibian authorities.

There are three counterpart institutions involved in this study - the Department of Animal Health and Production, the Department of Wildlife and National Parks, and the National Conservation Strategy Co-ordination Agency. A Reference Group based upon the Ad Hoc Committee on Fencing including both government agencies, NGOs and local authorities from Ngamiland will oversee the implementation of the study.

The team wishes to receive comment, opinions and information from all persons interested. We are open to discussing the issues, or to receiving written comment. Those interested should contact the team leader, Peter-John Meynell c/o Scott Wilson Kirkpatrick, Box 933, Gaborone Tel: 324710 Fax: 322886. email: [swfence@info.bw](mailto:swfence@info.bw).

## TSHEKA-TSHEKO YA DITLAMORAGO MO TIKOLOGONG TSA DITERATA/MELELWANE YA THIBELO MALWETSE A LERUO LE DIPHOLOGOLO MO KGAOLONG YA NGAMI

Tsheka-tsheko ya ditlamorago mo tikologong ya diterata/melelwane ya thibelo malwetse a leruo le diphologolo mo kgaolong ya Ngami e e engweng nokeng ke Lephata la Ditlhabololo la Mmuso wa Britane (Department for International Development – DFID) mo boemong jwa Mmuso wa Botswana e simolotswa. Baitsaanape ba mafatshe-fatshe ba lomagantswe ke Kompone ya Scott Wilson Kirkpatrick e golagane le ya Environment and Development Group ba gorogile mo lefatsheng la Botswana go tla go simolola tiro e. Thuto seka-dipuisano ya tshimologo ee tla kopanyang makgotla, maphata, le botlhe ba ba amiwang ke tsheka-tsheko e, e tla rulaganngwa ko Maun Phukwi a tihola malatsi a fera-bongwe, 1999.

Tsheka-tsheko e, ke tshalo-morago ya Scoping Exercise e e dirilweng ka Phukwi wa ngwaga wa 1997. Scoping Exercise ya 1997 e dirilwe go lebilwe matshwenyego a a neng a golela pele a ditlamorago tsa diterata/melelwane ya thibelo-malwetse tse di tihomilweng mo kgaolong ya Ngami morago ga go thagoga ga bolwetse jwa makgwafo (CBPP). Maikaelelo a konokono a Scoping Exercise, e ne e le go seka-seka dintlha tsa botlhokwa tse tsheka-tsheko ya Ditlamorago mo Tikologong ya gompieno e tshwanetseng go itebaganya le tsone.

Lenaneo la tsheka-tsheko ya ditlamorago mo tikologong e tla akaretisa dintlha tse di nyalanang tse di latelang:

- ◆ Tsheka-tsheko ya diterata/melelwane ya jaanong e e neng e tlhometswe go thibela go anama ga bolwetse jwa makgwafo, Northern buffalo fence le Caprivi Border Fence.
- ◆ Tsheka-tsheko ya ditlamorago mo tikologong ya mogopolo wa go oketsa Northern buffalo fence fa gare ga Tubu le setlhakatlhake sa Pepere.
- ◆ Tsheka-tsheko ya mananeo a go tlhomiwa ga diterata/melelwane le ya thibelo malwetse mo kgaolong ya Ngami
- ◆ Megopolo ka melawana kgotsa dintlha tse di tshwanetseng go tsewa tsiya mo isagong fa go dirwa ditsheka-tsheko tsa ditlamorago mo tikologong
- ◆ Ditogamaano tsa tsamaiso e e tsayang tsiya tikologo tsa Diterata/melelwane mo kgaolong ya Ngami.

Tsheka-tsheko e tla itebaganya le bomosola jwa diterata/melelwane le dikabelelo tse di tsamaelanang le mekgwa e e farologaneng ya go thibela malwetse, go balwa ga dipalo tsa diphologolo mo phefong, dipatlisiso tsa diphetogo mo matshelong a batho mo gae le mekgwa ya bone ya itshetso ga mmogo le tsheka-tsheko ya tsa itsholelo. Re tla nna le dipuisano le baagi ba metse e e amegang go tlhomamisa therisano e e nonofileng. Diphuthego tsa Kgotla di tla rulaganngwa gore go nne le dipuisano tsa therisano le baagi ba metse e e farologaneng. Re tla buisana le batho ba ba amiwang ke kgang ya diterata/melelwane go akarediwa le bagolwane ba lefatshe la Namibia. Tse tsotlhe di tla dirwa go simologa jaanong go fithelela ngwaga wa 1999 o fela. Tsheka-tsheko le dipatlisiso di tla dirwa mo pakeng ya pula e na le e sa ne. Pego ya tsheka-tsheko/patlisiso e, le thuto seka dipuisano ya therisano le baba amegang di tla dirwa fa gare ga kgwedi ya Moranang le Motsheganong ngwaga oo tlang (2000) fa tiro e wediwa.

Go na le maphata a le mararo a a tla dirisanang mo tsheka-tshekong e. One ke a Lephata la Botsogo jwa Leruo (Department of Animal Health and Production), Lephata la Diphologolo le Makgabisanaga (Department of Wildlife and National Parks) le ba Lephata la Tshomarelo (National Conservation Strategy Co-ordination Agency). Komiti ya therisano e e bopilweng ke komiti ya nakwana ya Diterata/Melelwane e e akaretsang maphata a puso, makgotla a a ikemetseng ka nosi, baemedi ba morafe wa kgaolo ya Ngami e tlhomilwe go okamela tiragatso ya tsheka-tsheko/patlisiso e.

Lekoko le le dirang tsheka-tsheko/patlisiso e, le na le keletso ya go utlwa megopolo le maikutlo a botlhe ba ba nang le kgatlhego mo kgannyeng e. Re bulegile megopolo go buisana kgang e ka botlalo kana go utlwa mafatlha a lona ka mokwalo. Ba ba nang le keletso ya go ntsha megopolo le maikutlo a bone, ba ka ikgolaganya le moeteledi-pele wa lekoko, Rre-PJ Meynell ko atereseng e e kwadileng fa godimo ga tsebe e.



## **APPENDIX 10 – COMMISSIONED ARTICLES PUBLISHED IN THE NATIONAL PRESS**

## APPENDIX 10 – COMMISSIONED ARTICLES PUBLISHED IN THE NATIONAL PRESS

Mmegi/The Reporter 04-10 February 2000

### 10 ENVIRONMENT

# Impact of veterinary

By DAN PEKE\*

THE following is the first in a series of six articles which will highlight the environmental impact assessment (EIA) of veterinary fences in Ngamiland. Since the study is still on going, its different stages will be dealt with as they progress. This article gives the reader an idea of what is going on, why certain decisions were taken and what is hoped to come out of the study.

Following the devastating outbreak in 1995 of Contagious Bovine Pleuro-Pneumonia (CBPP), commonly known as Cattle Lung Disease, the Government of Botswana put up three veterinary fences as an emergency measure in the

Ngamiland area to try to control it. As is well known, the disease spread and eventually the decision was taken to slaughter over 300,000 head of cattle to eradicate it. The CBPP fences remain as a continued control measure against cattle diseases.

They are a part of three sets of veterinary fences in Ngamiland: the Northern and Western Border Fences which border Namibia; the Northern and Southern Buffalo Fences around the Okavango Delta; and the Samochima, Ikoga and Setata CBPP Fences, which run east-west from the Delta to the Namibian border. (See map.)

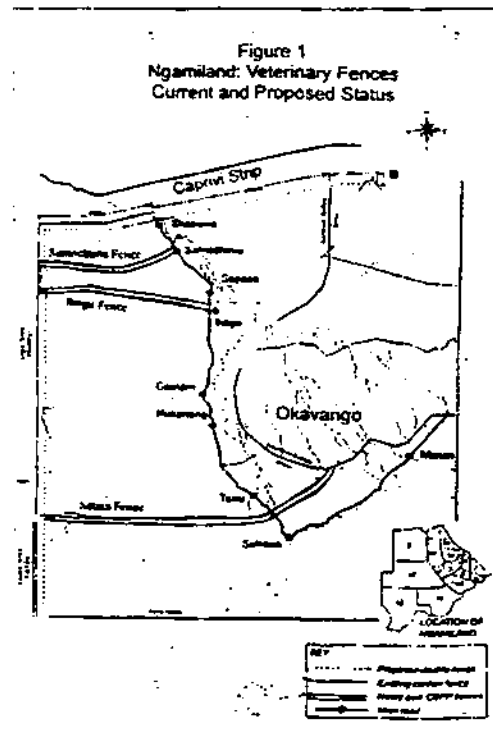
The construction of the fences led to growing concern among interested groups over their likely impact. An Ad Hoc Committee on Fences was set up because of concerns about the fences and included members of the NGO community as well as the key government departments. In July 1997 government carried out a Scoping Exercise to prepare terms of reference for an Environmental Impact Assessment study of the fences. The British Government, through its Department for International Development resolved to provide assistance to Botswana's Department of Animal Health and Production (DAHP) to strengthen the capacity of the DAHP to implement new, cost effective policies on animal health and production. The idea was to also promote the harmonisation of wildlife conservation and livestock management and to maximise sustainable use of natural resources in Ngamiland.

# fences in Ngamiland

The terms of reference called for the following: an environmental investigation of all existing fences; the Environmental Impact Assessment of the linking of the Northern and Southern Buffalo Fences between Tubu and Pepere Island; the Strategic Environmental Assessment of the livestock disease control policy; guidelines on future Environmental Impact Assessments of the fences; and an Environmental Management Plan for all the fences in Ngamiland.

The overall aim of the study is the need to control livestock diseases which is currently done through vaccination, surveillance and cordon fences. However, the concern is that the fences have had impact upon wildlife populations and movements, and upon the social and economic well-being of local communities. With the growing importance of tourism development as a means of improving the livelihoods of these communities, it was recognised that there is a need to develop livestock disease controls which are compatible with wildlife and wilderness conservation. Since there are several subject areas in the study, the consultants came up with five expert sub-teams which are focusing on specific key areas including veterinary epidemiology, wildlife and rangeland surveys, social and community development and economic studies. The policy and land-use component underpins the study.

The contract to undertake the environmental impact assessment was put out to tender in late 1998. Scott Wilson, a British consulting firm with permanent offices in Gaborone, together with The Environment and Development Group, were awarded the contract in May 1999. It was considered desirable in the interest of both credibility and independence to award the tender to an international group. It was also felt that a team of inde-



pendent consultants working with local and regional experts was well placed to facilitate the co-ordination of the three government departments being the DAHP, the Department of Wildlife and National Parks (DWNP) and the National Conservation Strategy Co-ordinating Agency (NCSA).

Starting in June 1999, the consultants have met with relevant experts including officials in the ministries of Agriculture, Commerce and Industry, the NCSA, officials of the Tswana Tribal and Local Government Administrations, Botswana-based local and international conservation groups, such as Kalahari Conservation Society and Conservation International, and DEID and the Delegation of the European Union. A Reference Group was then set up comprising representatives of these organisations to help steer the consultancy. The consultants have also trav-

## ENVIRONMENT 11

led extensively in Ngamiland and met with representatives of tour and hunting operations. They have established a community consultative group with members from 15 communities representing people directly affected by the fences.

The consultants organised a launch workshop in July which they considered very productive in terms of identifying the key issues and opening up discussion about the linkages between the fences and land-use. They also recognised the importance of cattle ownership to communities

in the Ngamiland and their need to be protected from cattle diseases, as well as the growing importance of tourism which is underpinned by the wildlife populations.

The July workshop was followed by a full-day interim stakeholder workshop in Maun last November 12. This was a big success because of the even bigger turn out and wider participation. The purpose of the November workshop was to give progress reports from all the sub-teams and to identify livestock disease control requirements. It was also used to deter-

mine the stakeholder perceptions of the effects of the three sets of fences.

The workshop was agreed that all cattle diseases, especially Foot and Mouth Disease and CBPP, are disastrous for the economy of the country, because of the risks of loss of export revenue. These diseases are currently put in check through the use of fences and vaccination programmes. However, because of their evidently destructive result on wildlife populations, the workshop suggested that some of the fences be realigned. In particular the Northern Buffalo fence and the Setata CBPP fence were identified as the two

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# Ngamiland

from page 11

which should be moved to new locations to allow freer movement of wild animals and to maximise grazing. A suggestion was made that the Setata fence be moved further north toward Tsau village and that the Northern Buffalo fence be moved eastward. The idea that the Northern and Southern Buffalo fences should be joined at Pepere and Tubu Island was roundly rejected because it would cut off wildlife movement. These suggestions from the workshop participants will all be considered carefully by the EIA team in

developing their recommendations.

It is hoped that by the end of the study, about June this year, a new, comprehensive livestock diseases control strategy, compatible with other land uses, will have been developed for Ngamiland. The aim of that strategy must be to optimise livestock production and tourism potential, and to address poverty alleviation among the communities involved, through the use of a combination of methods including fencing, where appropriate.

\*Dan Peke is a Gaborone-based independent journalist.

# Beef barons defend cordon fences

Mmegi/The Reporter 07-13 April 2000

NEWS 11

*IN this, the second in a series of six articles which will cover the environmental impact assessment of veterinary fences in Ngamiland, DAN PEKE writes on the arguments of the beef industry. In the next instalment, he will look at the arguments of the wildlife/tourism industry.*

**T**he Botswana government is undertaking an environmental impact assessment of veterinary fences in Ngamiland which are presently used to control livestock diseases - notably foot and mouth (FMD), rinderpest and CBPP.

Scott Wilson Kirkpatrick, a British consulting firm, is conducting the study.

The fences have had an impact on wildlife populations and movements and the social and economic well-being of Ngamiland communities. This has led to fierce criticism from certain quarters, notably from conservationists and advocates of the tourist industry. The beef industry on the other hand, supports their presence.

Executive chairman of the Botswana Meat Commission (BMC), Dr Martin Mannathoko, says the BMC loses income of between P20 million and P30 million annually from lucrative European markets because of a permanent prohibition on FMD infected beef cattle from Ngamiland, Chobe, Boteti and Nata/Gweta areas. These cattle, he says, account for 15 percent of BMC production and end up being sold to low-priced markets.

The Maun abattoir, which employed 100 people, closed in 1995 because of the outbreak of the cattle lung disease (CBPP) and the eventual destruction of 318 000 infected cattle. The abattoir provided a market for service companies and individuals that supplied food, machinery, transport and other services. All these and the beef farmers who supplied cattle were negatively affected when the abattoir closed down.

In addition, the Lobatse and Francistown abattoirs retrenched some employees because the Maun abattoir provided beef for the Lobatse cannery and hides for its tannery. Personnel who provided support services from Lobatse and Francistown to Maun were likewise retrenched. Altogether 450 employees were retrenched.

"The cattle business in Ngamiland is citizen-owned. The closure of the Maun abattoir robbed citizen farmers of valuable income", says Mannathoko.

The Director of Animal Health and Production (DAHP), Dr Motshodi Raborokgwe agrees. "Even though the cattle population in Botswana is quite small, the country has one of the most successful commercial beef industries in Africa. This is mainly due to success in the control of foot and mouth disease and other diseases as well as a strong tradition of cattle ownership".

The history of FMD, rinderpest and CBPP is varied. Rinderpest, for example, first broke out in Botswana in the latter part of the 19th century and is reported to have wiped out 98 percent of livestock and susceptible wildlife. It was only halted through the erection of bush fences. The other diseases, which appeared much later, were demonstrably halted in a similar fashion.

Environmental impact assessment (EIA) studies were not conducted when the fences were set up, mostly because of the urgency of the situations. Consequently, they have sometimes impacted negatively on wildlife and local human communities. These communities depend on cattle farming for their livelihood. Cattle ownership is deeply rooted in Botswana.

According to Raborokgwe, "the livestock are however, in danger of being decimated by these diseases which are still present in the region. The DAHP, which has the mandate to control livestock diseases, would not be able to do so without these fences to control livestock movement. The cattle industry is a renewable resource which will still be there when diamonds are gone."

Mannathoko observes that "many who claim to be more conservationists than the farmers say fences are bad for wildlife. This is not necessarily true. I was responsible for the planning and construction of the buffalo fence around the Okavango. There were claims of disaster but the fence ended up protecting wildlife areas".

He bases his claim on satellite pictures from the 1980s, which show healthy grazing areas on the wildlife-side of the fence when cattle were dying from drought. "If not for that fence, cattle-posts would have completely invaded and destroyed the delta. Wildlife would have been decimated and so would tourism in that area."

Adds Raborokgwe: "The cattle industry has very strong sector linkages. Even though not making significant contributions to the Gross Domestic Product, it still provides Botswana with food, income, draught power and employment. Unlike other sectors of the economy, ownership and control of the means of production have remained in the hands of locals. Hence the need to prevent cattle diseases by the most readily applicable method of fencing".

*(Readers are encouraged to join the debate of the issue of cordon fences by writing letters and other articles of comment/analysis of the matter - Editor)*

# ENVIRONMENT

# Impact of cordon fences debate continues

In this, the third instalment of the six-part series on the environmental impact assessment of Ngamiland veterinary fences, DAP KE looks at the arguments of the tourism/wildlife industry which is in favour of removing most of the cordon fences.

Government has undertaken an environmental impact assessment study of veterinary fences in Ngamiland which are presently used to control livestock diseases, notably foot and mouth disease (FMD) and contagious bovine pleuro-pneumonia (CBPP), commonly known as cattle lung disease.

The study, being conducted by Scott Wilson Kirkpatrick, a British consulting firm, has targeted the northern and southern buffalo fences, the Samochima, Setata, and Okoga CBPP fences and the cordon fences along the Botswana/Namibia border. The government has come under attack from local and international conservation groups for putting up the fences and has been criticised for bad conservation policies, the result of which may impact negatively on the local tourism industry.

In the last instalment, defenders of the cattle industry, notably the Botswana Meat Commission and the Department of Animal Health and Production, pointed out that the fences have helped to stop the encroachment of cattle farmers into the delta in search of readily available permanent water and excellent grazing and outlined the social and economic benefits of the industry to the nation.

Other supporters of the fences argue that at the moment, apart from one or two tour operators, there is little evidence that the fences have a major negative impact on tourism. They applaud the current government policy of restricting the delta to the ecologically mindful "high-cost, low volume" tourism. They say if anything, the proposed new policy of medium-cost, "higher volume" tourism which aims to involve surrounding communities will be more affected by the fences, especially the CBPP fences.

Innocent Magole, country director for Conservation International-Botswana, charges that, "Ngamiland veterinary cordon fences have undermined the integrity of the Okavango River Basin through reducing the habitat, fragmenting the ecosystem and interrupting the seasonal movements of some wildlife species".

Responding to the arguments of the beef industry that the southern buffalo fence in particular has benefited the Okavango Delta from incursions by cattle, Magole says that is merely accidental as the original intent was to separate the buffalo from cattle by blocking the buffalo's southward seasonal migrations.

Magole contends that, "these fences were constructed with one objective in mind - for the control of livestock diseases at all costs". He cites the CBPP fences as an example of this single-minded objective which was implemented with limited consideration of the overall bio-diversity of the delta.

Joseph Mathare of the Department of Wildlife and National Parks agrees: "The fences were constructed without the benefit of environmental impact assessments. We would like to encourage that all future fences

be subjected to EIAs and consider, before any decision to construct such fences is taken."

Fences have also been criticised for entangling and killing animals, especially giraffes. Department of Animal Health and Production estimated in 1997 that one giraffe per year for every 100 kilometres of the buffalo fences in Ngamiland were killed. They maintain that no other animal species are noticeably caught in the fences. By contrast, Mary Kalikawe, a biologist with the Department of Tourism, notes that "in other parts of the country fences,

specifically the Kuke, Dibete, Maklornahedi, the Nata-Tamafupa buffalo fence and the Botswana/Zimbabwe border fence, have caused massive deaths of migratory animals. This has involved wildebeest, kudu, eland and buffalo as they were obstructed in their migration to watering areas."

Magole disputes the argument of the cattle industry that there are presently no viable alternatives to the fences. "The solution can be found in an objective evaluation of land-use combinations that would yield the highest returns both locally and internationally. The current veterinary cordon fence infrastructure is in line with supporting a large herd of cattle, but I believe that Ngamiland has a natural capacity for holding a fewer number of cattle than the one that is being imposed on it."

Magole said the delta area has naturally-occurring pathogens for cattle that regulate cattle numbers, "unless we are willing to invest heavily (as we have done through the fences)" to shift this balance.

Magole says Conservation International-Botswana aims to see the greater Okavango River Basin, which spans the highlands of Angola through Namibia and into Botswana, functioning as an intact natural ecosystem. He con-

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tends that the people who live within the river basin must be the primary beneficiaries of the sustainable economic activities which include community-based natural resources management (CBNRM) and tourism.

The international conservation movement will be watching any decisions on the fences that may affect the management of the Okavango Delta as the world's largest Ramsar (the convention on internationally important wetlands) site, occupying nearly seven million hectares.

"The true value of the river basin can only be realised and harnessed when the area is functioning as a natural ecosystem". Magole notes that tourism and CBNRM are young and promising industries that serve as logical alternatives to rebuilding the large cattle herd of Ngamiland to its pre-CBPP size.

Already, the Okavango Poles Trust, an organisation set up for mekoro poles, feels that its membership is cut off by the short stretch of the northern buffalo fence which cuts through an area called NG12, just south of Seronga. Also, those involved with wildlife management maintain that if the northern and southern buffalo fences

are joined together, (an area the EIA is looking into) the small population of sitatunga living in the permanent swamp at the base of the panhandle will be cut into two, with disastrous effects for the rare antelope found here.

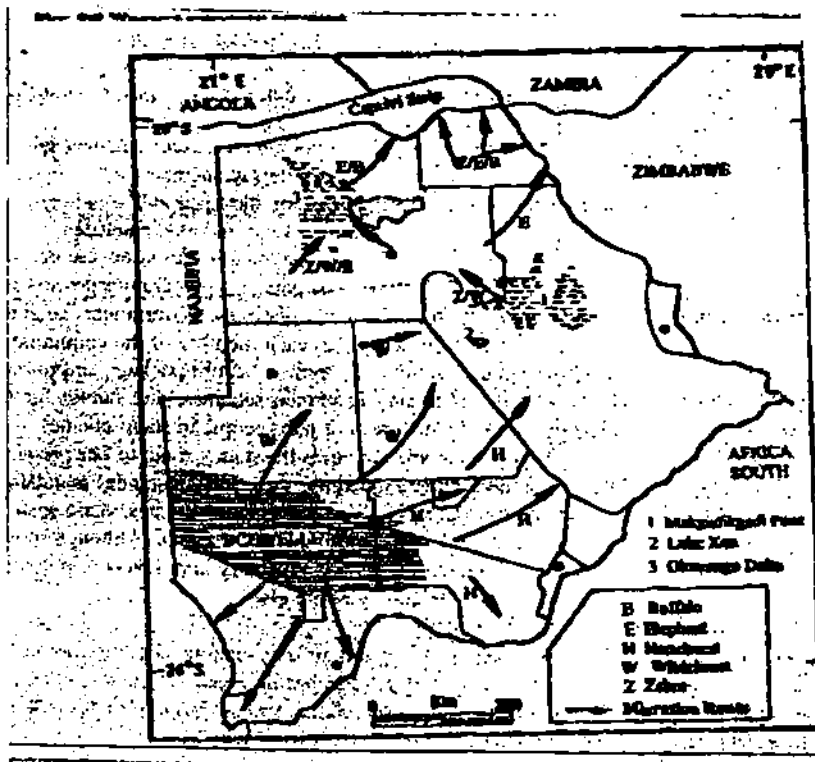
That cattle are still culturally important in Botswana is now questionable. Magole says. "Nowadays it is generally acceptable to pay lobola in cash, and not in cattle. Cattle owners are forever complaining about the unavailability of herders because of the growing unwillingness of people to be employed as herders."

Magole says there is a great opportunity for creating a 'Peace Park' between Botswana, Namibia and Angola on the Okavango River Basin as has been done between Botswana and South Africa over the Kgalagadi Trans-frontier Park. "However, this remains a dim possibility with the current Ngamiland veterinary cordon fences," he observes.

During a report back at the interim stakeholder workshop, which the EIA team held in Maun in November 1999, participants comprising farmers and professionals involved in the wildlife/tourism sector, recommended that the Northern and Southern Buffalo fences be realigned to areas where they would not cut through important wildlife areas.

They argued that the gap between the two fences be left open to allow access to tourists to enter the delta adding that it would be impractical in engineering terms to close the gap and maintain the fence because it would be susceptible to damage by wildlife and debris.

They advocated for the electrification of the northern buffalo fence in particular to deter elephant movement into farming communities living along the eastern bank of the Okavango River. They also recommended that the Ikoga CBPP fence be realigned to avoid hurting the tourism potential of the Tsodilo Hills, a proposed World Heritage Site.



**APPENDIX 11 – MEMBERS OF THE STUDY TEAM**

Mr. Peter-John Meynell	–	Team Leader
Dr. Keith Lindsay	–	Deputy team leader, Leader of Wildlife sub-team
Dr. Debbie Gibson	–	Wildlife sub-team – aerial surveys
Dr. Jem Perkins	–	Wildlife sub-team – rangeland surveys
Dr. Tony Wilsmore	–	Leader of Veterinary sub-team
Dr. Gavin Thomson	–	Veterinary Sub-team – disease epidemiology
Dr. Ignatius Ndzinge	–	Veterinary Sub-team
Ms. Ann Muir	–	Leader of Social & Community Sub-team
Ms. Ketsile Molokomme	–	Community field studies co-ordinator
Mr. Mark Murray	–	CBNRM specialist
Mr. Ralph Cobham	–	Policy and Land-use adviser
Mr. David Parry	–	Land-use sub-team
Mr. Mike Murray-Hudson	–	Land-use sub-team
Prof. Anil Markandya	–	Leader of Economics sub-team
Mr. Nick Dale	–	Economics sub-team
Ms. Lapologang Magole	–	Economics sub-team

**SCOTT WILSON LOCAL OFFICE SUPPORT**

Mr. Vyande Chisiza	–	CEO
Mr. Richard Young	–	Engineering, computer and GIS support
Ms. Anna Motsumi	–	Office Administrator
Ms. Maria Lefhoko	–	Accounts

**MEMBERS OF THE FIELD STUDY TEAM**

Mr. Isaac Basutli	–	Field Studies Assistant
Ms. Lucia Morutwe	–	Field Studies Assistant
Ms. Tsholo Ramathaka	–	Field Studies Assistant
Mr. Meshak Thebeemang	–	Field Studies Assistant
Mr. Onkabetse Kavinja	–	Household economy surveyor (Thuso Lutheran Rehabilitation Centre)
Mr. Benson L. Kuti	–	Driver (Also member of the Community Consultative Committee)
Mr. Johanne Molaootsile	–	Driver

**MEMBERS OF THE WILDLIFE AERIAL SURVEY TEAM**

Mr. Dan Muhghogho
Mr. E. Seonyatseng
Mr. S. Hirschfield
Mr. T. Mokoti
Mr. E. Serebotseng
Mr. S. Olesitse
Mr. V. Mothofela
Mr. S. Mitanda
Mr. G. Masunga
Mr. M. Sechele



## APPENDIX 12 LANDSAT TM PROCESSING OF NGAMILAND DATA

All data were processed by Emma Hunter of NRT - UK

### 1. Imagery

Six Landsat TM scenes were provided for Ngamiland as follows:

Scene ID	Acquisition Date
174074	19 Jan 1999
174073	9 Apr 1999
175074	27 Feb 1999
175073	27 Feb 1999
176074	6 Mar 1999
176073	6 Mar 1999

The images were provided having been sub-sampled to 25 m pixel resolution. The scene location diagram below illustrates the position of each image relative to each other.

176073	175073	174073
176074	175074	174074

### 2. Projection

The images were georectified using a transverse mercator projection with the following parameters:

latitude of origin:	equator
central meridian:	24 ° E
x shift:	500,000
y shift:	10,000,000
scale factor:	0.9996
spheroid:	clarke 1880

### 3. Georectification

The georectification was carried out using the parameters detailed below:

Image Number	Number of GCPs	Correction Order	RMS error
174074	111	2 <sup>nd</sup> order	6.366 pixels
174073	83	2 <sup>nd</sup> order	4.627 pixels
175074	86	2 <sup>nd</sup> order	6.226 pixels
175073	77	2 <sup>nd</sup> order	5.003 pixels
176074	21	1 <sup>st</sup> order	8.525 pixels
176073	31	2 <sup>nd</sup> order	6.605 pixels
			nb/ 1 pixel = 25 m

The RMS error gives an indication of the overall positional accuracy of each scene.

### 4. Mosaic

Once the six scenes had been mosaiced, the mosaic was split into four sections (for ease of display). The coordinates for each quarter are listed below.

NW quarter:	UL x = 175004 UL y = 8022458	LR x = 391504 LR y = 7826133
NE quarter:	UL x = 391504 UL y = 8022458	LR x = 597229 LR y = 7826133
SW quarter:	UL x = 175004 UL y = 7826133	LR x = 391504 LR y = 7665008
SE quarter	UL x = 391504 UL y = 7826133	LR x = 597229 LR y = 7665008

Please see the list of file names and descriptions for details of which mosaic images have been split into four and which have been kept whole.

### 5. Classification

Each image was classified individually. Classification had to be done prior to mosaicing because the images were from different dates and therefore had different growth states. This causes areas of the same class across two images to be classified as different classes.

Each classification resulted in the classes detailed below. If a number is present in the table this indicates that the class was present on the image. If the table is blank this indicates the absence of a class. The significance of the numbers is detailed in the paragraph that follows the table.

#### Image classes

Class	Image					
	174073	174074	175073	175074	176073	176074
1. bare/calcrete	21	44	67	90	18	1
2. dryland 1	28	43	68	87	16	2
3. dryland 2	27	42	69	86	17	3
4. interdune	-	-	71	91	14	4
5. lands/bare	30	41	65	89	19	5
6. class 1	-	-	70	-	13	6
7. dryland association	31	50	66	85	15	7
8. permanent swamp	23	46	61	81	11	-
9. permanent swamp2	25	48	63	82	-	-
10. water	24	47	62	84	12	-
11. seasonal swamp	22	51	64	83	-	-
12. teak	26	-	-	-	-	-
13. mababe	29	-	-	-	-	-
14. class 2	-	45	-	-	-	-
15. class 3	-	49	-	88	-	-

Prior to the classified images being mosaiced, the classes had to be assigned unique numbers so that each class on each number had its own number (see table above). This is so that the classification could be reconciled across the entire mosaic. The resulting classification follows:

#### Class Legend

- 1 = bare/calcrete
- 2 = dryland 1 (orange/red on image)
- 3 = dryland2 (green on image)
- 4 = interdune
- 5 = lands/bare

- 6 = Class 1 (brown patches – quite a few to west)  
 7 = dryland association (on islands and around delta mainly – pink/brown on image)  
 8 = permanent swamp (red on image)  
 9 = permanent swamp2 (dark green on image)  
 10 = water  
 11 = seasonal swamp (pale green on image)  
 12 = teak  
 13 = Mababe (around depression)  
 14 = class 2 (dark red on sands in image 174074)  
 15 = class 3 (blue areas next to Lake Ngami)

These classes were then saved as ArcView grid files for further processing

#### Classification in ArcView

The grid files, as were compiled by NRT were then processed in ArcView by Ecosurv (Botswana). The grids were reclassified repeatedly to identify specific land uses. In the case of the arable lands areas, the grid was saved as a shape file and heavily edited to exclude areas which had been inaccurately identified as lands.

### 6. File names and Descriptions

#### 6.1 NDVI

NDVICOL.tif – NDVI image with red-blue colour table covering whole of Ngamiland.

#### 6.2 453 mosaic images

These images have been split up by the coordinates listed under section 4 Mosaicing. The images consist of bands 4, 5 and 3 (near-infrared, mid-infrared, red). Each quadrant consists of two files – a tif image file and a tfw Arcview world file which contains the coordinate information.

NGAMI453_NE.TFW	world file
NGAMI453_NE.TIF	image
NGAMI453_NW.TFW	world file
NGAMI453_NW.TIF	image
NGAMI453_SE.TFW	world file
NGAMI453_SE.TIF	image
NGAMI453_SW.TFW	world file
NGAMI453_SW.TIF	image

#### 6.3 Georectified Images

These images consist of the original landsat scenes corrected to the projection outlined in section 2. Each scene has three files associated with it – a tif image file, a tfw Arcview world file containing coordinate information and an RMS file which is an ascii text file containing positional error information on the ground control points (gcp) used for geo-rectification.

LTM175073.TIF	image
LTM175073.TFW	world file
LTM175073.RMS	gcp accuracy
LTM175074.TIF	image
LTM175074.TFW	world file
LTM175074.RMS	gcp accuracy
LTM174073.TIF	image
LTM174073.TFW	world file
LTM174073.RMS	gcp accuracy
LTM174074.TIF	image
LTM174074.TFW	world file
LTM174074.RMS	gcp accuracy
LTM176073.TIF	image
LTM176073.TFW	world file

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LTM176073.RMS	gcp accuracy
LTM176074.TIF	image
LTM176074.TFW	world file
LTM176074.RMS	gcp accuracy

NB LTM176073 and LTM176074 are subsets of the original Landsat scenes as geocorection points were only available for those parts of the images within Botswana.

#### **6.4 Individual Classified Images**

Each image was initially classified as described in section 5 Classification. The resulting images are listed below by Landsat scene. The images consist of a tif image file and an Arcview tfw file for each landsat scene.

BAN175073.TIF	image
BAN175073.TFW	world file
BAN174073.TIF	image
BAN174073.TFW	world file
BAN174074.TIF	image
BAN174074.TFW	world file
BAN176074.TIF	image
BAN176074.TFW	world file
BAN175074.TIF	image
BAN175074.TFW	world file
BAN176073.TIF	image
BAN176073.TFW	world file

These classified images were converted to grids in Arcview and the classification modified to improve consistency. The resulting grids are listed below.

#### **RECLASSIFIED GRIDS**

NGAMIMLC –	Grid of classified image for whole of Ngamiland
NGAMIRCLSS –	Reclassification of ngamimlc
NGAMISIMP –	Reclassification of ngamireclss (combining some classes)

#### **6.5 Vector Data**

Vector data from the Ministry of Agriculture consisting of 1:250000 topographic map data were used for georectification.