

**Strategies for Effective Monitoring  
in Community Based  
Natural Resource Management**

**A Case Study  
of the ADMADE Program  
in Zambia**

Andy Lyons  
Department of Wildlife Ecology and Conservation  
University of Florida  
September, 1999

## **Acknowledgements**

This research could not have been possible without the help of numerous individuals who assisted me while working in Zambia for a period of almost one year. First and foremost, I am very grateful to the ADMADE scouts and Unit staff who were patient in answering my endless questions about their roles and perceptions of monitoring. I am also indebted to the staff of the Nyamaluma Institute for Community Based Resource Management, especially Dale Lewis, James Katumbi, Phillip Ngulube, and William Banda, for orienting me to Nyamaluma's monitoring and training systems, and sharing the often unwritten history of ADMADE's experiment in CBNRM. I am also grateful to senior officers of the Zambia Wildlife Authority (formerly National Parks and Wildlife Services), in particular Ackim Mwenya, Gilson Kaweche, and Henry Mwima, for supporting this research and offering useful suggestions. I am additionally thankful to the Agricultural Development Office at USAID/Zambia, in particular Dave Soroko and Morse Nanchengwa, for their assistance and support of this research. Finally, this work could not have been possible with the support of my supervisory committee at the University of Florida, Drs. Susan Jacobson and Colin Chapman, who helped me design the study and secure funding to work in Zambia.

This study was funded by the Wildlife Conservation Society of New York, the Tropical Conservation and Development Program at the University of Florida, and USAID/Zambia.

Andy Lyons  
September 1999

## About This Report

This report presents a summary of field research carried out for a masters thesis in Wildlife Ecology and Conservation. The research, conducted over an eight month period in 1998/99, sought to identify strategies for effective monitoring in community based natural resource management (CBNRM) projects by studying the monitoring system of ADMADE, the Zambia Wildlife Authority's program for community-based wildlife management in Game Management Areas (GMAs). The research focused on issues such as soliciting community participation in monitoring, information flow and management, stakeholders and information needs, synthesizing lessons learned, data quality, using indicators for wildlife monitoring, and capacity building.

This study involved three inter-related tracks of research:

- description and analysis of ADMADE's monitoring needs, strategies, and activities
- evaluatory exercises to measure the effectiveness of ADMADE's approach to monitoring
- development of interventions to strengthen ADMADE's monitoring system

This paper is a precursor to a more comprehensive masters thesis which will describe the research in greater detail. Certain sections, which will appear in the final thesis, have been reduced or omitted from this report, including:

- the general background on wildlife ecology and management in Zambia
- a literature review of monitoring and data quality issues
- more detailed analysis of my interviews with village scouts

As noted above, the focus of this research was primarily on the strategies and processes of monitoring at the program level, rather than the specific results of monitoring. Hence readers hoping to see results that can answer "does ADMADE work?" may find this study to be disappointingly scant on such conclusions. However those wanting to know "what tools and strategies has ADMADE developed to find out whether it works?" will hopefully find the results of this study interesting and beneficial.

This report is available for downloading in its entirety from <http://nersp.nerdc.ufl.edu/~alyons>, or by emailing the author at [alyons@nersp.nerdc.ufl.edu](mailto:alyons@nersp.nerdc.ufl.edu).

## Table of Contents

Acronyms .....	v
Chapter 1: Introduction .....	1
Purpose of the Study .....	1
Methods.....	2
Literature Review.....	2
Database Analysis .....	2
Field Visits.....	2
Limitations of the Study.....	3
Definitions and Concepts .....	4
Roles of Monitoring in CBNRM .....	5
Chapter 2: Monitoring in ADMADE.....	7
A Stakeholder Analysis of Monitoring Information in ADMADE .....	7
Rural Communities .....	7
ZWA Unit Staff.....	8
Nyamaluma Institute .....	9
Zambia Wildlife Authority Headquarters.....	9
USAID.....	10
Wildlife Conservation Society (New York).....	11
Safari Industry.....	11
Ministry of Environment and Natural Resources, Environmental Support Programme.....	11
Environmental Council of Zambia, Wildlife Resources Monitoring Unit.....	12
NGO Community.....	12
Data Sets.....	13
Information Flow .....	16
Use of Maps.....	17
Assessing Wildlife Populations .....	19
Quota Setting .....	23
Hunting Statistics .....	25
Key Informants .....	26
Field patrol data .....	28
Indicator Availability and Agreement.....	28
Quota Setting Meetings.....	29
Evaluating Data Quality .....	30
Data Quality Controls - Procedural & Human .....	31
Data Quality Controls - Computer/Quantitative.....	31
Data Quality Controls – Summary.....	36
Percentage of Field Patrols Recorded .....	37
Chapter 3: Synthesizing Results .....	39
Key Questions Matrix .....	39
Findings and Lessons Learned .....	43
Chapter 4: Interventions.....	51
Upgrading the Information System at Nyamaluma .....	51
Previous Information System .....	51
Results: The ADMADE Data Manager .....	54
Developing a Web Site.....	59
Increasing Local Capacity for Data Analysis.....	59

Chapter 5: Conclusion.....	61
The Way Forward .....	61
Other Research Needs .....	64
Appendix I - Bibliography .....	66
Appendix II - A Framework for Effective Community Based Monitoring .....	70
Appendix III - Menu System of the ADMADE Data Manager .....	71
Appendix IV - Data Analysis Training Conceptual Framework.....	88
Appendix V - Advanced Scout Training Workshop Notes.....	103
Appendix VI - Additional Research Proposals .....	109
Effectiveness of Training .....	109
Poaching and Bushmeat Trafficking.....	111
Institutional Structure and Providing Support ADMADE Communities .....	112
Field Patrol Movements and Search Tactics .....	112
Cultural Forces in Conservation .....	113
Validity of Informant Data.....	114

## **Acronyms**

ADM – ADMADE Data Manager  
ADMADE – Administrative Management Design  
CBRNM – Community Based Natural Resource Management  
CDC – Community Development Committee  
CEMP – Community Environmental Management Programme  
CRB – Community Resource Board  
ECZ – Environmental Council of Zambia  
EINMS – Environmental Information Network and Monitoring System  
ESP – Environmental Support Programme  
ESRI – Environmental Systems Research Institute  
FMC – Financial Management Committee  
GIS – Geographic Information System  
GMA – Game Management Area  
GRZ – Government of the Republic of Zambia  
ICDP – Integrated Conservation Development Project  
KANTIPO – Kafue Anti-Poaching Organization  
LIRD – Luangwa Integrated Resource Development Project  
MENR – Ministry of the Environment and Natural Resources  
NGO – Non-Governmental Organization  
NPWS – National Parks Service  
PEF – Pilot Environmental Fund  
RMC – Resource Management Committee  
SLAMU – South Luangwa Area Management Unit  
SCI – Safari Club International  
USAID – United States Agency for International Development  
VAG – Village Area Group  
WCRF – Wildlife Conservation Revolving Fund  
WCS – Wildlife Conservation Society  
WRMU – Wildlife Resources Monitoring Unit  
ZWA – Zambia Wildlife Authority

## Chapter 1: Introduction

### *Purpose of the Study*

'Monitoring,' however it may be defined, is most frequently used as a broad term encompassing a variety of activities, objectives, and stakeholders. In the context of conservation and development projects, an effective system for monitoring is widely acknowledged as important both for contributing to program success as well as measuring the level of success. However even a cursory review of Integrated Conservation and Development Program (ICDP) literature will reveal that 1) monitoring is often designed primarily as a tool to satisfy donor demands for reporting and accountability, and 2) the conceptual framework upon which a project's monitoring system is based is often far less developed than the conceptual framework of other project activities.

This research study was motivated from the belief that information can be used as a tool to improve management at all levels, empower rural communities, and improve the design of conservation program, and furthermore that these roles are equally if not more important than meeting the information needs of external stakeholders. Many rural communities, whose support and participation in the management of natural resources is now universally appreciated, have not benefited as much as they could have from project monitoring systems, which in fact are ultimately used to make decisions affecting their livelihoods. Conservation projects and rural people can not afford to use their limited material and human resources inefficiently in a world where external assistance is limited and competition rewards efficiency and strategic planning.

In this study I have attempted to analyze the monitoring system of ADMADE, in light of the above framework, as a case study of an ICDP that has experimented with ways of involving local communities in monitoring. Specifically, this research attempted to answer:

- Who are the stakeholders in ADMADE's monitoring system and what are their information needs?
- What are the goals of ADMADE's monitoring system and what strategies have been used in its design? What lessons have been learned?
- How rigorous is data collected in ADMADE, and what can it be used for?
- What factors determine the quality of data collected by village scouts, and how can data quality be measured?
- Where are the weak points in ADMADE's monitoring system and how can these be strengthened?

Like a lot of fieldwork, this research evolved over its course as new issues were encountered and unforeseen circumstances demanded new approaches for collecting data. In particular, the primary unit of analysis was shifted away from individual village scouts to ADMADE Units and the project as a whole. This was primarily due to the fact in practice that little monitoring data is linked to individual scouts, and travel constraints made it difficult to reach a sufficient number of scouts in the field. In addition, conceptually many of the truly interesting and unique characteristics of ADMADE's monitoring program occur above the level of the scout, warranting analysis at higher levels.

A second alteration in the study concerns the assessment of data quality. Originally I had proposed to compare ADMADE's monitoring data with other, more objective, measures of wildlife from third party research. However it quickly became apparent that, with a couple of exceptions, there are basically no other measures of wildlife populations in ADMADE GMAs. Hence the question of rigor of data has been approached more theoretically, by reviewing the methodology of using indices for evaluating wildlife

populations, and synthesizing the different types of controls that have been or could be used by ADMADE to ensure data quality.

## ***Methods***

This research was conducted in Zambia between October 1998 and June 1999. Additional preliminary research was completed in Lusaka from July to September 1998. The following types of research methods were used:

### **LITERATURE REVIEW**

A considerable amount of literature, both published and unpublished, has been written on ADMADE. Nyamaluma Institute, where I was based for the research, has published a considerable collection of manuals, workshop proceedings, trip reports, monitoring summaries, policy papers, and newsletters. USAID/Zambia, which has been ADMADE's primary donor for its first ten years, also has a large collection of reports and evaluations. Wildlife conservation in Zambia has also been a popular topic for articles from academic journals. A bibliography of the various reports and articles reviewed for this study can be found in Appendix I.

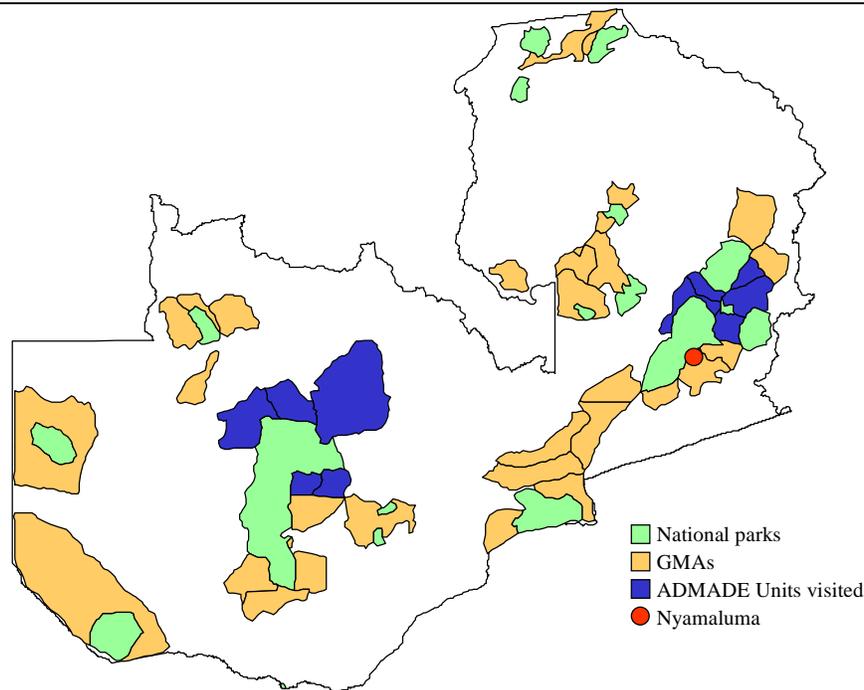
### **DATABASE ANALYSIS**

Nyamaluma Institute, located near South Luangwa National Park, has long been the research and training center for ADMADE. All monitoring activities at the project level are based out of Nyamaluma, and they are the primary repository for monitoring data. Nyamaluma also hosts a state-of-the-art Geographic Information System (GIS) lab, which is used for data analysis and presentation.

While at Nyamaluma, I was given free access to their database of monitoring data and GIS. My analysis of existing monitoring data and observations of the information system eventually evolved into developing an improved database system called the ADMADE Data Manager (see Chapter 4). I was also able to observe day-to-day activities at the research center, and spent a substantial amount of time observing and interacting with Nyamaluma's research staff. Nyamaluma's research officers also serve as extension and training staff, and I benefited immensely from their tremendous wealth of experience with communities and monitoring issues in the field.

### **FIELD VISITS**

For most of this study, I was based at Nyamaluma Institute. I did however accompany Nyamaluma inspection teams to several ADMADE areas, listed below. During these trips, I interviewed scouts, Unit leaders, and Deputy Unit Leaders. I also observed data management practices at the Unit Headquarters, sat in on several quota-setting exercises, and assisted Nyamaluma staff with other data collection activities.



*Figure 1 – ADMADE Units visited for research  
Lower Lumimba, Upper Lumimba, Munyamadzi, Chifunda,  
Kasonso Busanga, Lunga Luswishi Busanga, Mumbwa*

### ***Limitations of the Study***

Previous evaluations of ADMADE have been criticized for being scant on original data, based on limited and non-representative field visits, and dependent on anecdotal case studies. Although the primary focus of this research was synthesis and not evaluation, it too is not immune from these limitations. The logistics of doing any kind of fieldwork with ADMADE, especially research, are formidable. The areas are far apart, not accessible all year round, and have few or facilities for accommodation. As a visiting student researcher, I did not have my own vehicle and was dependent on catching lifts with staff from Nyamaluma. However the project's transport is limited and usually obligated for other purposes.

Consequently, sample sizes are generally small, data is mostly qualitative, and the areas I visited were not selected based on my research questions. I was not able to conduct interviews or collect data at scout camps other than Unit headquarters, and did not spend any extended periods of time with community members. I also did not have an opportunity to interview any professional hunters or safari operators for their input on monitoring issues, which could have been insightful. Nor did I have the opportunity to accompany scouts on a field patrol to study their movements and search strategies, as I originally hoped to.

On the other hand, the research based at Nyamaluma was fairly comprehensive, as I had open access to documents, staff and the monitoring database. The information stored in Nyamaluma's database and the extensive field experience of the research staff were a rich data source, and helped to increase the validity of findings even when original empirical field data was scant.

Despite its limitations, I believe this research does accurately capture the context and strategies of ADMADE's monitoring program, and has synthesized the major results of a ten-year experiment in community-based monitoring. This work has already fed into three important and successful interventions

to strengthen monitoring within ADMADE (see Chapter 4), and I hope will also benefit CBNRM programs elsewhere in Zambia and Africa.

### ***Definitions and Concepts***

‘Community’ and ‘monitoring’ are two terms which are inescapable in any discourse on community-based monitoring, and yet are rather fuzzily defined and open to different interpretations. Hence it is prudent to establish a few working definitions at the onset to prevent confusion arising from different connotations of these terms.

‘Monitoring’ is term which often carries a variety of unstated assumptions depending on the user and the context. To minimize the number of qualifications, for the purposes of this paper I am using relatively simple definition of monitoring as *the systematic collection of data*. Implicit in this definition is that the same type of data is measured on a regular, or at least predictable, basis, and that data is recorded in some way (e.g., on paper). However not implicit in this simple definition are the elements of:

- monitoring designed around specific goals
- consistency and objectivity in measurement
- mechanisms in place for summarizing, analyzing, and disseminating data
- other aspects of research design, such as a hypothesis testing, representative sampling, control groups, etc.

Although these elements are certainly desirable in most cases, for discussion it is probably useful to restrict ourselves to a broader definition which only implies systematic data collection. By demanding only general requirements for things we can label ‘monitoring’, research can encompass variety of activities that center around data collection, and force ourselves to articulate the methodological issues and broader framework in which monitoring plays a role. Thus while ‘monitoring’ by itself may not a very useful descriptor, requiring ourselves to use qualified terms like ‘impact monitoring’ or ‘the monitoring hypothesis’ leads to a more productive discourse.

The term ‘community’ likewise is a loaded reference which many academics claim exists only in theory. What we may commonly refer to as a ‘community’ can inevitably be broken down into multiple sub-groups based on divisions of gender, class, livelihood, household, access to resources, political affiliation, etc. When we speak of participation of the ‘community’, or problems of the ‘community’, more often than not we are actually referring to specific subset of a group of rural people who may share little more than the same geographic area. Hence while ‘community’ can be a useful term for general reference, when it comes to specific discussions of community responsibilities, problems, perceptions, attitudes, livelihoods, etc., we are best advised to be as specific as possible as to which group of persons we are referring.

‘Information need’ and ‘information use’ are two other terms which I’ve noticed are often used interchangeably but have significantly different functions and are best kept separate. Simplified, ‘information need’ can be thought of as the thing you want to know, while ‘information use’ is why you want to know it. When asking village scouts why they were recording data on field patrols, a common answer I would receive was “to know where the poachers are.” While this is a fine example of an information need, knowing the location of poachers is usually not an end to itself, and could not be considered a use of information. However “planning anti-poaching activities,” is an example of a use of information which may have been implied in the original answer. In this report, I conscientiously distinguish between information needs and uses, because unfortunately one does not always imply the other and information use is in general the more interesting phenomenon to study.

## ***Roles of Monitoring in CBNRM***

CBNRM projects are by their nature complex enterprises. Stakeholders usually include everybody from rural communities, government departments, private industry, donors, and NGOs. Not too long ago the conservation and development goals of CBNRM projects were commonly thought to be mutually exclusive. The context under which CBNRM programs operate is equally complex. There are economic forces at play, as well as cultural, ecological, institutional, and political dynamics. Indeed it is amazing there are a few examples, including ADMADE, where CBNRM actually seems to be a successful strategy. For such ambitious undertakings to work, we must really understand not only the dynamics of the natural resources at the center of the picture, but also the interactions between all the other parts and actors.

Monitoring is an important element of CBNRM projects not only for its benefits to management, but also because it can help illuminate the different interactions between the players and forces in CBNRM. Unfortunately, all too often the design of a monitoring system is based around donor or government reporting requirements. However that function of monitoring is just the tip of the iceberg. A well-designed and implemented monitoring program can perform numerous functions at a variety of levels, described further below.

### **Ensuring accountability**

Despite the many sophisticated evaluatory and planning functions of monitoring, simple accountability remains one of the most important roles of monitoring. Ensuring that quotas are not violated, that scouts use their food and ammunition for the intended purposes, and that community funds result in community projects, are all examples of the accountability function of monitoring. This role is important not only to ensure that scarce resources are used efficiently, but also to sustain trust and confidence amongst such a diverse group of stakeholders. Many of the strategies of CBNRM are based on partnerships which require mutual faith and understanding among parties that often have a long history of conflict. Timely and accurate information can help serve as the bridge between parties and keep the whole program moving forward. At the donor level, demonstrating accountability for project resources is a legal requirement and a precursor to future support.

### **Adaptive management**

Like accountability, adaptive management exists at different scales within a CBNRM approach. At the resource level, monitoring provides needed feedback for guiding management operations, such as targeting law enforcement, setting harvest levels, developing work plans, and improving the efficiency of management efforts. At the project level, monitoring data helps to identify weaknesses, target interventions, identify new opportunities for collaboration, develop training programs, and guide policy development. Because CBNRM is still a relatively new and largely unproven technique for conservation and development, monitoring helps us to learn as we go so that the best set of management practices and program structures are identified.

### **Building local management capacity**

We live in an information era, and although many conservation and development professionals would prefer otherwise, rural communities are not isolated from the effects of rapid change and globalization. The price of agricultural products are largely set by international markets, marketing even in rural sectors is increasingly competitive, and development planning at the community level is an information intensive exercise. In short, rural communities in the developing world that lack the capacity to plan and manage their own enterprises will most likely be left behind.

Developing skills in collecting and using information for management is one of the most important components of capacity building. One of the spin-offs for communities participating in CBNRM projects like ADMADE is hopefully an increased capacity to work as a group and feel comfortable with information-based decision making needed to deal with the challenges of the future. The skills it takes to cohesively make decisions on quota setting, land-use issues, planning a new classroom, etc., are the same skills which can be applied to collectively market agricultural crops, plan health interventions, create small scale business plans, or more effectively lobby government for increased services.

### **Public education**

All CBNRM projects need to increase awareness of the program, its goals, and strategies. CBNRM programs are somewhat unique in that they depend on certain behaviors being adopted by the *entire* community, not just a small group of people directly involved in the program. Using monitoring data in education programs provides an important tool to convince people of the merits of the program and justify management practices. Monitoring public awareness, attitudes, and behavior can also help identify the need for and effectiveness of education programs.

### **Testing new interventions**

CBNRM programs have few time-tested models to follow, and most have to pioneer their own techniques. Monitoring is critical to planning or evaluating new interventions. Whether the experiment is a new method to discourage poaching, new community structures to increase representation in community decision making, a new training program, or changes in land-use practices, monitoring provides the information to identify, plan and evaluate new techniques at the community and project levels. Without sufficient monitoring data, development of new methods is certainly going to be more haphazard, more controversial, less likely to succeed, and harder to replicate.

### **Evaluating a conceptual framework**

All CBNRM programs are based on a conceptual framework, a theory that explains why a system is in the state it is, and how changes can be made. For example one piece of ADMADE's conceptual framework says, "Local people will have little interest in conserving wildlife if it doesn't have economic value. So if we give wildlife economic value, local people will be interested in protecting wildlife."

Conceptual frameworks constitute the fundamental building blocks of CBNRM programs, and the effectiveness of a program can be often directly linked to the validity of the framework. Many project failures can be directly traced to flawed or incomplete conceptual frameworks. Monitoring data can help evaluate and improve conceptual frameworks. For example, after several years of trying, a project may realize that their conceptual framework was somewhat simplistic. For example it may be found that people will be interested in conserving wildlife only if it has economic value **and** that value can be applied to their basic survival needs such as food security. It is this type of learning process, made possible by monitoring, that allows conservation and development to evolve and improve as a field.

## Chapter 2: Monitoring in ADMADE

### *A Stakeholder Analysis of Monitoring Information in ADMADE*

There are numerous stakeholders in ADMADE's monitoring system, both internal and external to the program. While many stakeholders share common interests in monitoring, each stakeholder also has specific information needs relating to its function in ADMADE. When discussing or evaluating ADMADE's monitoring system, we need to consider the various perspectives and information needs of the key actors. The main stakeholders and their interests in ADMADE's monitoring program are summarized below:

#### **RURAL COMMUNITIES**

Residents living in or near ADMADE GMAs have probably the most to win or lose from wildlife management in Zambia. Whereas other wildlife stakeholders are affected by wildlife indirectly, such as by lost recreation opportunities, reduced revenue, esthetic values violated, poor job performance, etc., the wildlife-related issues faced by rural residents are very immediate and personal, including property damage, fear, loss of vital food stocks for the hungry season, possible loss of life, and risk of arrest or imprisonment. Conversely, rural residents also have much benefit from wildlife management, through increased opportunities to satisfy livelihood needs, improved health services, education, and better food security. Hence it is appropriate that rural communities have been finally recognized as perhaps the most important stakeholder in CBNRM programs such as ADMADE.

In terms of information needs, rural communities require data upon which to manage their wildlife resources, such as making quota recommendations, planning anti-poaching operations, and ensuring that all hunting fees and regulations are adhered to. Whereas in the early years of ADMADE many of these chores fell almost exclusively upon the Unit Leader and his field staff, the new ADMADE structures dictate that more and more of these responsibilities lie with the various community management committees<sup>1</sup>. Information available for management activities includes indicators of wildlife population trends (e.g., hunting statistics, observations on field patrols), field patrol results, poacher profiles, and Wildlife Conservation Revolving Fund (WCRF) statements.

Planning and implementing community development is at least complex, if not more so, than managing wildlife. In order to prioritize development needs, communities need information about household level food security, livelihood strategies, human population growth and distribution, health and education services, wealth distribution, and intra-community dynamics.

Catching and preventing mismanagement of money and other project resources is another important need of rural communities. Whether it is ammunition and rations taken on field patrols, or the amount of money received by the Community Resource Board (CRB) for an entire year, accountability and transparency of resource use is critical for program success. To ensure accountability, communities need information on field patrol supplies, license sales, animals hunted, community development projects, and Unit expenditure summaries. When mismanagement does occur, communities need a monitoring system

---

<sup>1</sup> In 1999, ADMADE reorganized administration of the project at the community level. The Sub-Authority (a community committee controlled by the chief) was replaced with a democratically elected Community Resource Board. The CRB is assisted by three technical sub-committees, the Resource Management Committee, Community Development Committee, and Financial Management Committee. To ensure more equitable representation geographically, membership of the CRB and management committees must be divided evenly between the Village Area Groups, which are new sub-divisions of a GMA.

that is responsive enough that it will catch the problem at an early stage so that corrective measures can be taken.

Under the 1998 Zambia Wildlife Act, Community Resource Boards will also be required to develop comprehensive resource co-management agreements between themselves, the relevant government agencies, and private industry. Negotiating a co-management agreement is an information-intensive activity in itself, requiring recent resource inventories and baseline data on management operations and resource use. In addition to helping develop co-management agreements, resource monitoring will also be an important component of all co-management plans.

Communities will face other information needs when reviewing and renegotiating safari hunting concessions with safari operators. One of the major determinants of success of ADMADE in a GMA is the performance and integrity of the safari operator and his professional hunters. Monitoring data can be used to evaluate the past performance of a safari operator, assess the economic potential of a hunting block, and negotiate new concession fees.

Local land-use plans have been developed for most of the ADMADE Units in the Luangwa Valley, and will be developed for the remaining areas in the next year or two. Land-use plans are developed in participatory workshops, and are broad-spectrum, comprehensive sets of proposed actions designed to resolve and prevent land-use conflicts. Resolutions from a land-use plan may include shifting human activities away from wildlife areas, implementing a new project such as an electric fence or road rehabilitation to address community needs, or clarification on the roles of the various actors in ADMADE. Developing a land-use plan is a complex, participatory exercise, which requires monitoring data such as wildlife habitat needs, safari hunting trends, Unit demography, community development priorities, and revenue flows.

### **ZWA UNIT STAFF**

The information needs of Zambia Wildlife Authority (ZWA – formerly known as the National Parks and Wildlife Services) field staff, which includes the Unit Leader, his Deputies, and civil servant scouts, parallel the information needs of local communities with whom they are partners in management. As the field representatives of ZWA, these officers have the responsibility and authority to enforce wildlife regulations, conduct anti-poaching operations, arrest poachers, and recommend scientifically based hunting quotas. On the 'softer' side of their job, Unit staff are active participants in formulating local policy, such as land use plans, resolving conflicts, and public education. Each of these different types of activities requires monitoring information to plan, execute, and evaluate.

In addition to conducting management operations, Unit staff has an interest in ADMADE's monitoring system in a way that no other stakeholder has: they are the source of most of the data. Village and regular scouts, under the leadership of the Unit leader and his deputies, collect all of the safari hunting, field patrol, and poacher arrest data, and are recorders for other types of data such as crop damage and snaring pressure. The scouts and their supervisors need to know not only the results of their monitoring work, but also feedback on their methodology of data collection. One of the on-going efforts by extension staff from Nyamaluma has been to increase the capacity of Units to collect, store, and analyze the various forms of monitoring data.

Interviews conducted for this study revealed that providing evidence for judicial proceedings is another common use of monitoring data at the Unit level. Poacher case records and field patrol dataforms become important pieces of evidence when poachers are brought to court. Likewise when scouts are accused of an

offense, such as improperly confiscating property, or injuring or killing a poacher, dataforms from the operation may be used in adjudicating the case.

At a slightly higher organizational level, Wardens, who are responsible for an entire command (Zambia is broken into nine commands), have their own information needs. Wardens are in charge of all personnel matters, allocation of human and material resources, and monitoring wildlife populations in their command. Commands also get a percentage of safari hunting revenues for their operations, so they have a vested interest in ensuring that safari hunting is being managed properly and sustainably. Some commands also have biologists on staff, who typically have few resources to work with and may rely heavily on data from scouts in ADMADE areas. Biologists may also assist Unit staff in monitoring activities, such as data analysis or organizing ground transects.

### **NYAMALUMA INSTITUTE**

Nyamaluma Institute is ADMADE's center for training, research, and extension services. Although officially a government facility, in many regards Nyamaluma functions as a semi-autonomous NGO, providing a variety of services to ADMADE Units. Nyamaluma also serves as the primary liaison between ADMADE Units and other stakeholders, such as the Zambia Wildlife Authority headquarters in Chilanga, the safari industry, and the international conservation and donor community.

Nyamaluma's information needs are as diverse as the roles it plays. To fulfil its function as a training institute, Nyamaluma requires information about staff numbers, retention rates, educational background, and training needs. In its role as a source of extension services, Nyamaluma needs all the same information as communities and Unit staff. Likewise, as the primary liaison between communities and ZWA headquarters, international donors, and the safari industry, Nyamaluma requires the same type of information as these other stakeholders.

Nyamaluma is able to fulfill so many roles partly because it functions as the central nervous system of ADMADE's monitoring system. There are very few monitoring activities in ADMADE that were not designed, initiated, and continuously supported by the staff and technical resources at Nyamaluma. In exchange for offering technical support with data analysis and presentation, Nyamaluma gets a copy of all monitoring data which it enters in a master database.

### **ZAMBIA WILDLIFE AUTHORITY HEADQUARTERS**

The Zambia Wildlife Authority office in Chilanga is the department headquarters. This is the base for all the senior officers in ZWA, including the Director, Deputy Director, Chief Warden, Landuse Planning Officer, and Chief Wildlife Research Officer. The headquarters office is responsible for all issues and decisions affecting wildlife in Zambia, including deciding final hunting quotas in Game Management Areas, budgeting and staffing, program planning, research and education, developing and enforcing policies and regulations, collection of fees and permits, and program coordination with other organizations domestic and foreign. ZWA Headquarters has vested interest in ADMADE because ADMADE is the department's official management policy in most non-depleted GMAs. Safari hunting in ADMADE areas also provides a significant amount of revenue both for ZWA and GRZ.

As far as ADMADE is concerned, senior officers in ZWA want to know how successfully wildlife is being conserved in the project areas, and how communities are benefiting from the program. On a more immediate level, they need information on staffing issues and supplies for field operations. At the policy and strategic planning levels, they need to know how government and industry practices affect the success of safari hunting and ADMADE, and how those policies might be altered or supplemented with new initiatives. The decision to adopt ADMADE as the official government wildlife management policy for

GMAs was based in part on information meticulously kept during the pilot Lupande Development Project. Similarly, the future evolution of wildlife management in Zambia will be based in large part on the monitoring results and experiences of ADMADE.

In 1999 an ADMADE Coordinating Office was opened at ZWA headquarters Chilanga. This office allows ADMADE to develop a badly needed presence in the day-to-day activities of the department. The coordinating office also provides field support to the ADMADE Units surrounding Kafue National Park, and liaises with other government departments and the donor/NGO communities in Lusaka. The information needs of the coordinating office parallel those of Nyamaluma, and there is close coordination between the two branches. The coordinating office does not presently play a role in data processing and analysis, but once its future is stabilized monitoring is likely to become a larger component of its operations.

## **USAID**

As the major donor for the first ten years of ADMADE's existence, USAID has its own information priorities. At a very basic level, they want to determine whether the goals and objectives described in project documents are being achieved, and whether the program is sustainable. In the big picture, one of USAID's interests in funding ADMADE has been to evaluate whether CBNRM is an effective strategy for wildlife management, and if so whether this approach can be replicated in other areas or other sectors. Thus it needs information that will show not only whether ADMADE is achieving its goals, but also through which strategies and under what conditions.

One of the challenges all donor funded projects must face are shifts in the donor's information needs. In the mid and late 80's, when ADMADE's funding agreement was developed and approved, USAID's reporting and evaluation frameworks were generally oriented to measuring the impact of individual projects. Furthermore, biodiversity conservation was a goal in itself. In the mid-90's, USAID as an agency became more 'results oriented', reflecting a larger movement in the US federal government to improve accountability and effectiveness. Oversea missions were told to develop strategic plans for the country, and streamline their project portfolios to be more coherent and integrated around a hierarchical framework of goals and objectives.

As a result of this shift, the last phase of USAID funding for ADMADE under the current project agreement falls under Strategic Objective One: *To increase the rural income of selected groups*. Under this strategic objective, and its three intermediate results, a variety of performance indicators are listed for which ADMADE must provide data in its quarterly reports. These indicators include the net income of rural households, access to finance, value of commodities marketed, improved land and labor productivity, and the number of clients of support institutions. ADMADE, with its strong programmatic emphasis on wildlife conservation, does not fit neatly into this new branch of USAID's strategic objectives chart, and has had to strengthen its data collection in several areas. To measure performance towards USAID's objectives, ADMADE needs to report the number of people benefiting from community development projects, the nature of those benefits, the effectiveness and efficiency of management activities, and variables which impact the long-term sustainability of the program. This translates into improving data collection on revenue flows, community awareness and support for the program, impact of community development projects, management capacity at the local level, wildlife population trends, and performance of the safari hunting industry.

Because donors are not involved in day to day management, USAID for the most part only requires aggregated summaries of monitoring data, not all the details. Furthermore, because ADMADE's impact monitoring data is compiled with data from other supported projects, USAID prefers quantitative over

qualitative data, and absolute values instead of simply relative measures or trends. They also require data which is representative of the project as a whole, instead of just selected areas, to ensure that the results are a valid measure of ADMADE's overall performance.

### **WILDLIFE CONSERVATION SOCIETY (NEW YORK)**

As ADMADE's longest standing supporter from the international conservation community, the Wildlife Conservation Society (WCS) of New York has many of the same types of information needs as a donor, but with a stronger emphasis on the status of wildlife. Unlike USAID, which sees wildlife conservation as a means to improve rural livelihoods, WCS sees rural development as a means to conserve wildlife. They would like detailed feedback on all wildlife issues, including quantifiable data on habitat and species conserved. WCS has conservation interests and objectives at the regional and continental level as well, and would like data that can be aggregated with others to shed light on conservation issues at larger scales. Furthermore, because WCS and other international conservation NGOs support and plan conservation projects in many other countries, they also want feedback on ADMADE's success as a methodology, including lessons learned and the context for success/failure.

### **SAFARI INDUSTRY**

The safari hunting industry is the private sector partner with the largest role in ADMADE. Within the safari industry, the people that have the most immediate interest in ADMADE's monitoring system are the individual safari hunters, safari operators, and professional hunters. Safari operators are generally individuals who have won a concession agreement from the government to conduct safari hunting in a specific hunting block. They represent the political and business side of safari hunting. Professional hunters, on the other hand, are typically highly-experienced hunters who have been contracted by the safari operator to construct and operate a safari hunting camp in the hunting block, which includes entertaining and guiding clients on hunts.

Most operators and professional hunters in the safari business are motivated as much from a passion for wildlife and hunting as the financial rewards. They have an interest in ensuring that hunting in Zambia is managed profitably and sustainably, and by extension are interested in all data that is used to guide management of wildlife. More specifically, they are interested in any information that can be used for setting hunting quotas, to ensure maximum profit without jeopardizing the success of future hunting seasons. They also don't want to be in the position of advertising wildlife trophies that don't exist, because this can ruin one's reputation in a fairly fickle market. When competing for concessions, safari operators need data upon which to base their bid for the hunting block. This includes measures of wildlife abundance, past hunting success, management capacity, and characteristics of the local communities.

Both safari operators and professional hunters must recruit foreign hunters to hunt in their area. Much of this marketing takes place during the annual Safari Club International Convention in Las Vegas. To market their hunting block to wealthy, sophisticated, and demanding clientele, safari operators need to present evidence of the status of wildlife and hunting success in their area. To a lesser but growing extent, safari hunters are also interested in the conservation benefits of hunting, and desire information about the sustainability and ethics of hunting in a certain area. ADMADE's 'Green Bullet' certification program is one of the newer elements of its monitoring program which provides prospective hunters with this type of information.

### **MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES, ENVIRONMENTAL SUPPORT PROGRAMME**

Within the Ministry of Environment and Natural Resources (MENR), the Environmental Support Programme is a multi-faceted project aimed at increasing environmental management capacity in Zambia. The sub-programs under ESP, each of which is supported by a separate donor but share common goals

and strategies, include the Environmental Information Network and Monitoring System (EINMS), the Community Environmental Management Programme (CEMP), the Project Environmental Fund (PEF), and Institutional and Legal Framework (ILA). At least two of these component projects, the EINMS and CEMP, have very concrete interests in the monitoring activities of ADMADE.

EINMS has the mandate of compiling a directory of all environmental data in the country and developing institutional partnerships to facilitate exchange and enable cross-sectorial analyses. Wildlife, along with forest resources, fisheries, and clean air and water, is one of the key resources identified by the ESP to be of national significance and at risk. ADMADE has one of the most complete datasets on wildlife in the country, particularly outside national parks in the game management areas where much of the wildlife resides. Furthermore, from a methodological standpoint, the EINMS and its institutional partners have a lot to learn from ADMADE's ten year experience of using community residents in natural resource data collection, and conducting analysis with state of the art computer applications.

The CEMP program is similar to ADMADE in that it strives to involve communities in the management of natural resources. Two of the four CEMP pilot areas actually overlap ADMADE units. However CEMP differs slightly from ADMADE in that it focuses on a larger suite of resources, including forest products, fisheries, and mining, and is being implemented through district level government. Nevertheless, national, district, and community leaders in the CEMP program could all benefit from ADMADE's monitoring system, both in sharing content and methodology. Because CEMP is likely to evolve into a national program, ADMADE areas may potentially gain as well, in strengthening the capacity to manage non-wildlife resources, diversifying the resource base for community development, and working more closely with non-wildlife departments in local government.

#### **ENVIRONMENTAL COUNCIL OF ZAMBIA, WILDLIFE RESOURCES MONITORING UNIT**

The Environmental Council of Zambia (ECZ) is a semi-autonomous government unit that performs a variety of roles, including enforcing environmental policies related to pollution. ECZ also implements or provides support to many environmental projects within different government ministries, including several of the sub-programmes under ESP. Recently, a new unit within ECZ, the Wildlife Resources Monitoring Unit (WRMU), was created with the mission to compile a database on wildlife populations, support ZWA in monitoring activities, and serve as a third party source of wildlife data. There is a natural opportunity for developing partnership and dialogue between ADMADE and WRMU, as they support complimentary datasets and methodologies.

#### **NGO COMMUNITY**

There are numerous wildlife NGOs, both domestic and international, working in Zambia. WWF has activities in two of Zambia's prized wetlands, the Kafue Flats and Bangwelu, which also support safari hunting. The Zambia IUCN office supports biodiversity inventories and coordinates environmental research for a variety of government units and donors. At the regional and continental level, IUCN's different specialist groups monitor the status of wildlife, of which Zambia hosts some of the most important remaining populations for some species. The Wildlife Conservation Society of Zambia (unrelated to WCF New York) supports the Chongolola program, which are wildlife clubs in schools throughout Zambia. The South Luangwa Area Management Unit (SLAMU, formerly known as the Luangwa Integrated Rural Development Program) is a program similar to ADMADE but operates in only two GMAs. SLAMU has recently adopted selected elements of ADMADE's safari monitoring program for its own operations. The Kafue Anti-Poaching Organization (KANTIPO) is a young NGO comprised mostly of lodge owners supporting anti-poaching and community development activities in and around Kafue NP. These are just a few of the many wildlife related NGOs and activities in Zambia, all of which have or would like to have wildlife data and methodologies for community-based monitoring.

## **Data Sets**

From the onset of the program, ADMADE's design called for the systematic collection of a core group of datasets, focusing on wildlife and management capacity. While there have been some changes over the years, the basic content and analysis of these core datasets has not changed significantly. Recently, few new monitoring datasets have been added, address more of the social aspects of the program such as demography and levels of resource use. In time, as an archive of data is gradually built up, the combination of resource monitoring data and social variables will paint a clearer picture of the achievements of the program.

Below are descriptions of the main datasets that are systematically collected in all ADMADE areas. The descriptions are grouped based on the original source of the data. Except where noted, all of the following datasets have been entered into the master database at Nyamaluma (see Chapter IV).

**Field patrol data (FLDPAT1 dataform)** - includes patrol dates, number and type of scouts in the patrol, supplies taken and returned, number and location of poachers encountered, names and origin of any poachers arrested, and objects confiscated (e.g., carcasses, weapons, snares, ivory, etc.).

**Field patrols observations (FLDPAT2 dataform)** - includes carcasses found (species, number, and cause of death), snares found, fishing camps and waterholes encountered, poacher camps, fires, live animal sightings (each area picks up to six species to monitor), and the number of hours spent in each grid (added 1999).

All observations are geo-referenced using a 5 km<sup>2</sup> grid system. In the early years of ADMADE, field patrol observations were recorded in an open-ended 'Comments' section. However this approach frequently resulted in irrelevant details and was impossible to process in a computer or analyze quantitatively. In 1995/96, the dataform was redesigned so observations would be entered in tabular format. However it was not until 1999, when the Nyamaluma computer system was upgraded, that field patrol observations were input into the database.

**Safari hunting (SAFLICE, TROPHY, SAFHUNT, CLIENT dataforms)** - includes starting and ending dates of a hunt, license numbers, fees paid, the species desired by the client, species actually killed, wounded animals, locations and dates of animals killed, evidence of snare wounds on animals (added 1999), trophy sizes (following SCI measurement conventions), sex, number of baits (for baited species such as lion), non-hunted trophy animals seen, disturbances to the hunt, poaching activity, client opinions of their hunt and Zambia.

The safari hunting dataset is one of the most reliable datasets in ADMADE for several reasons. For the most part, safari hunting data is complete, because there are typically only 10-25 hunts per season and department policy requires a scout to accompany all safari clients. More importantly, we have a pretty good idea when data is missing. Secondly, the measurements (e.g., date of the kill, trophy size) are not difficult for scouts to take, which increases confidence in the data. For these reasons, safari hunting statistics serve as one of the important indicators used to assess wildlife population trends.

**Crop Damage (CROPDAM, FIELD CROPDAM, GRANARY CROPDAM dataforms)** - includes name of the crop, date, owners name, location (village and grid number), number of plants affected (usually reported in kg or buckets) size of the garden, species that caused the damage, action taken (e.g. shots fired), and result (animal frightened off, wounded, or killed).

Damage to crops is probably the biggest wildlife concern facing rural farmers in ADMADE GMAs. This dataset represents an effort to monitor the significance of this damage, and look for patterns in incidences. Unfortunately, it is not known what percentage of crop damage is actually reported to wildlife scouts and recorded on paper, however in many areas it is believed to be fairly small. Hence while this dataset has many uses, it can not be used to make an accurate estimate of the total amount of damage caused by wildlife.

Prior to 1998, data from the Crop Damage dataform was not entered into the computer. Nevertheless, all existing dataforms from earlier years were saved, and eventually entered in 1998 for analysis. In 1999, the Crop Damage dataform was divided into two new dataforms - Granary Crop Damage and Field Crop Damage. This division was in response to a notable increase in the number of attacks on granaries (food storage bins areas within the village), by elephants. Increased attacks on granaries are a concern in ADMADE, and require slightly different monitoring and preventative strategies.

**Household Demography** - includes the number of people per household, broken down by gender and age group. This is the only community-generated dataset that is not collected by wildlife scouts. In 1998-99, Nyamaluma contracted private individuals from each area to conduct a door-to-door survey for the census. This exercise was undertaken primarily to help demarcate boundaries for the new Village Area Groups, a subdivision of a GMA which was introduced to ensure that representation in decision making is more equitable. The demography data can be used for other studies as well, such as planning community development projects and evaluating the per-capita benefits of the program. Only the GMAs in the Luangwa valley area were surveyed in 1998, the remaining areas expected to be surveyed in 1999.

**Quota setting worksheets** - Starting around 1997, all stakeholders in a Unit are supposed to meet at the end of each hunting season to discuss the hunting quota for the following season. In practice these exercises have only occurred when extension staff from Nyamaluma are available to facilitate the meeting, however in the future it is expected that communities will be able to conduct these meetings on their own. The methods for assessing population trends in the area include a mix of quantitative (e.g., hunting statistics) and qualitative (e.g., scout opinions, feedback from the tracker) indicators (see below). The result of each indicator (i.e., upward trend, no trend, downward trend) is written on a flip chart for each species, and a new recommended quota arrived at by consensus. The flip charts are then copied onto the Quota Setting Worksheet, which is brought to Nyamaluma and entered into the database.

**Staff** - When teams from Nyamaluma visit an area, they collect information about the Unit staff, both civil servant and local. Fields in the database include date of birth, education level, position, status (e.g., in camp, retired, etc.), and family size. This data is used for analyses on staff efficiency, financial support for scouts, and retention rates.

**ADMADE projects** - Updated on an annual basis, the dataset includes a list of the projects financed with safari hunting revenue. It includes the type of project, when it was started, when it was completed, the amount of money spent, and the current status. This dataset does not include the number of users or beneficiaries of the project, and has not been converted into the new database (May 1999).

**Camps, assets, firearms** - These datasets are also collected by teams from Nyamaluma on an annual basis, and are used for planning support to areas and measuring changes in the operational capacity of a Unit.

**Official quotas, license prices, and daily license sales** - Once a year, a committee at ZWA Headquarters in Chilanga sets the final hunting quota for each hunting block, after reviewing community

recommendations and any other available information. ZWA also sets the price for hunting licenses, and sells all hunting licenses at the headquarters office<sup>2</sup>. The office which sells hunting licenses has been computerized since 1994, and all of those records have been imported into Nyamaluma's new database. This information is useful for analyses such as comparing the amount of revenue that should return to a hunting block versus what actually is transferred, and studying long-term revenue trends in safari hunting in Zambia.

**Other** – In addition to the above datasets, which are collected on a regular basis for all ADMADE areas, other data has been collected over the years by Nyamaluma on an as-needed basis in specific areas. These special studies include surveys of ADMADE awareness, garden productivity, ground transects, infrastructure surveys, snaring pressure, behavioral studies of species of concern, and others.

**Quantity of data summary**

Table 1 below shows the number of areas which are represented in the monitoring database at Nyamaluma. Although this table isn't a totally complete picture of the amount of monitoring data in ADMADE because some units may still have their dataforms at the Unit and , it does show general historical trends and highlights those datasets which have been most successfully collected for the greatest number of areas.

Data Set	Source	Number of GMAs With Records				
		1994	1995	1996	1997	1998
Field patrol data	community	11	16	13	8	11
Field patrol observations	community	0	0	3	3	10
Safari hunts	community	0	15	12	11	8
Crop damage	community	0	2	1	3	1
Household demography	community	0	0	0	0	6
Quota setting worksheets	community	0	0	0	8	6
Staff	Nyamaluma	11	17	12	16	18
Camps	Nyamaluma	16	20	12	13	11
NPWS Quotas	NPWS	22	22	21	20	19

Table 1 - Datasets in Nyamaluma database, May 1999

**Dataset Gaps**

As noted earlier, the strongest focus of ADMADE's monitoring program has been resource monitoring. Relatively little data on socio-economic indicators is collected on a regular basis. Household assets, average levels of education, the impact of project-built facilities, harvest yields, community participation in the program, income generation, and public attitudes are examples of socio-economic data which are generally lacking but would complement the natural resource monitoring to paint a more complete picture of ADMADE's accomplishments. The allocation of safari revenues at the community level, which has been a source of controversy for years, is also haphazardly and inadequately monitored (see Recommendations, Chapter 5). Another dataset that would be useful to monitor is the amount training community residents have received, as the effectiveness of training in ADMADE has been largely unstudied.

Senior officers in ADMADE acknowledge these gaps in their monitoring system, and have taken steps to broaden the focus of data collection. Contracting community residents to conduct household demographic

<sup>2</sup> In 1999 a decentralized licensing system is being pilot tested in several GMAs, which will change the way hunting licenses are sold and the record keeping system.

surveys was very successful, and could become a model for collecting other types of socio-economic data. As more and more local residents participate in ADMADE under the new community structures, there will be an increasing need to have access to data which can be use to plan community development and ensure transparency.

### **Dataform Expansion**

1999 was a year of explosive dataform growth for ADMADE. New community development dataforms introduced in 1999 include the Village Area Group (VAG) Committee Establishment dataform, VAG Meeting Attendance dataform, and the VAG Committee meeting report. The VAG Development Needs Implementation dataform, Social Service Provider Form, and VAG Development Needs and Priorities dataform are designed to help communities plan and execute projects. There is a similar set of dataforms for the Community Development Committee, in addition to the CDC Community Development Monitoring dataform which is designed to help the CDC Committee oversee projects. Other new dataforms include a Self-Appraisal Monthly Work Form for village scouts, a new Snare Survey dataform, and Population Trends dataform.

Not all dataforms that have been introduced by Nyamaluma in the past have "taken root" in the Units, so time will tell which of these new forms will be used at the community and/or project level. Although many of these dataforms are intended to be used only within a Unit, if past history is to be a guide, only those dataforms which are requested and supplied by inspection teams from Nyamaluma are likely to become permanent additions to ADMADE's monitoring program. Nyamaluma is also near or above its capacity at processing dataforms, so priorities will have to be set before large new datasets are integrated into the database (see Chapter 5).

### **Information Flow**

Information flow may seem like a rather logistical, boring detail of a monitoring system to analyze. However when probing the effectiveness of a monitoring program, it is often the little "details" that illuminate the strengths and weaknesses of the system. Many desired qualities of a monitoring system, including adequate dissemination, timeliness, and data quality, are affected by the logistics of information flow. Studying information flow can also illuminate gaps between the program model and the reality, which in addition to being of interest in itself, may also provide insight to the suitability of the model as a whole.

When discussing information flow, it is useful to categorize datasets based on their origin. ADMADE's core datasets can be broken down as follows:

<u>Community-collected data</u>	<u>Nyamaluma-collected datasets</u>	<u>Other</u>
Field patrols	Staff	Hunting quotas
Safari hunting results	Camps	Hunting license sales
Poacher case records	Unit assets	
Crop damage	Training records	
Household demography	Special studies data	

As can be seen, many of the datasets, including most of the really interesting ones, are collected at the community level. With the exception of household demography, which is an infrequent door-to-door survey done by a contracted community member, all community-based monitoring data is collected by ADMADE scouts. This is not accidental, as there are many advantages of using scouts for data collection. Most scouts spend significant amounts of time in the field, and are in a good position to record the types of phenomenon of interest. Scouts fall under a command and control system, increasing the effectiveness

and efficiency of data collection, supervision, and storage. Most scouts are local residents, which may increase interest and confidence in the data by the community at large. Finally, all village scouts go through training at Nyamaluma at one time or another, where monitoring skills have been built into the curriculum.

In the future, it is hoped that a broader spectrum of community members will become involved in monitoring, particularly members of the different management committees. However at least in the data collection aspect of monitoring, it seems likely and appropriate that village scouts will remain the backbone for the foreseeable future.

Although it is impossible to generalize, Figure 2 on the next page illustrates the general flow of information and some of the common barriers and bottlenecks.

### ***Use of Maps***

ADMADE has been tremendously successful in getting maps to its Units. Any visitor to an ADMADE Unit headquarters is likely to see maps produced by Nyamaluma on the walls and in files. Often Nyamaluma maps are the *only* maps available in the Unit. Government maps produced by the Survey Department are, for whatever reason, are rarely seen in ADMADE areas.

Map production was a strong emphasis at Nyamaluma during the early days of ADMADE. The research team digitizing dozens of Survey Department maps in order to produce smaller scale base maps of each area. The basic layers for fall field maps include the Unit boundary, streams and roads (important for patrol navigation), scout camps, and an overlay of 5 km<sup>2</sup> grids. Most areas also have a map layer for human settlements, and many have additional layers for water holes, safari camps, project sites, and VAG boundaries.

Nyamaluma produces two types of maps. Letter sized base maps are designed primarily for navigation and locating grid numbers during field operations. Base maps are printed in bulk, and distributed to all village scouts involved with monitoring. Custom made flipchart-sized wall maps are designed to present monitoring summaries during group meetings. Wall maps show results such as the grids where safari hunting is active, field patrol coverage, and areas of land-use conflicts.

Although it is difficult to quantify, the maps distributed by Nyamaluma have undoubtedly proven invaluable for planning and evaluating field operations. Because they are customized for individual areas and printed in bulk, base maps are available to scouts for field patrols and safari monitoring. The large wall maps make monitoring results relatively easy to understand for community residents. ADMADE areas are quite large, and without an integrated capacity to produce maps, ADMADE would have found it much more difficult to visualize patterns in management and land-use within a Unit and across larger areas. Maps have also have an educational value in helping to convey the finiteness of a management area. This is an important realization for community residents who may never have seen all corners of their GMA and perceive it to be without end.

Recently, scouts have also starting to use base maps for recording monitoring data (see Chapter 4). Using a simple system of writing tick-marks in the appropriate grids and keeping a separate base map for each type of observation, scouts will be able to maintain their own spatial summaries of where they have gone and what they have seen. By reducing the dependency on the extension staff from Nyamaluma, and reducing the amount of lag time for analysis, it is expected that scouts and community leadership will make more frequent use of monitoring data when planning activities.

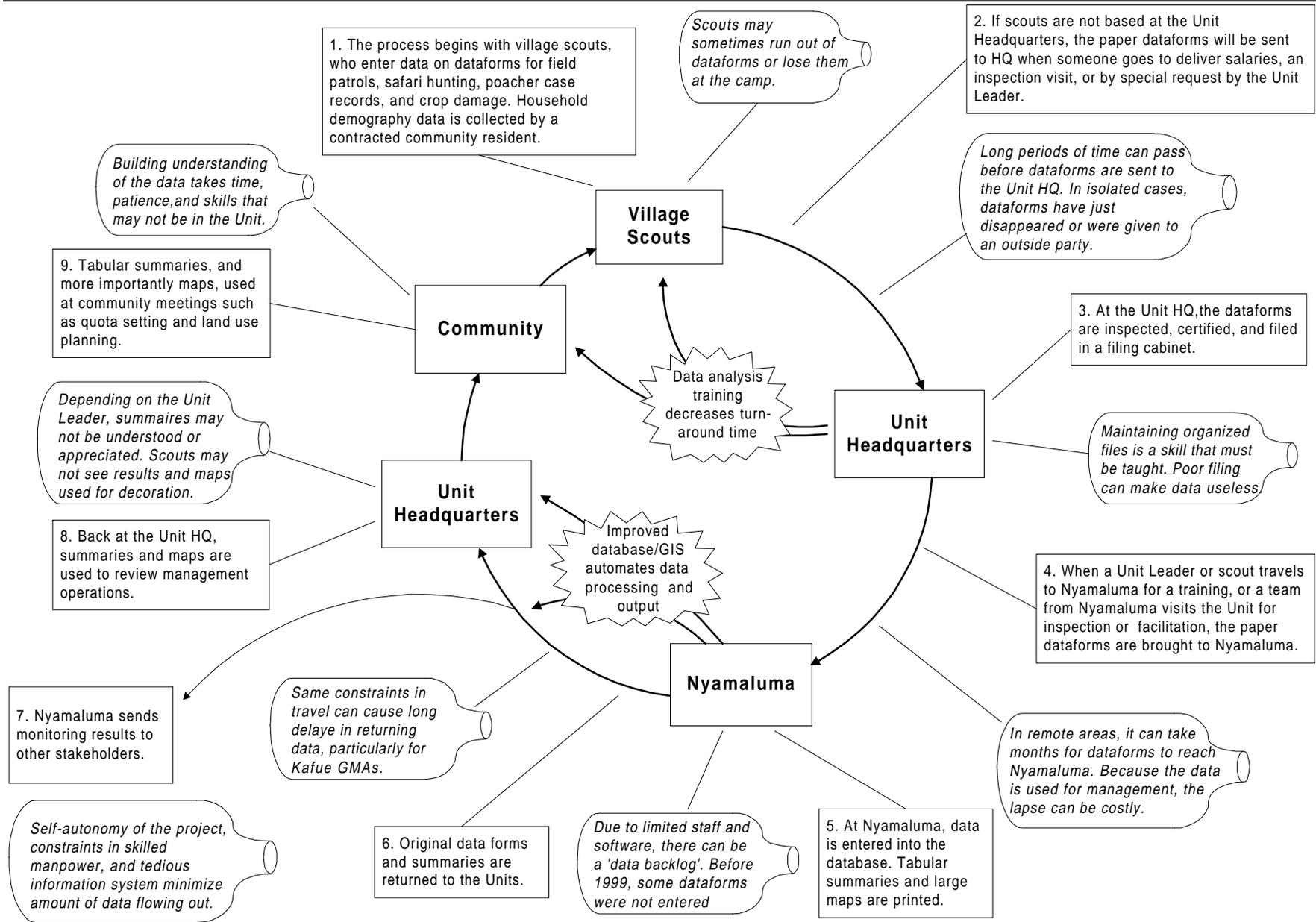


Figure 2 - Information Flow, Bottlenecks, and Interventions in ADMADE

## ***Assessing Wildlife Populations***

One of the main objectives of ADMADE's monitoring program is to measure wildlife populations. More specifically, monitoring data is needed to set hunting quotas, provide an early warning system for species in trouble, and convey the status of wildlife to other stakeholders such as ZWA HQ and donors.

### Measuring Wildlife Populations: The Choices

Counting wildlife is a field of science on its own, and there is a multitude of methods. Counting techniques can be broken into two broad categories, direct and indirect. Direct methods count animals themselves, even though the whole population might not be counted. Indirect methods measure the signs animals leave behind, such as tracks or scat, or some other secondary phenomenon that is related to the total population, such as a sex ratio or harvest statistics.

#### **Direct Methods**

Aerial surveys  
Ground transects

#### **Indirect Methods**

Animal signs (e.g., tracks, scat)  
Bait response  
Capture-recapture  
Sex ratios  
Harvest statistics \*  
Key informants \*

*\*methods used by ADMADE*

In general, direct methods are considered more valid than indirect methods, because the variable of interest is the variable actually measured. Indirect methods rely on theories about the relationship between the observed phenomenon and the wildlife population. For example estimating elephant density by counting dung piles (an indirect method) requires a theory on the relationship between the density of dung piles and the total population of elephants. These relationships may be not fully understood, affected on other variables, or based on assumptions that reduce the validity of the results and limit the types of questions that can be addressed with the data.

Both direct and indirect methods can suffer from problems with measurement or sampling. Measurement problems include inconsistent measurement (e.g., different equipment, different observers, different scales or techniques), lack of sufficient precision in the measurement, and inaccurate measurement. Sampling problems include insufficient sample size, temporal bias (e.g., measuring a 'snapshot' which may not reflect the true state of the population if measured over a larger spatial or temporal scale), and non-representative selection of observations.

### Constraints with Direct Methods

Unfortunately, the direct methods of counting wildlife although generally more valid are not particularly suitable for ADMADE areas. Aerial surveys in savanna woodlands are only reliable at detecting the very large conspicuous mammals, such as elephant, buffalo, large antelope, etc. Small mammals and animals which are secretive – such as the cats – or well-camouflaged are not easily counted from an airplane. Aerial surveys, as well as ground transects, are also very sensitive to factors such as time of day, experience of observers, time of the year, fire, etc. which can bias results by unknown magnitudes.

A second problem with aerial surveys is the cost. ADMADE areas spend about \$5/km<sup>2</sup> on field management per year (NPWS, 1998), and aerial surveys in Zambia cost about \$0.80 - \$1 /km<sup>2</sup> inclusive at a 10% sampling rate (Jachmann, per. comm, 1998). Spending 20% of the annual management budget on a single survey is simply not a feasible option for any protected area.

Other challenges with aerial surveys include obtaining the equipment and technical expertise to conduct the operation. Hence it seems unlikely that rural communities will ever have the resources to conduct or even contract aerial surveys themselves, and it will continue to be a donor or department initiated activity. Thus while aerial survey data will always be an important supplement to other types of data, it will most likely never be repeated frequently enough or free from bias to be the definitive data source for wildlife populations in ADMADE GMAs.

Ground transects, either on foot or by vehicle, have their own disadvantages. Vehicle transects in the heavily-wooded, lightly-roaded ADMADE GMAs are vulnerable to highly biased results because only animals that are within visual distance of the road can be counted. Foot transects on the other hand can reach areas off the beaten track, but are even more expensive to conduct than aerial surveys because of the greater number of people required, longer amounts of time, and logistical support needed (Jachmann, personal communication, 1998). These methods also require skilled biologists and computer software for analysis, and like aerial surveys are susceptible to even small changes in methodology. Thus while ground transects can also tell a part of the story, they alone are not a panacea for measuring wildlife.

### Indirect Methods

If the direct methods of counting wildlife seemed plagued with problems, indirect methods do not fare much better. Out of the possible choices for indirect methods, the only techniques which are really feasible in ADMADE areas are collecting hunting statistics (e.g., trophy size, search effort, hunting success) and interviewing key informants. Other indirect methods such as capture-recapture studies, counting tracks or dung piles, or recording responses to baits (e.g., carcasses, animal vocalizations) require advanced scientific expertise and equipment beyond the capacity of Unit staff.

Unlike direct methods, most indirect methods only produce an index or proxy for the wildlife population, which generally can not be used to calculate abundance or density. Data from these indicators is only comparable if (1) we assume that even though the sampling is not random, it is at least consistent over the time frame of interest, and (2) we get enough observations that any bias from fluctuations in sampling average out. However if measured consistently over time and with enough samples, an index can in theory detect change in a population.

Like all techniques, indirect methods are sensitive to changes in sampling procedures or the way measurements are taken. Indirect methods such as hunting statistics and key informant interviews are particularly vulnerable to unknown bias from sampling. Safari hunters do not randomly select animals from a population, and scouts do not randomly select the areas they patrol. Because of this non-random sampling, it is difficult to make many inferences about the population as a whole.

### Temporal Bias

One advantage of the indirect methods used by ADMADE, hunting statistics and key informants, is that there is much less temporal bias. Hunting statistics are collected over a six-month hunting season, and key informants are asked to recall their last 3-5 years of observations. Hence any short-term fluctuations in the population tend to average out. In contrast, aerial surveys and ground transects are done much less frequently, and the status of the vegetation and the state of the observers on the day of the count has a much greater, though still unknown, influence on the results.

### Animal Movements

Another challenge of counting wildlife in GMAs is animal movements. Most of the ADMADE GMAs, and all of the GMAs richest with wildlife, border national parks. Although many of the details of animal

migration are not well known, there are definitely large movements of wildlife across these borders. Animal migrations in and out of GMAs may be triggered by rainfall patterns, over-browsing, predator pressure, or anthropogenic disturbances such as hunting pressure or habitat loss. In the absence of accurate information on the magnitude and timing of these movements, the preferred censusing methods would be those that measure a sufficiently large enough spatial and time scale to not be heavily influenced by these movements. These would favor large scale aerial surveys or combining indirect monitoring data from multiple adjacent GMAs with sufficient samples throughout the year.

### Confidence Limits

It has been said that the most dangerous data is not the data which is inaccurate, but inaccurate data which is not known to be inaccurate. An important characteristic of data quality is some kind of built-in measure of the accuracy or confidence we have in the data. Direct methods are at an advantage to indirect methods in this aspect. Because direct methods are directly measuring the variable of interest, well-established statistical formulas can be applied to calculate a confidence range. The problem with indirect methods are that the observations and the actual phenomenon of interest are related by some third mechanism or chain of events, which is often complex and not well known. Hence with indirect methods, it is usually not possible to quantify how accurate our results are, although we can usually qualitatively guess the likely direction of error and perhaps its magnitude. Confidence in indirect methods can also be evaluated by comparing multiple indicators (see below).

### Sustainability

Another factor, outside of science, that must be considered when planning a monitoring strategy in the context of CBNRM program is sustainability and the degree of community participation. A common characteristic of wildlife monitoring in conservation programs all over Africa is an almost complete reliance on outside financial and technical resources. If these outside resources can be sustained indefinitely, (e.g., a protected area that operates from an endowment, a financially secure wildlife department), then basing monitoring around the relatively expensive direct methods would be favored. However if the support from outside resources has a known termination date, then the monitoring program should at least include a component that can be realistically sustained with the resources of local management. Large scale direct methods will always have an important role for collecting baseline data, developing management plans, prioritizing conservation areas, etc. However unless CBNRM projects also establish within their monitoring systems techniques that can be sustained by field staff after donor pull out, they are jeopardizing the long-term likelihood of achieving the conservation goals.

Table 2 on the following page compares the most common methods for counting wildlife in Zambian GMAs.

Method	Est. cost per km <sup>2</sup>	Species	Suitability for woodlands	Can calculate abundance	Confidence limits	Expertise required	Logistic requirements	Temporal sensitivity	Participatory
Aerial census	\$1	large only	poor	yes	wide	high	low	high	poor
Ground transect – foot	\$3	all	good	yes	wide	high	high	high	fair
Ground transect – road	?	most	poor	yes	wide	high	medium	high	fair
Hunting statistics	negligible	hunted species	good	no	?	low	medium	low	good
Interviewing key informants	negligible	all	good	no	?	low	low	low	good

Table 2 – Selected comparison of wildlife counting methods

### Combining Methods

Because all wildlife counting methods have their limits, the safest approach is to (1) use as many indicators as possible<sup>3</sup>, and (2) avoid conclusions that can't be justified by the data. This is the strategy that ADMADE has generally followed, and although it limits the types of conclusions that can be drawn, the validity of any findings is enhanced.

Comparing different measures of wildlife populations is always good practice, however it is particularly important for indirect indicators. Indirect methods tend to be more susceptible to external, unmeasurable influences, which we hope will average out given enough measurements. Indirect methods also generally suffer from unknown confidence limits, so comparing different indicators is the one of the few ways to assess whether the results can be trusted. When several indicators are in agreement, then the likelihood that they reflect an actual pattern in the population is enhanced, which is essentially mimics the purpose of a confidence interval.

The second strategy for using indicator data is to avoid the Nosnibor effect, drawing only conclusions at levels which the data can support. For wildlife population monitoring, there are basically three types of conclusions that can be drawn: (1) presence/absence of a species, (2) increasing/decreasing population trend, and (3) an estimate of absolute abundance or density. As you increase the level of conclusion sought, the data requirements become more and more rigorous. For example the data requirements for estimating absolute abundance are more demanding than those for detecting a change in the population, which in turn requires more stringent data than determining whether a species is present or absent. ADMADE indicator data can be used at most to establish the presence/absence of a species or estimate a population trend. The conclusions are much stronger on the absence/presence question than population trends, and indicator data can not be used to measure abundance at all. Likewise, aerial census and transect survey data, where it exists, can be used to estimate abundance, but is more dependable for supporting conclusions about the population trend of a species.

One of the indirect indicators used by ADMADE, observations of key informant, contribute not only by supporting or contradicting the results of other indicators, but also by interpreting the meaning of other, perhaps more statistically robust, measurements. For example, detecting that a species is declining is an important finding from quantitative monitoring methods, but determining whether that species is declining due to disease, migration, or over hunting can only be answered by key informants or other more detailed studies.

Data from direct and indirect methods can support each other not only in cross-checking conclusions, but also in designing sampling protocols. For example, an important part of planning aerial or ground transects is deciding how to stratify the area based on vegetation or topological zones. Sampling units that have a more homogeneous population distribution result in narrower confidence limits and more robust conclusions about the population. Monitoring data from key informants, such as scouts, professional hunters, and trackers, can assist dividing the GMA into appropriate census areas. Likewise, existing monitoring data can also suggest the total area used by migratory species, so that surveys avoid missing part of the population.

### ***Quota Setting***

Perhaps the single most important management application of monitoring data in ADMADE is the annual exercise of setting hunting quotas. Hunting quotas are the mechanism used to control hunting,

---

<sup>3</sup> This strategy is also known as triangulation, borrowing from the navigational practice of using several bearings to determine ones location

and represent the critical and delicate balance between financial revenue and ecological sustainability. The quota setting is also a fascinating process in itself as it encapsulates much of the complexity of CBNRM:

- multiple stakeholders with varying interests
- developed in a context of complex ecological and socio-economic systems
- the roles and power levels of the different stakeholders reflect larger institutional and policy structures

In Zambia, there are five types of hunting quotas. The safari quota is the number of animals which can be sold to international safari clients. This is the type of hunting that generates the vast majority of the revenue for ADMADE. The non-resident quota is the number of animals which can be hunted by Zambian nationals who live outside the hunting block, while the resident quota is the number of animals which can be legally hunted by local residents. Finally there are quotas for culling, which is mostly used to thin populations and provide a cheap source of meat for people in the area, and ceremonial purposes, such as traditional ceremonies at the chief's village.

There are two general models for setting quotas: *percent off-take* and *trial-and-error*. These models can be mixed and matched, but in any particular quota setting exercise one approach is likely to dominate the other. In the percent off-take method, information about the reproductive biology of a species is used to calculate a maximum percent of the population that can be harvested each year. In the trial-and-error method, (1) a guess-estimate is made of a reasonable quota, (2) the population is rigorously monitored to detect upward or downward trends, and (3) the quota is updated on a regular basis to reflect new information as it becomes available.

In practice there is actually a third model of quota setting, which becomes the default when there is no monitoring data to support either of the other two models. In this method, the interests of different stakeholders are reviewed and a quota is negotiated based on the power relationships of the various parties. Unfortunately this method rarely produces a sustainable quota yet becomes the norm when there is no monitoring system in place. This is largely the system that was used in GMAs before ADMADE was established by the government.

Which method of quota setting is most appropriate is largely a function of the type of monitoring data available. Calculating the percent off-take requires a fairly accurate estimate of the total population. This may be possible on fenced game ranches, but is rarely practical in the open areas of Zambia. As an example, the table below shows the results of a series of aerial surveys in Munyamadzi GMA.

Species	Total Population - 95% Confidence Interval		
	1994 (4.2% †)	1996 (5.1% †)	1998 (12.3% †)
Buffalo	0 - 8,170	0 - 22,066	0 - 14,140
Eland		not seen	0 - 67
Elephant	101 – 817	0 – 337	0 - 612
Hartebeest	86 - 2,086	0 – 410	not seen
Reedbuck	25 – 329		not seen
Roan	31 – 347	0 - 1,260	not seen
Waterbuck	0 – 677	not seen	0 - 412
Wildebeest	817 - 3,571	0 - 353	0 - 1,080
Zebra	142 – 538	16 - 1,342	not seen

† sampling rate

Table 3 – Aerial Survey Results, Munyamadzi GMA  
(Jachmann, 1994; Jachmann, 1996; Jachman 1998)

What should be noted about these figures are the fairly wide confidence intervals for the total population estimates. These wide intervals, which are not uncommon in aerial surveys, are quite adequate for purposes such as detecting statistically significant changes in populations or developing a coarse estimate for the population. However no wildlife manager would feel confident setting a quota using the percent off-take model with population ranges such as these.

In ADMADE areas, which generally lack recent population estimates even as broad as the ones above, the only alternative for setting quotas is the *trial-and-error* method. According to this model, the population must be rigorously monitored and the quota reviewed and adjusted on a regular basis. In ADMADE, this review is made at the end of each hunting season. The indicators that are used to monitor the wildlife populations include:

## HUNTING STATISTICS

**Trophy size.** Each time a safari client hunts a horned animal, the village scout accompanying the client measures and records the size of the trophy. Measurements follow the widely used standards by Safari Club International (SCI). Trophy size is a fairly reliable measurement, because measuring horns is not difficult and can be done accurately and without time pressure. For lions and leopards, skull width and length are the measurements used by SCI for trophy size. However this measurement can not be taken by scouts in the field, because it requires removing and cleaning the skull. Hence there is relatively little trophy data for the big cats.

Assuming that safari hunters are generally selecting trophy animals in the same way from year to year<sup>4</sup>, trophy size is a fairly direct and valid index of the age of the oldest adult males in the population. This by itself is enough of a reason to use trophy size as an indicator, as sustainability of the program requires managing for trophy animals. In addition, changes in trophy size also reflect changes in age structure in the population, which in turn is an indicator of the birth-death rate, and therefore population growth or

<sup>4</sup> In practice selection of animals by safari hunters is certainly not entirely consistent. Some hunters look for animals that will get them in the SCI record book, while others are more like stamp collectors who just want a variety of trophies to display on their wall. Other factors, such as fatigue, running out of time, or advice from the professional hunter, may also influence which animal a hunter selects to shoot. However as long as the general mix of hunters is similar from year to year, these differences in selection should average out.

decline. Thus with a sufficiently large sample size to reduce sampling error, trophy size is a fairly valid measure of the population.

**Hunting success.** Hunting success is the percentage of safari hunters seeking a particular species that successfully found and shot an animal. Before each hunt begins, the village scout accompanying the client is supposed to ask which animals he is looking for during the hunt. At the end of the hunt, the animals actually taken are compared with what was desired to calculate hunting success.

Hunting success intuitive seems like a good index for the population, however it can be biased by several factors. Firstly, it is assumed that the amount of time spent looking for an animal is roughly uniform across years, or at least a consistent spread. A low hunting success from ten classical safaris (where hunters can spend more than a week hunting) would be a more significant result than a low hunting success from ten mini safaris (less than seven days hunting). Currently ADMADE doesn't weight or breakdown hunting success data according to length of the hunt, however the assumption is that these variations will be similar from year to year.

The validity of hunting success as an indicator of population change is also very dependent on sample size. A hunting success of 33% would be interpreted much differently if was a result of one out of three hunters finding the animal than if it resulted from eight out of 24 hunters taking an animal.

**Hunting effort.** Hunting effort is defined as the number of days it takes a safari client to find and shoot an animal. When hunting effort increases, it implies that animals are more difficult to find, presumably because there are fewer of them. Hence hunting effort is also intuitively a good indicator of population change. However like the other indicators, the validity hunting effort as a proxy for population change is dependent on other confounding factors being controlled or at least averaged out.

Other factors which affect hunting effort include the time of the season, because it takes longer to find animals during the beginning of the hunting season when grasses are high. The time it takes to find and shoot an animal may also vary depending on whether the hunter is on a classical safari, where he has more time to be selective, or a mini-safari, where all hunting must end after seven days. Finally, hunting effort can vary greatly according to the style of the professional hunter, and other species on the hunt which may necessitate hunting animals in a particular order.

With so many confounding factors, hunting effort is one of the weaker indicators of population change. In theory, the effect of factors other than population size should cancel out with a sufficiently large sample size. Nevertheless when taken in concert with other indicators, hunting effort can help detect changes in population.

**Number of animals hunted.** The total number of animals which have been legally hunted is an indication of the offtake from hunting. By itself, the number of animals successfully hunted may not be very meaningful, as it depends on a variety of factors (such as the number of hunters who wanted an animal). However when matched with other trends from other indicators, the trend is more likely to be valid. Number of animals hunted is also important because it represents the sample size for hunting effort and trophy size, and helps the magnitude of changes in the quota.

## KEY INFORMANTS

Interviewing people who spend lots of time in the bush, such as scouts, professional hunters, trackers, ex-poachers, etc., can yield important insights into population dynamics not captured by hunting statistics or quantitative monitoring. These individuals have knowledge not only of whether populations

are increasing or decreasing, but where animals can be found and perhaps why the population is changing.

However like any other indicator, using key informants can result in bias or error. There are a multitude of possible confounds in using observational data, all well described in any social science research methods text. Some of the more relevant problems for ADMADE include influences on responses from other scouts, bias resulting from limited field experience or limited to certain times or in certain areas, recall error, mistaken observations, and hidden agendas.

The basic strategies for making informant data more valid are the same strategies for making any other kind of data valid: measuring the data has to be as objective as possible, and confounds have to be controlled for. Collecting data from informants (i.e., interviewing them or administering a questionnaire) is always a challenge due to the number of possible influences from the interview situation. In the past, ADMADE has not used any systematic or controlled method for interviewing informants; their opinions on wildlife were solicited during group meetings such as quota setting exercises. This generally resulted in forming an opinion by group consensus, with one or two scouts speaking for the others, and perhaps suppressing dissenting views. In 1999, Nyamaluma introduced a more objective way of interviewing informants, by developing a "Population Trend Survey" questionnaire which is designed to be administered to key informants individually and under controlled circumstances. This approach offers promising possibilities, because it should now be possible to look for agreement between scouts and the same scout over time to study the validity of informant observations.

Informants involved during the quota setting process include:

**Scouts.** Village and civil servant scouts form the backbone of ADMADE's law enforcement and monitoring programs in the field. On both field patrols and safari monitoring their primary mission is to go where wildlife (and poachers) is likely to be found. Hence they can offer some of the most well-informed observations about populations. The amount of time in the bush scouts spend in the bush is not well known, however it is certain to vary widely. A 1998 ADMADE report estimated that scouts patrol an average of 20-40 days per year. This is probably an underestimate, but to what extent is not known. One thing certain is that due to lack of transport many patrols are restricted to the immediate area around the camp.

**Professional hunter and tracker.** The job of a professional hunter is to guide safari clients to wildlife. Professional hunters also have good vehicles to move around the area and often many years of experience in an area. Hence they are usually a good source of information on wildlife population dynamics. Most professional hunters also employ a local resident with extensive experience in the bush to be a tracker, providing another good source of information.

**Unit leader.** Although due to the nature of his job the Unit leader doesn't go out on patrol as much as his scouts, he nevertheless is a valued source of information on wildlife. The Unit leader is in frequent contact with his scouts, and serves as a focal point for all other wildlife issues, such as reports of poaching activity, crop damage, legal hunting by Zambians, and disturbances to habitat. A good Unit leader has a grasp on the main wildlife problems in his area, and when combined with other informants can provide valuable insight into population trends.

**Ex-poachers, honey gatherers, etc.** Other informants who generally have extensive knowledge of the bush include local residents such as former poachers, honey gatherers, firewood gatherers, etc. Their background, bush experience, and other agendas may be less well understood than scouts or professional

hunters, however they provide corroborating evidence for population trends and can offer important insights into resource use patterns.

**FIELD PATROL DATA**

Observational data from field patrols is a potentially rich source of data for quota setting. Revised dataforms for recording field patrols observations were introduced in 1996, however they were only entered into the Nyamaluma database for the first time in 1999. As of yet no area has accumulated enough field patrol data to detect trends in animal sightings. However once a Unit has three or more years worth of field patrol data, they will be able to provide additional indicators such as number of animals observed per hour of field patrol time, as well as locations of animal sightings. Other recorded field patrol observations which may be useful during quota setting exercise includes observations of carcasses, snares, and bush fires.

**INDICATOR AVAILABILITY AND AGREEMENT**

Table 4 below summarizes the amount of population indicator data that was available during the first two years of ADMADE's experiment with community quota setting exercises. This data was extracted from the Quota Setting worksheets which are filled out during the exercise. The table indicates that there is at least some data for the large majority of species on quota. It also indicates that the number of indicators per species is 4.25. While there is no magical number for the minimum number of indicators, in general "more is better" and three is probably the minimum that would allow any amount of cross-checking.

The coefficient of agreement is the percentage of all possible pairs of indicators that are in agreement. Higher values indicate that indicators tended to agree with each other, while lower values indicate there was disagreement between the indicators. Note however that when the 0's (no-conclusive indicators) are removed from the analysis, the coefficient of agreement increases significantly. This implies that you rarely have indicators that are in opposite directions (e.g., one indicating a negative trend and another indicating a positive trend). Agreement also suggests that the indicators are valid measures of the same underlying phenomenon (i.e., population change). This result and the number of indicators available supports the conclusion that ADMADE's use of indicators for monitoring wildlife population trends is based on sound methodology.

Hunting block	Year	Num species with indicator data	Average number of indicators per species	Coefficient of agreement	Coefficient of agreement w/o 0's
Chanjuzi	1997	26	4.8	0.49	0.73
Chanjuzi	1998	23	3.7	0.38	0.64
Chifunda	1997	22	4.9	0.45	0.65
Chifunda	1998	20	3.6	0.55	0.66
Chikwa	1997	22	5.7	0.53	0.81
Chikwa	1998	23	4.6	0.46	0.57
Luawata	1997	20	4.7	0.69	1.00
Luawata	1998	16	2.8	0.43	0.73
Mulobezi	1997	20	5.0	0.48	0.72
Mumbwa East	1997	17	4.0	0.54	0.71
Mumbwa West	1997	21	5.0	0.42	0.71
Mwanya	1997	22	4.0	0.53	0.79
Mwanya	1998	18	3.9	0.61	0.89
Nyampala	1997	21	4.9	0.47	0.80
Nyampala	1998	20	3.8	0.50	0.87

Sandwe	1998	11	2.4	0.33	0.48
West Petauke	1997	20	5.0	0.48	0.78
Average		19.1	4.25	0.48	0.72

Table 4 – Indicator Data Available for Community Quota Setting

### QUOTA SETTING MEETINGS

At the end of the hunting season (October-November), each ADMADE area is supposed to hold a meeting to review the most recent indicator data and recommend a hunting quota for the next season. Quota setting meetings are supposed to involve the full spectrum of stakeholders, including the professional hunter, community members, Unit staff, and NPWS biologist for the area. Facilitators use a participatory approach during the meeting, soliciting feedback from all parties with knowledge of or interest in wildlife.

Meetings usually can be completed in one day, although sometimes a second day is required if the area contains more than one hunting block or the meeting got off to a slow start. These quota setting meetings were introduced program wide in 1997 and most meetings have been facilitated by staff members from Nyamaluma. However it is hoped that in the future the Unit staff and community leadership will play a larger role in conducting these meetings.

The basic strategy for wildlife assessment in quota setting is to compile data from as many sources as possible and look for agreement between indicators. Before the meeting begins, the facilitators and Unit staff prepare all the hunting statistics for the current season, and look for trends from previous years. A trend is defined as three or more year's worth of data suggesting a definite change in the population. The results of each indicator are summarized on a flipchart with the following symbols: + positive trend, - negative trend, 0 no discernable trend. Next to these are additional columns for the opinions of scouts, tracker, and professional hunter, which are filled in during the meeting.

Interpreting indicators is based on scientific principles, but also involves a very fluid and qualitative discussion. In most cases, the statistical indicators and the opinions of the scouts and Professional hunter are in agreement, and there is little debate. In some cases, the hunting statistics are self-contradictory, inconclusive, or unavailable, and more discussion is required between the 'human indicators'. In rare cases, the quantitative indicators contradict the observations of scouts and hunters. In general, the opinions of people outweigh the statistical measures. From my observations of four quota setting exercises in 1998, the indicators which carry the most weight during group discussions are in order of their importance:

1. opinion of the professional hunter
2. opinions of the tracker and the scouts
3. opinions of others at the meeting (e.g., ex-poachers)
4. hunting statistics

Once consensus has been reached on whether the population of a species is changing, the next step is to review the hunting quota. If there is unanimous agreement that a species is increasing, the hunting quota may be raised. Crocodile, monkeys, puku, impala, and hippo are examples of species which have been doing well in recent years. In some cases, the professional hunter will request that the quota not be raised even if the data indicates a rising population, because he doubts his ability to successfully market the additional animals to clients. In these cases, a raise in the quota may be allocated for culling, ceremonies, or non-resident hunting. When indicators suggest that a population is in a period of decline, the hunting quota will likely be reduced, sometimes drastically. In some instances this occurred because

the community's previous quota recommendation was ignored or raised by the final quota setting committee at ZWA headquarters.

Conservatism is part of ADMADE's overall design strategy in quota setting. When data is missing or inconclusive, the quota tends to remain the same. Even when data indicates that a population is increasing, quotas are more often than not adjusted slowly. My observations were that although there was usually someone at the meeting who wanted to drastically increase the number of animals on quota, the final consensus was much more conservative. This dampening effect of individual voices is another important benefit of broad participation in community meetings. Both reproductive rate and home range requirements are sometimes taken into account when adjusting hunting quotas. Even if all indicators are positive, quotas for species such as leopard that reproduce slowly and are thinly spread are likely to be incremented by only 1 or possibly 2 animals. Some species, such as lion, have a separate quota for male and female species.

Once the quota setting meeting is complete, the results of the discussion are copied from the flipcharts and onto the Quota Setting Worksheet, which is then signed by all those present as well as the chief. This paper is then sent to ZWA headquarters for the annual review meeting of the national quota setting committee.

The facilitation role of Nyamaluma's extension staff is an important element in community quota setting exercises. In addition to the technical knowledge they bring, along with summaries of previous monitoring data and logistical support such as a vehicle and flipchart materials, they also represent an outside 3<sup>rd</sup> party which is perceived to be objective and may be needed to bridge differences between stakeholders. Whether ADMADE Units will be able and willing to conduct quota setting exercises with the same level of professionalism without support from Nyamaluma remains to be seen.

### ***Evaluating Data Quality***

*Data quality* is a term which is most frequently used in a very broad sense, but a working definition is *characteristics of information that make it useful for real world purposes*. "Real world purposes" includes analysis, education, decision making, and management. Data quality encompasses a host of issues, including timeliness, accuracy, precision, validity, sample size, measurement and sampling bias, geographic and temporal scales, confidence, and even dissemination and presentation of findings. In practice, data quality is somewhat relative, because the requirements for quality vary with the intended application of the data. However the basic concept and factors that affect data quality are the same for all applications.

Ensuring data quality is a concern for any monitoring program. Anxieties about data quality increase the further one gets away from the source of the data. For example, a bureaucrat in Lusaka will be less able to detect possible biases and inaccuracies in a summary of ADMADE's monitoring data than a Unit leader. Data quality is difficult to measure, and errors can either multiply or average out as data becomes more and more aggregated. Evaluating data quality is challenging unless there is an independently measured standard to compare with. Unfortunately CBNRM programs like ADMADE rarely have the benefit of an independent standard, because there are no other projects or studies recording this kind of data in these areas.

Although measuring quality data objectively is difficult to quantify, it is relatively easy to take steps to control the quality of data. ADMADE uses a mix of procedural controls and quantitative tests to increase the reliability of its data. Although no system for data quality assurance can be made foolproof, these controls are reasonable precautions given the available resources.

## DATA QUALITY CONTROLS - PROCEDURAL & HUMAN

**Monitoring certification for village scouts.** Instruction in data recording is an integral component of the 4-6 month basic training course all village scouts attend. Scouts are taught the basic concepts of monitoring and use of the dataforms. While the skills for recording data do not require a high level of education, not all village scouts demonstrate the aptitude or interest to be monitors. During the end of their basic training, scouts are evaluated on their ability to use dataforms, and only those who pass are 'certified' to be monitors. Nyamaluma also holds shorter advanced scout classes from time to time, which usually cover monitoring topics in more detail.

Only certified scouts are supposed to be selected for safari monitoring or appointed as the data recorder on field patrols or investigating crop damage. In reality, some non-certified scouts, including civil servant scouts, may also wind up recording data recording on field patrols or safari hunts. The Unit leader or his designated deputy have the responsibility to weed out those scouts who don't show competence in monitoring, and over time, only those scouts who have the ability and interest to record data wind up as monitors.

**No financial incentives.** To reduce the likelihood that dataforms will be falsified, village scouts are given no material incentives for recording data. Instead it is hoped that scouts will be motivated from an understanding and appreciation of the benefits of collecting data. Although the policy of not providing incentives for the extra work is unpopular among scouts, and may have other disadvantages as well, it has most likely achieved its objective of minimizing falsified data and there have been no known cases where dataforms were purposefully fabricated.

**Dataform certification.** The first line of defense against bad data comes at the field level. Each dataform is supposed to be reviewed and certified by the Unit leader or his appointed deputy soon after the data is collected<sup>5</sup>. Certifying data forms in the field can catch omitted responses on forms, as well as detect certain irregularities and outliers. In practice, the degree to which dataforms are certified depends in large part on the individual unit leader or deputy assigned to monitoring, and frequency of contact with scouts.

**Spot checking during data entry.** The data entry staff at Nyamaluma have a lot of experience entering and analyzing data, and have a good feel for what is and what is not a reasonable measurement. Many mistakes can be caught during the data entry process, including problems with inconsistent units and outliers, for example a hippo shot in the hills. Data which is suspect is not entered into the database, and common dataform mistakes are noted in preparation for the next training on monitoring.

**Interpreting analyses.** Previewing the results of an analysis can also highlight errors in data. Most of the extension staff from Nyamaluma who spend a good bit of time in the field have a pretty good intuitive feel for the major problems and accomplishments in different areas. When summaries or graphs depict results that seem counter-intuitive, the discrepancy may be traced either to an incorrect analysis, error in data processing, or bad data.

## DATA QUALITY CONTROLS - COMPUTER/QUANTITATIVE

---

<sup>5</sup> Other CBNRM projects such as LIRDPA have also recognized the importance of reviewing datasheets in the field soon after the data is collected, so that mistakes can be corrected and questions clarified while the operation is still fresh (Jachmann 1998).

**Enforced referential integrity.** The new database system (see Chapter 4) has a number of built-in features that help to ensure good data. Enforced referential integrity helps to prevent incomplete records from being entered, and makes certain that all fields containing a lookup value (such as the id number of a species) have valid values. This prevents many errors that formerly resulted from inconsistent spellings or impartially filled data forms.

**Field and table validation rules.** In addition to enforcing the integrity of linkages between related tables, the new database also has the ability to validate all data being entered against preset validation rules. For example, the date a hunt ended can not come before the date it started (an error which in fact was encountered in the old system because the spreadsheet wasn't formatted to display the year of a given date). Similarly, table definitions specify which fields must have data, and which fields are optional. Table validation rules also prevent duplicate records, for example there can not be two field patrol observations entered for the same phenomenon in the same grid on the same day. Other validation checks are done programmatically during the data entry process, such as the check for valid trophy measurements based on the species hunted.

**Statistical measures of data quality.** Once data has gotten through field certification, data entry, and finally made it into the "system", it can still be examined for data quality. One of the advantages of using a well-designed database is that quantitative summaries and graphs can be easily and quickly produced. The following are actual examples of charts, maps, and tables of monitoring data that are built-in to the new ADMADE database and can be used to highlight data quality concerns.

Sample Size

An important and easily measured component of data quality is sample size. Summaries which are based on only a small number of observations are less likely to accurately reflect the population than those with a larger size. Very few observations in ADMADE's monitoring system are based on a random sample, so sufficient sample size becomes all the more important to minimize the bias introduced by sampling.

Fortunately sample size is easy to present to the user in tabular and graphical summaries. Figure 3 to the right is one of the many interactive charts in the new database and depicts the hunting success for hartebeest in all GMAs from 1994 to 1998. The blue diamond markers represent the hunting success (calculated as the percentage of hunters who shot a hartebeest out of those who stated they desired one at the start of their hunt), and should be read using the scale on the left. The square green markers represent sample size and should be read using the scale on the right.

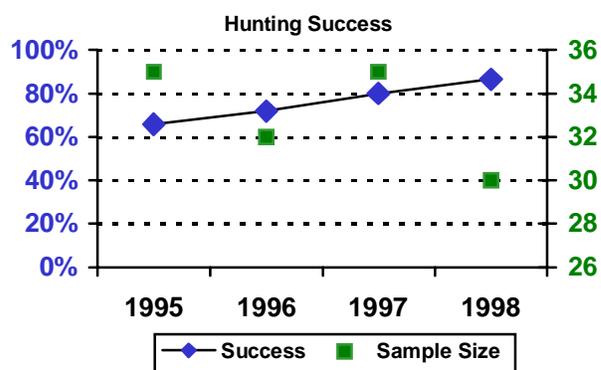
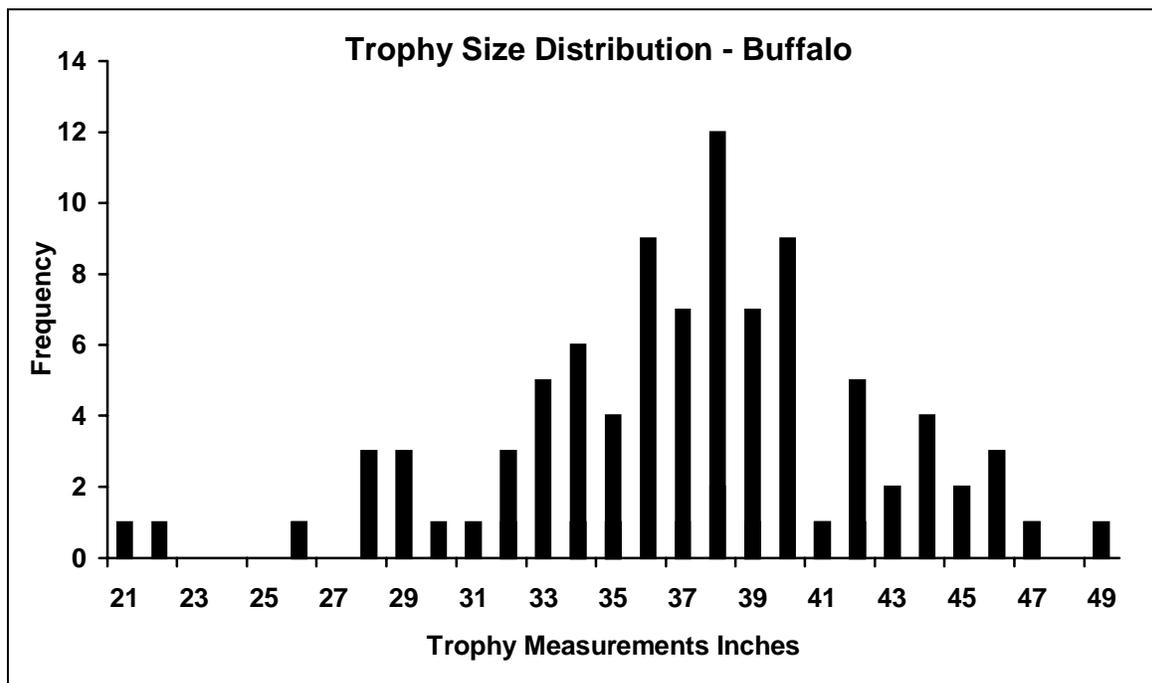


Figure 3 - Hunting success of hartebeest 1994-98

In this graph, we see that the sample size is between 30 and 35 hunters each year, which is probably enough to reduce the effect of any outliers (we could also plot 95% confidence limits for each year if we wanted even more feedback on dispersion). Hence for the country as a whole, we can say with a fairly high degree of confidence that hunting success for hartebeest increased between 1994 and 1998. If, on the other hand, the sample size had only been 5-10 hunters per year seeking hartebeest, as it is for some species, then this indicator would be a lot less significant when evaluating the sustainability of hunting quotas for hartebeest.

Dispersion

The amount of dispersion in a set of measurements can suggest whether the data has been measured and collected properly. Histograms can quickly present the type of distribution curve of the sample data, which are expected to fit certain norms. Figure 4 below shows a histogram of trophy measurements for Cape Buffalo for all hunting blocks and all years combined. This fairly normal distribution is what we would probably expect from a natural population of trophy specimens, and suggests both that scouts are making measurements properly and that individuals are probably being selected from the population in a consistent manner.



*Figure 4 - Histogram of trophy size measurements reveals an expected distribution curve in measurements*

Temporal Bias

Another factor which can affect data quality is the timing of observations. Bias can be introduced when the sampling isn't consistent or representative of the time frame of interest. Graphs and numeric summaries can be used to help detect bias that might be introduced by irregular temporal sampling.

Figure 5 below shows the number of day on patrol for two camps in the Chifunda Unit for 1998. A few observations are immediately apparent from this graph. First of all, Kanusha camp did almost no patrolling during the months of February to May - the rainy season. Hence any data from the scouts in that camp on poaching levels, animal abundance, or other phenomenon are likely to be biased by the lack of patrolling during this period. Secondly, there are no patrols recorded for the months of November and December. This can only be attributed to (1) there were no patrols during those months, (2) not all data has been entered into the database. Assuming the later, we also note that any summary of patrolling effort for this Unit for the year will likely under-represent the actual number of days patrolled.

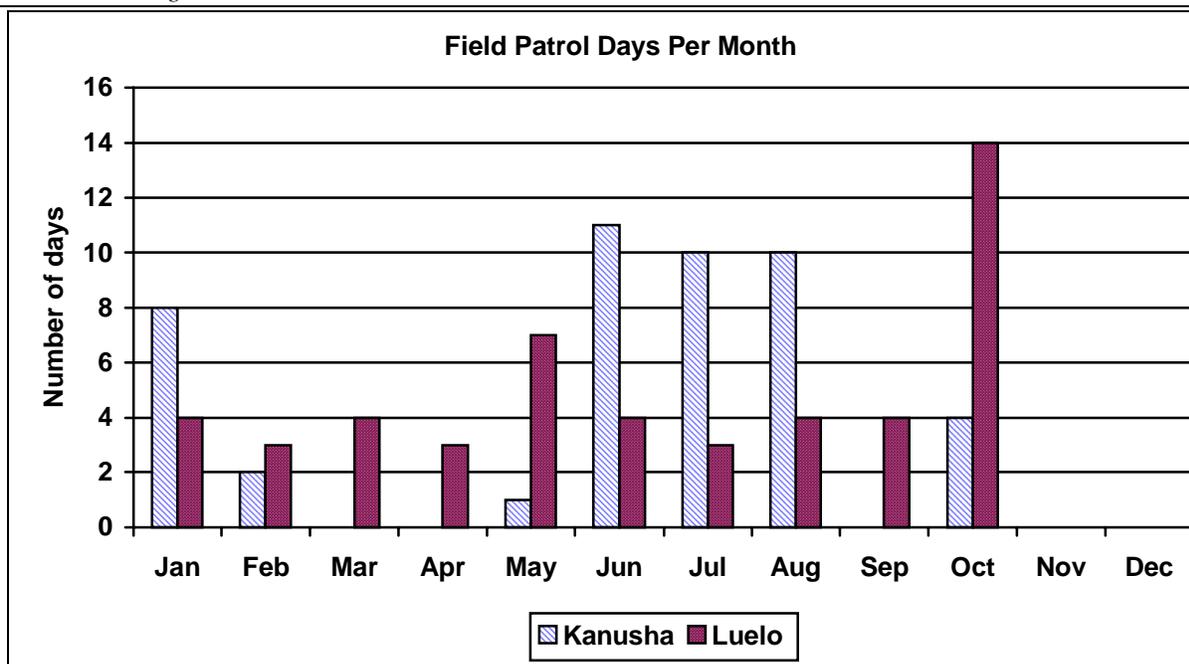


Figure 5 – Number of days on patrol for Kanusha and Luelo camps, 1998

The next graph shows a timeline of hunts in Chanjuzi Hunting block, 1998. What can be noted from this graph is that (1) there are no large gaps in the hunting, and (2) there was no hunting after September 22<sup>nd</sup>. This implies that either the professional hunter closed the camp before the normal end of the hunting season, or the data is incomplete. Since hunting statistics provide one of the important indicators for assessing population trends, we would want to resolve this question before using this data to look for trends in wildlife populations. An important requirement for the methodology of summarizing hunting statistics for trend analysis is to get an entire season's worth of data so that intra-seasonal variations in hunting effort and hunting success will average out. We also note that the PH frequently has more than one client at once (or else there were two PHs in the area), and more than half of the clients were on mini-safaris (7 days or less) which don't generate as much revenue as classical safaris.

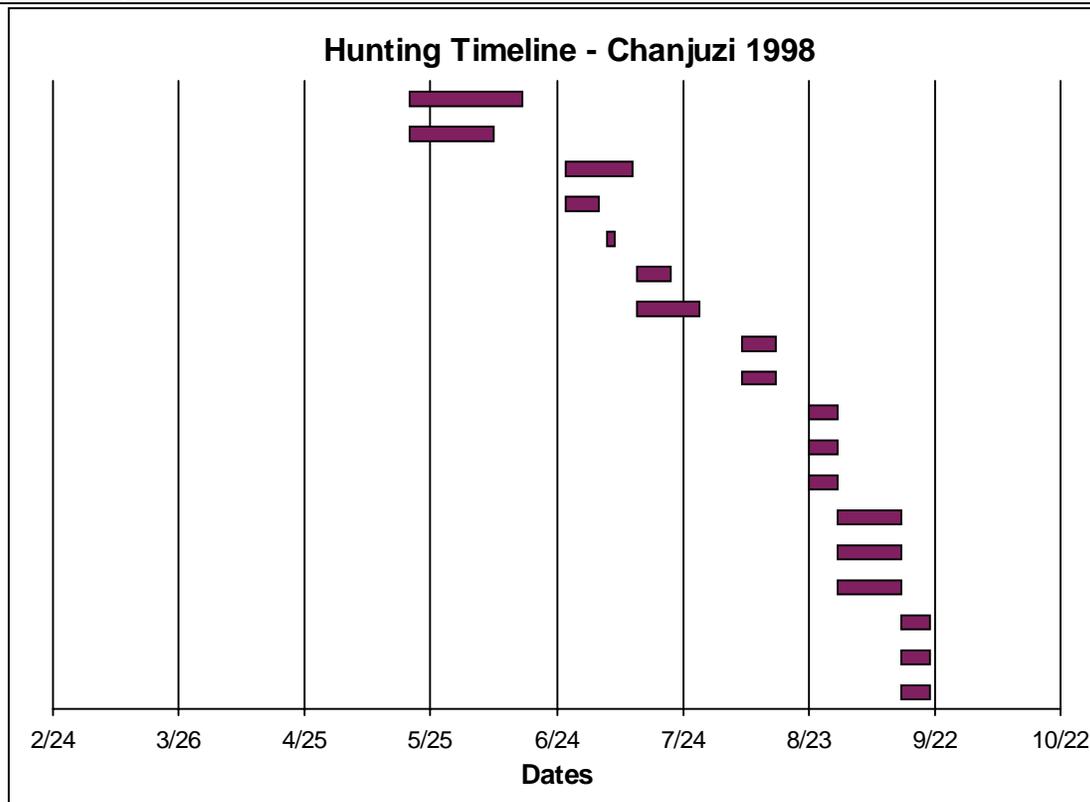


Figure 6 - timeline of safari hunting in Chanjuzi hunting block, 1998

Spatial Bias

Figure 7 below is copied from one of interactive maps in the new database, and shows the 5 km<sup>2</sup> grids where scouts went on field patrols in Mumbwa GMA during 1997. The color represents the number of times a grid has been patrolled, with red indicating the greatest number of visits.

We note from this map that not surprisingly scouts patrol more heavily around their base camps. While that realization may have implications on its own, it also must be considered when interpreting other results from field patrol monitoring. For example all of the safari hunting in Mumbwa GMA is done on the western side of the GMA, so at least for this year it would probably not be appropriate to use field patrol observations to examine the competition between safari hunters and poachers for the same animals. This spatial sampling bias also suggests that scouts may be impacting poaching activity near local settlements on the eastern side of the GMA, but are not patrolling areas closer to the park, where commercial poachers may be attracted.

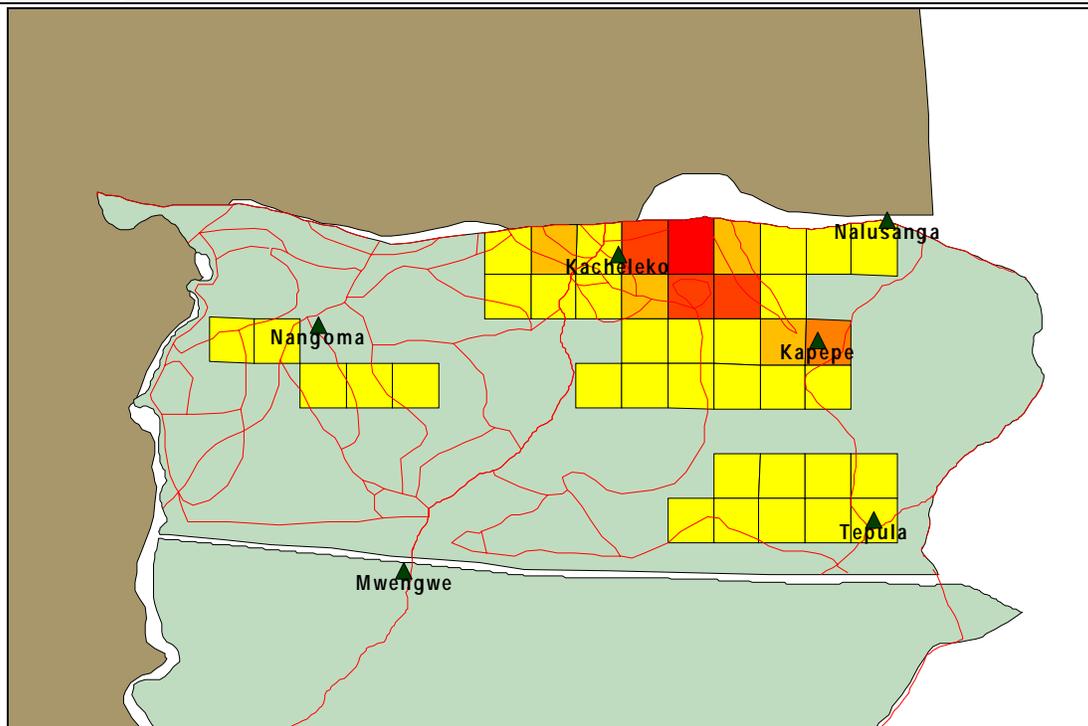


Figure 7 - Map showing location of field patrols in Mumbwa Unit, 1997

**DATA QUALITY CONTROLS – SUMMARY**

Table 5 below summarizes the different types of data errors and what steps can be taken to detect or prevent bad data. Mistakes in measurement that produce outliers are relatively easy to catch, either with human checks, validation rules in the computer, or histograms. Bias that may be introduced from poor sampling (either too small or non-representative) can probably be detected using statistical summaries, but how to interpret uneven sampling is a more challenging issue. Data which has simply been lost is also easy to detect, but hard to interpret how that may affect the results. Finally falsification of data is probably the most difficult type of error to deal with, so the best treatment there is simply prevention.

Types of Data Errors	Data Quality Controls		
	Human: Data form certification and data entry checks	Computer: Referential integrity and validation rules	Statistics: Tabular and graphic
Poor measurement or recording – incomplete data	x	x	
Poor measurement or recording – outliers	x	x	x
Small sample size			x
Biased sampling temporally			x
Biased sampling spatially			x
Missing data bias			x
Data falsification	x		

Table 5 - Potential error and data quality controls

### ***Percentage of Field Patrols Recorded***

One of the important but largely unanswered questions about ADMADE's monitoring program is the percentage of field patrols that are actually recorded on the field patrol dataform. This unknown ratio has implications not only for calculating estimates of law enforcement effort, but also evaluating the validity of any monitoring data collected on field patrols.

Scouts in interviews for this study unanimously stated that 100% of all field patrols are recorded on dataforms. However after reviewing the field patrols summaries it seems unlikely that all field patrol data actually makes it through the information chain to Nyamaluma. Not only do the results suggest low patrolling effort (20-40 days per year per scout according to a 1998 Nyamaluma report based on selected areas with 'good' datasets), but also some Units have lengthy gaps where no patrolling is recorded. Hence it is suspected that either the percentage of patrols recorded is less than 100% to begin with, or that dataforms get lost somewhere along the information pipeline to Nyamaluma.

Our visit to Mumbwa GMA afforded an opportunity for the first time to empirically study the percentage of field patrols recorded on dataforms. The Mumbwa Unit headquarter at Nalusanga maintains a Field Operations Record Book, a ledger for all field operations that originate from Nalusanga camp. Although the ledger book records just a subset of the fields of information on the ADMADE field patrol data forms, it does provide an independent record of field patrols.

I compared the field patrol records in the Field Operations record book with ADMADE Field Patrol dataforms for 1997 and 1998. For 1997, there are 17 field patrols which originated from Nalusanga recorded in Nyamaluma's database, and 16 original dataforms at the Unit Headquarters. However the Field Operations Ledger recorded 44 field operations during 1997, excluding operations such as escorts and check points. Thus for that year only 39% of the field operations were recorded on dataforms that reached the unit headquarters and Nyamaluma.

Reviewing the field patrol dataforms from 1997 reveals that all recorded patrols were between July and December of that year. Hence the most likely explanation for this low reporting percentage is that the first six months of data was either never collected or lost. However neither the Unit staff nor research staff at Nyamaluma had any memory of what may have caused this gap, and the missing data still results in a gross underestimate of patrolling and monitoring effort.

It should also be noted that Nalusanga camp lies on the border of Mumbwa GMA and Kafue National Park, and that scouts patrol in both areas. KNP is not an ADMADE area, and there is no base map for it. Hence although scouts are supposed to record patrols made in either area, it may not be entirely surprising that not all patrols, particularly day patrols, in the park are recorded.

For 1998, there were 39 field patrols originating from Nalusanga in the Nyamaluma database, this time spread almost evenly throughout the year. However the Nalusanga Field Operations ledger recorded 115 field operations, again excluding investigations, official escorts, funeral drills, etc. Thus only 32% of field operations were actually recorded for that year. The missing data from the ledger book indicates an unrecorded 122 patrol days and 421 man-days of effort. Thus for 1998, the number of recorded patrols from Nalusanga was only 32% of the actual, only 56% of patrol-days, and 67% of total man-days.

Of the non-recorded field patrols, 69 were in Kafue National Park and nine were in Mumbwa GMA. This pattern suggests the probable cause of the underreporting - scouts apparently don't fill in dataforms for all patrols in Kafue, even though they do submit dataforms for *some* of the patrols there. However

another element of the problem is from non-recorded operations in the GMA. The nine patrols not recorded in the GMA represent 163 man-days of patrolling effort and monitoring data missing.

Many of the patrols not recorded were day patrols, confirming another suspicion that day patrols are widely underreported in general. Scouts or Unit staff may not want to use their limited supply of dataforms on day patrols, as running out of data forms has been a recurring problem in several areas. Or scouts may think that only patrols which warrant filling in a data form are those where a poacher is arrested, supplies are used, or something interesting is found. Most scouts who record data on patrols stated that they take notes on plain paper, and then fill in the dataform on their return.

It seems unlikely that the missing data was caused by a chronic problem of dataforms getting lost or destroyed after being filled out. Nalusanga has a spacious office and one of the more organizing filing systems we saw. Furthermore, the operations under question originated right from the headquarters, which is right on the main road so travelling to and from town does not require the standard relay of bush transport. In fact one would suspect that the percentage of field patrols recorded would be much higher in a camp such as Nalusanga, where scouts are based at the same camp where dataforms are distributed, reviewed, and filed. Hence the most likely explanation is that due to misperception or lack of supplies dataforms for many field patrols were never filled out in the first place.

These results should not be considered indicative of all ADMADE areas, because they reflect the rather special circumstances of only one camp in one Unit. However they do underscore the reality that the completeness of field patrol data is difficult to assess and should not be assumed to be 100%. One intervention by Nyamaluma that may help evaluate data completeness in the future is the 1999 Self-Appraisal dataform. If used properly, this dataform will provide future researchers an independent record of field operations at the camp level, as well as other time allocation categories such as construction, going for salaries, education programs, rest, etc.

## Chapter 3: Synthesizing Results

### *Key Questions Matrix*

The ultimate measure of success of a monitoring system is whether it can provide a basis to answer the important questions posed by its stakeholders. Table 6 below summarizes a few of the very fundamental questions about ADMADE, and gives an indication of how well ADMADE's monitoring system is able to provide data relevant to the question. Each of these questions could be a significant research study into itself, and none are so simple that they could be answered by a single graph or table of monitoring data without additional data collection and analysis. However the table tries to capture where ADMADE's data is strongest, and where additional data or species studies are needed for the questions about the "big picture".

Chapter 3: Synthesizing Results

Question	Importance	Primary stakeholders	Data source(s)	How well can it be answered	Additional data needed
<b>Ecological impact</b>					
Are wildlife populations stable?	Wildlife conservation is one of the main goals of the program; needed for sustainability	ZWA, GRZ, WCS, safari industry, USAID, intn'l conservation community, rural communities	hunting statistics, key informants	good – indirect measures are generally in agreement with each other	periodic aerial census or ground counts
Is habitat being conserved?	Loss of habitat is the greatest long term threat to wildlife; conserving habitat is a project goal in itself	ZWA, WCS, safari industry	key informants	fair – disturbance to habitat is only monitored in patrolled areas	satellite imagery, periodic vegetation surveys
Has poaching been controlled?	Poaching is the greatest short term threat to wildlife and the primary reason ADMADE was introduced	ZWA, WCS, donor community, safari industry, rural communities	field patrol records, poacher case records, key informants	good – patrol and poacher arrest data incomplete, however generally strong consensus	more complete poacher case records, court records, snare surveys (begun 1999)
<b>Social impact</b>					
How are rural households benefiting from ADMADE?	One of the main goals of the program	USAID, ZWA, rural communities	selected case studies, field reports	poor – no baseline data was collected; only recently has monitoring of community development projects started to measure benefits; data largely unrepresentative	random socio-economic household surveys, systematic monitoring of project benefits
Is ADMADE understood and supported by rural communities?	Support for the program is a strong indicator that it is having a positive social impact; important for sustainability	USAID, ZWA, GRZ, rural communities	selected case studies, observations at community functions, field reports	poor – negligible monitoring has been done on attitudes, awareness, and understanding of ADMADE	random household surveys
How has ADMADE affected food security?	A goal in itself; impact may be both negative (less access to meat) and positive (through projects); strong relationship between food security and poaching	USAID, ZWA, GRZ, rural communities	selected case studies, crop damage records	poor – crop damage dataset incomplete; case studies exist for only a couple of areas; little baseline data; food security not a benefit of most community projects	more rigorous monitoring of crop damage, community-based food security surveys (e.g. Livingstone Food Security Project)

Question	Importance	Primary stakeholders	Data source(s)	How well can it be answered	Additional data needed
How democratic are ADMADE CBOs	Autocratic community leadership has been a long term problem, democratic structures strongly correlated with community support and equitable benefits; democratic decision making a goal in itself; precursor for sustainability	USAID, ZWA, GRZ, rural communities	field reports, observations, anecdotal evidence, demographic data	fair – the governance style of CBOs has not been measured by any study, a politically sensitive topic; however an overwhelming number of accounts of autocratic decision making by traditional authorities	a new checklist of indicators of democratic management, population distribution in VAGs and management committees
<b>Sustainability factors</b>					
What is the population growth rate in ADMADE GMAs?	Prosperity and population growth is a long-term threat to natural resources	ZWA, GRZ, USAID, rural communities	household demography, case studies	fair – baseline data first collected 1998/99, some case studies of village expansion	country census data 2000, repeated household demography surveys
Is ADMADE addressing the real threats to wildlife?	The immediate threats to wildlife are well known, the deeper roots are more difficult to identify and combat	ZWA, GRZ, WCS, USAID, rural communities	workshops, land use plans, case studies	good – ten years of experience and data has provided a good basis to understand the proximate and ultimate causes of wildlife degradation. ADMADE has a pretty good idea where it can and can not work	additional studies on macro-micro relationships, urban-rural linkages, long-term development, institutional capacity building, commercial bushmeat industry
Do communities have the capacity to manage their own wildlife?	The devolution of responsibilities to communities continues, but the limits to what communities can be expected to accomplish have yet to be reached; the level of long-term support to communities is unknown	ZWA, USAID, WCS, GRZ	trip reports, case studies	fair – the experiment of developing community capacity continues, however ADMADE has done relatively little to measure the effectiveness of its training program and other capacity building measures	a study exploring community capacity building: best methods, pace, limits.

<b>Question</b>	<b>Importance</b>	<b>Primary stakeholders</b>	<b>Data source(s)</b>	<b>How well can it be answered</b>	<b>Additional data needed</b>
Are law enforcement activities effective and efficient?	Law enforcement is the backbone of resource management. Strong correlate between efficiency of operations and achieving management goals	ZWA, USAID, WCS, rural communities	field patrol records, poacher case records	fair – we have several measures of patrol effort, and patrol costs; need better data on the number and outcomes of poacher arrests	study of court-imposed punishments, repeat offenders, time-allocation of scouts
Is safari hunting a sustainable source of revenue?	ADMADE is precariously dependent on the safari industry; hunting is in decline in general in the West	ZWA, USAID, WCS, rural communities	safari client questionnaire, personal experiences	poor – the safari industry as a whole has not been well studied; beyond the scope of ADAMDE	a study on the economics and demographics of safari hunters and safari hunting
Can ADMADE be replicated?	Twenty chiefs in Zambia are asking for ADMADE to be introduced; the design may be applicable to other areas or resources	ZWA, USAID, WCS	special studies	fair – ADMADE has developed general guidelines where it works best, less well established is how it should be implemented and supported, the ADMADE approach has not been tested with non-wildlife resources	national workshop to develop guidelines for introducing ADMADE to new areas, dialog with other CBNRM programs in non-wildlife sectors

Table 6 – Key Questions Matrix

### ***Findings and Lessons Learned***

ADMADE's ten year experiment with community based monitoring is one of the longest of any CBNRM program in Africa. Like many of the activities in ADMADE, monitoring has not followed a strategic plan, but evolved through a process of trial and error. The combination of these two facts makes the experiences of ADMADE a valuable resource for compiling lessons learned in community based monitoring.

1. *Scouts are willing and competent in collecting data, even though they don't really understand why they are collecting data.*

My interviews with experienced village scouts revealed a high level of comfort with using field patrol, safari hunting, and crop damage dataforms. Scouts unanimously stated that the dataforms were clear and easy to fill out. Scouts further stated that using the dataforms did not interfere with their other primary responsibilities on field patrols and safari hunts.

Conversations with the data entry staff at Nyamaluma also revealed that the scouts who submit dataforms rarely make errors, and the errors made are usually minor in nature. ADMADE's two main strategies for developing competent data collectors, training and a weeding out process, appear to have been effective in producing a network of scouts who are willing and able to record data during field operations. In 1999, Nyamaluma has also started giving certificates in monitoring to all scouts who attend an advanced monitoring workshop. If this monitoring certification becomes adopted program wide, and Unit leaders require/encourage all data recorders to be certified, then this step will serve to increase even further the level of competence of monitoring officers.

However despite their understanding of data collection, the scouts I spoke with didn't fully understand the role monitoring plays or can play at the Unit or project level. Although most were familiar with the quota setting exercises, they had only a fuzzy appreciation that data could be useful in other ways and by who.

2. *Scouts and their field supervisors see monitoring primarily for the benefit of higher level administration. Exercises such as land-use planning and quota setting can increase the perceived value and relevance of monitoring activities at the community level.*

When asked why they were collecting data on field patrols, safari hunts, or investigating crop damage, the most common answer from village scouts could be paraphrased as "because it's my job". Scouts in general do not have a clear understanding of why collecting this information is important. Many thought the information was needed by higher level officers, one remarking to the effect, "we don't need to write these things down for ourselves, we already know where the poachers and animals are." Another believed that there was someone in the command headquarters that was reviewing his dataforms as they were submitted.

Involving scouts in community-level exercises such as quota setting meetings land-use planning workshops can increase their appreciation and understanding of information-based decision making. Unfortunately however not all scouts are able to attend such functions. Frequently only those scouts based at the Unit headquarters, or who happen to be at the Unit headquarters during a meeting, have the opportunity to see how their fellow residents use information.

3. *CBNRM monitoring should encompass both the status of the resource as well as other important aspects of the program, such as management and public attitudes. Failure to monitor all of the critical linkages in the program can erode the foundation of the CBNRM approach.*

The various elements of CBNRM projects can be thought of as the links of a very long chain, with each link critical for holding all the parts of the program together. Conserving wildlife is certainly an important element of wildlife based CBNRM, but in and of itself does not guarantee that the program will continue to be sustainable. All of the other links in the chain, including public awareness, education, improved food security, equitable sharing of benefits, transparent and accountable management, support from traditional leaders, a sustainable market of safari hunters, responsible professional hunters, etc., are equally important to achieving the final goal. A monitoring system needs to keep encompass of all of the pieces of the puzzle or the whole thing can fall apart.

As an example, one of the Units in the Luangwa Valley was doing well for several years, with hunting revenue steadily increasing, and community initiatives, such as a new theater group and participation in public meetings, on the rise. In 1998, a financial scandal was unearthed, eventually leading to the loss of the Unit leader. As a result of this blow, staff morale plummeted, confidence in the program fell, poaching skyrocketed, the number of hunting clients fell by more than half, and hunting revenue dropped by 40% in a single year. A strong Unit leader, good financial management, and community support for the program are important links in the chain of success, links which did not hold up in this case. If monitoring of these elements had been more sensitive and responsive, it is possible that the damage from this tragic event could have been lessened.

4. *Monitoring wildlife with indirect indicators is highly economical and is adequate for most management purposes if done properly. Measures of sampling effort are important when using indicators.*

ADMADE's use of indirect indicators for assessing wildlife population, as opposed to direct counting methods, is almost cost-free. Wildlife scouts would still conduct anti-poaching operations and accompany safari clients even if they weren't recording data. The amount of additional investment to add data collection to these operations is miniscule, being mostly training costs, stationary, and the salaries for 2-3 support staff at Nyamaluma. Nor does monitoring seem to impinge upon the ability of scouts to perform the primary functions of their field operations.

Although this method of assessing wildlife is far from perfect, when observations are made in a consistent manner, multiple indicators are used, and a conservative approach is made to setting harvest levels, then sustainable management of the population is possible. The fact that many ADMADE areas in different parts of the country have been able to support safari hunting fairly consistently for the past ten years is in itself compelling evidence that this strategy of monitoring can work. While monitoring with indices can not answer many other important questions, such as absolute population abundances or the conservation impact on broader taxa, they seem to have proven adequate for management.

A second benefit, which may be even more significant than the financial savings, is that monitoring wildlife with indices can be achieved by ZWA field officers and community leaders themselves<sup>6</sup>. Direct methods of censusing wildlife can provide important data as well, but are unlikely to be within

---

<sup>6</sup> Although there are no ADMADE Units that are completely self-sufficient in processing and analyzing their own data without support from Nyamaluma extension staff, several areas are close and the trend is certainly in that direction

the capacity of field staff due anytime soon due to the cost and technical expertise required. Developing monitoring methods that can function at least partially without dependence on support from donors or central government should be an objective of all CBNRM programs.

One way ADMADE's monitoring data can be made even more robust for management, and also shed light on some of the more scientific questions, is to make greater use of measures of sampling effort in analyses. Although field patrols and even safari hunts do not represent random samples either spatially or temporally, recording when, where, and for how long scouts are making observations in the field would increase the validity of results. The research Unit at Nyamaluma is moving in this direction, for example introducing in 1999 a column for 'day light hours in grid' on the field patrol dataform. They have also introduced a new database system that for the first time allows entry of all observational data from field patrols and safari hunts, including the 'daylight hours spent hunting' and number of baits used for large cats. These new fields of information will allow more accurate measures of hunting effort and help control for the effects of these variables in other analyses.

5. *Initial capital investment and centralized training are not sufficient by themselves to establish a community based data collection system. Support visits and assistance with data processing are required.*

The ADMADE Units near Kafue National Park present an interesting natural experiment on the importance of field support to CBNRM. Four of these areas were among the nine GMAs selected by USAID for support in the early 90s. They received the same vehicles, radios, uniforms, and training at Nyamaluma as did the remaining five areas, which are all in the Luangwa Valley. The only real difference between the support of these areas and those in Luangwa Valley was the frequency of visits from extension staff from Nyamaluma. Visits to these areas occurred much later and less frequent than Units closer to Nyamaluma. Indeed our trip to Kasonso-Busanga and Lunga-Luswishi in early 1999 was the first visit from an ADMADE inspection visit since the program began.

Although these areas received the same capital investment and sent officers to the same Nyamaluma-based courses, they were clearly behind in many aspects of the program. The greatest gaps could be noted in the amount and structure of community participation in ADMADE. However even the monitoring activities in these areas were substantially less organized. The largest gaps were not with the capabilities of the scouts, but data management practices at the Unit Headquarters. Data management is a topic covered in many courses at Nyamaluma, but has always required additional field support and is a never-ending focus of inspection teams throughout country.

This discrepancy is not all that surprising but highlights the importance of field support for communities in CBNRM programs, particularly in areas where new skills are involved, such as monitoring and building partnerships between communities and government. Although capital investment and foundation training are important may be even sufficient for some aspects of CBNRM, other skills clearly are imparted more slowly and require a longer-term presence from support staff. Discrepancies between the east and west GMAs also poses some questions about ADMADE's centralized training model, and whether or not some skills would be more effectively and economically imparted through regional extension services.

6. *For uniformity and project level analyses, the design of a monitoring system needs to be centralized. However implementation and analysis are most effective when driven at the field level.*

It is somewhat tenuous to claim that ADMADE has a truly "community-based" monitoring system. Although the principal actors in data collection are community residents, they are working under a government command and control structure and are following top-down instructions for monitoring. There is certainly nothing wrong with this approach, and indeed if you want to be able to generate project-wide summaries and analyses, there really is no alternative strategy to using a top-down methodology to ensure consistent and uniform data collection.

However the top-down approach to monitoring can falter when you examine which levels are best served by the monitoring system. Because village scouts and their Unit supervisors are basically following instructions they were given by inspection teams and during workshops at Nyamaluma, they may not immediately understand the rationale of the monitoring program and the techniques used for data analysis. Consequently, at least initially they may not see much benefit from monitoring, other than appeasing those in higher authority. Many problems in monitoring at the field level, such as poor data management, poor supervision, and just simple neglect, can be traced to a fundamental lack of appreciation of the importance of monitoring and understanding its role in management. As scouts and Unit leaders become more experienced with using information for decision making, these data management issues tend to become less of a problem.

This recurring pattern suggests that an important strategy to strengthening monitoring programs is to raise the level of appreciation and understanding of monitoring at the field level by involving officers not only in data collection but also analysis and interpretation. Devolving these functions, which are currently performed almost entirely at Nyamaluma, to the community level would likely result in strengthened data collection and management. A competing hypothesis is that local people actually have very little use for systematically collected data, in which case strengthening the command and control structure would be a more appropriate strategy for solving monitoring problems.

Although Nyamaluma has not made a concerted effort to devolve data analysis, it has taken some steps to increase the capacity of community members to summarize and interpret monitoring data. Monitoring is covered as one of the topics during many workshops and courses, and Unit staff are frequently involved in data interpretation during inspection visits. Undoubtedly these efforts will continue, as the leadership of ADMADE aspires to reduce support to some areas so they can strengthen others and maybe even introduce the program to new areas.

7. *Building the capacity of field staff to collect data can be achieved relatively quickly and cheaply. Building the capacity of field staff and community leaders to analyze/disseminate monitoring data is a slower process.*

Data collection has proven to be the easiest set of skills to teach to scouts and unit staff. Data collection primarily involves recording on paper those observations which scouts are already familiar with, and doesn't require any understanding of data management systems and the ultimate role data can play. Data recording skills can usually be successfully developed through attendance at a single course at Nyamaluma followed by periodic feedback on dataforms.

Data management, which essentially consists of collecting, certifying, and filing dataforms, builds upon data collection and is next most difficult skill to develop. This requires practices which previously may have been either unfamiliar or not perceived to be important. Data management in a Unit requires attention to detail, cooperation among Unit staff, and strong leadership. Although some Unit leaders have quickly understood the importance and practices of managing data, many need more

than just attendance at a course at Nyamaluma. Office management systems are a frequent focus of inspection teams from Nyamaluma.

Data analysis, which builds off of both data collection and proper management, is the last and most difficult skill to develop. Training is critical for teaching Unit leaders and community members how to analyze and interpret monitoring data, but needs to be supplemented with on-the-job learning. This aspect of monitoring has proven the most difficult to develop, partly because it builds off of several other skills. However some areas have very capable Unit Leaders who have learned what patterns and conclusions can be extracted from monitoring data, and as the training and outreach programs at Nyamaluma continue, these skills will certainly continue to grow.

8. *The spatial aspect of monitoring data is essential in a CBNRM monitoring program, and should be integrated into data collection, processing, and outputs from the very beginning. Maps are a powerful tool for focusing dialog and communicating results to local communities.*

The architects of ADMADE's monitoring program appreciated from the very beginning the importance of incorporating spatial references in all datasets at an appropriate scale. Initially each Unit was divided into 10 km<sup>2</sup> grids, and base maps prepared so that each grid could be given a number that could be written on dataforms. As this system was tested, it became apparent that scouts could locate themselves within a quadrant within the grid, so the base maps were redesigned with 5 km<sup>2</sup> grids. This coarse scale sacrifices precision for the sake of accuracy, but seems adequate for the management-oriented uses of the data. More importantly, scouts feel comfortable that they can locate themselves on a map at this scale with a high degree of confidence.

Nyamaluma's use of GIS technology allows not only the ability to enter and analyze spatial data but also present results in a variety of map formats. Maps have proven an excellent tool for crystallizing dialogue around the key resource issues in a community, and can present complex spatial relationships in a format that can be understood by most people with a minimum amount of education. There are numerous examples of successful community-initiated land use resolutions based on spatial relationships, such as the relocation of fishing camps, gardens, and even households away from wildlife areas. These initiatives would not likely have been possible without Nyamaluma's ability to quickly and accurately generate large maps of monitoring results.

9. *Data collection programs should be designed in consideration of information management capacity. A well-constructed computerized database at the project level is an effective way of storing, analyzing, and disseminating information.*

Like many conservation and development programs, ADMADE's monitoring program has generated a lot of data, perhaps more than can be practically analyzed. At the Unit level, the capacity to study and summarize data is quite low, and most data forms remain in the filing cabinet until field staff from Nyamaluma come to collect them. Even at Nyamaluma, constraints on staff time and software have prevented some datasets from being fully entered, resulting in some dataforms sitting unanalyzed for years. Hence an important caveat for all CBNRM programs is to not collect more data than can be processed. While everyone, in particular project managers, would like more data for their reports and assessments, collecting data that can't be used is inefficient and can lead to disillusionment when those involved in monitoring fail to see the fruits of their labor.

Over the history of the program Nyamaluma has been able to process an impressive amount of data streaming in from the Units. The main tool for this task has of course been the computerized

database system. Nyamaluma's database allowed thousands of dataforms to be entered and summarized in a consistent manner. The 1999 database upgrade, which was a component of this research (see Chapter 4), increased the capacity of Nyamaluma to enter data, analyze it, and create summaries for a variety of stakeholders. The database has also, for the first time, largely removed the technical barriers to disseminating data electronically. Nevertheless, as the number of dataforms introduced into the program continues to grow, ADMADE will need to continue to ask itself - both at the community and project level - when does it become too much.

10. *All links in the information flow are critical. Constriction or breakage at any point in the information flow can render all other efforts useless.*

In the same way that it is a shame to see data collection efforts go to waste when there is insufficient capacity for data processing, it is also sad to see data collection wasted when there is a breakdown in the information flow. Although loss of data in ADMADE is not the norm, and does not seem to be linked to any single cause, it has happened all too frequently. Munyamadzi Unit lost all their 1997 data for both field patrols and safari hunting, possibly it was taken by a department biologist and never returned. Other areas have sent data to Nyamaluma through the regional command, only to have it lost en route. Many other dataforms have been lost either at the scout camps or in Unit offices, many of which are poorly equipped and organized. Even at Nyamaluma, data has occasionally been lost either because of a hardware crash, operator error, or disorganized filing (although in many cases backups allow lost data to be recovered). Hence when planning or evaluating a monitoring system, all links in the information flow should be treated as equals, and assumptions that unplanned parts of the puzzle will simply fall into place later should be avoided at all costs.

11. *Disseminating results to stakeholders is required for adaptive management to take place, yet too frequently receives little attention. Village scouts and Unit Leaders are in general not very good at disseminating results to community members.*

The ultimate aim of monitoring in adaptive management programs is to provide feedback to the program for improving planning and management. Performing analyses, creating summaries, printing wall maps, reports, etc. are all well and nice, but one should never forget that unless monitoring results are disseminated and result in a better program, monitoring will not have fulfilled its purpose. This is true both at the community and project level.

Dissemination of results is a critical prerequisite for this feedback process to occur. At the community level, people who need monitoring results include scouts, community leaders, safari operators, professional hunters, the Unit Leader and his staff. At the project level, the relevant stakeholders include training and research staff at Nyamaluma, senior officers at ZWA Headquarters, and ADMADE's institutional partners. These are the parties responsible for planning and implementing ADMADE at the various levels, and all need access to monitoring data if they are to make informed decisions.

ADMADE has been more successful in disseminating monitoring results to some parties than to others. The research and extension staff at Nyamaluma are of course familiar with the results of monitoring, because they are intimately involved in the analysis and interpretation. Unit leaders and their deputies are probably the second-best informed, as they have the most contact with Nyamaluma officers and are recipients of printed maps and summaries. ADMADE has relied heavily upon Unit leaders and their deputies to inform the public about monitoring results, however the extension staff and scouts I interviewed did not indicate such exchanges are the norm. Information flow within the

Unit will most likely improve as the community management committees step up and play a bigger role.

The audience which has perhaps been most poorly reached by ADMADE's dissemination system for monitoring results is the "Lusaka crowd", in particular senior officers at ZWA headquarters, and the donor and NGO community. This gap in the information flow is acknowledged at Nyamaluma, and has been caused at least in part by insufficient middle-level management. The ADMADE newsletter, which is the one update published at Nyamaluma and comes out on a regular basis, is oriented more towards news items and promoting the "ADMADE Vision," as opposed to reporting results which can be used to guide policy makers. The challenge for ADMADE is to find mechanisms to keep all of its constituents informed, without compromising the level of feedback to the people who need it the most - the rural communities.

12. *Community ownership of data is important to recognize in a CBNRM monitoring system.*

One of the underlying tenets of ADMADE's approach to wildlife management is that the communities are the de-facto owners of the wildlife and the program. This basic principle, upon which all CBNRM is based, applies to monitoring through the ownership of data. Village scouts, in their role as local residents and representatives of the community, collect the majority of monitoring data. Although communities are by no means homogenous entities and there are multitudes of distinct interests and agendas, because the monitoring data is collected by a local person it has a level of credence not likely possible if outsiders were the primary data collectors. Dataforms also remain the property of the community after they have been processed at Nyamaluma. Thus even though Units are heavily dependent on outside support to design and implement their monitoring activities, ownership of the data lies very much with the communities in both design and practice.

13. *Pilot testing dataforms is important.*

With nearly ten years experience in publishing dataforms, the Nyamaluma research unit has learned, sometimes the hard way, the importance of pilot testing dataforms. Some of the common mistakes on dataforms have been traced to layout problems, confusing terminology, or ambiguous wording. Even simple design elements, such as using the # sign to stand for 'number' have been misunderstood and caused errors. Training is of course an important element in using dataforms, however because not all scouts can attend training when changes are made to dataforms, and there is no substitute for intuitive design, clear instructions, and pilot testing.

It often will take several attempts to work all the bugs out in a dataform. Reviewing the mistakes on dataforms is an ongoing exercise by the extension and research staff, providing feedback which is then used when dataforms are reprinted. At other times, design changes have been introduced even after a dataform is printed, whereby scouts are asked to pencil in the new changes. Other design changes have been implemented in the field. Aside from being confusing for scouts, having multiple versions of dataforms in circulation can make certain types of analyses difficult or impossible.

Nyamaluma has also learned that dataforms should be designed primarily for recording very specific data. Tabular data entry sections that prompt the recorder for specific pieces of information tend to work better than open-ended descriptive sections<sup>7</sup>. Open-ended sections are prone to being overlooked by the scout or generating incomplete or irrelevant details that can not be analyzed. Examples of

---

<sup>7</sup> ADMADE's sister program, LIRDP, came to the same conclusions about dataform design (see Jachmann, 1998)

comments from the first field patrol dataform included the irrelevant "It was a good patrol, only too many mosquitoes", or ambiguous "we found some footprints". The newer dataforms still have a comments section for unusual observations or problems, but the majority of observational data is entered under discrete columns such as "grid", "snares found", "fresh poacher camps", etc.

14. *Integrating data collection with other activities is more sustainable than making data collection a separate program.*

ADMADE's accomplishments in data collection are in large part due to the use of village scouts as human sensors. Low budget CBNRM programs such as ADMADE are unlikely to ever have the financial or human resources to maintain a separate network of field monitors in such a vast project area. Instead of being a separate activity on its own, data collection at the Units has basically been tacked onto existing operations, such as anti-poaching patrols, escorting safari clients, and problem animal control. There are advantages and disadvantages to this approach. When monitoring is merged with other activities, the observations may be biased by non-random sampling methods and limited time available for observations and measurement. However these drawbacks are vastly offset by the single most important advantage to integrating data collection with other activities: it is more likely to get done<sup>8</sup>. The primary role of village scouts, both on paper and in their own perception, is law enforcement. They would conduct field patrols and accompany safari hunters whether they had dataforms or not. If monitoring became a completely additional assignment for scouts, instead of a supplementary activity, it would be much more challenging to get scouts to use their limited resources for monitoring operations.

In addition to introducing data collection as a supplemental and not separate activity, ADMADE's monitoring design also merges recording of critical data, with less-critical data. Unit leaders and scouts naturally have greater interest in recording data that could potentially get them into or exonerate them from trouble, such as safari hunting license numbers or the amount of ammunition consumed on a patrol. By combining this type of information on the same forms as less immediately pressing data, such as observations of live animals or bush fires, ADMADE has ensured that all data will be recorded properly and diligently.

15. *Successful monitoring is dependent on a conducive management environment*

It is important to remember that monitoring in CBNRM programs is but one element of a much larger and complex system. Monitoring can only be effective when all the other critical pieces are also functioning. Monitoring can not compensate for the lack of an economically marketable resource. Monitoring can not overcome institutional and legal frameworks that fail to empower communities to manage their resources. Monitoring can not be community-based when there are no resources for training or field support. See Appendix III for a more comprehensive framework for community-based monitoring.

Thus, if the expressed aim of a monitoring program is to help develop a self-perpetuating community based resource program, then one would be wise to examine the feasibility of the project as a whole before investing many resources in monitoring. If, on the other hand, monitoring information is desired as an end in itself irregardless of the outcome of the project, then it may be worth supporting whether the project is successful or not.

---

<sup>8</sup> Other authors, e.g., Bodmer 1994, have also notes that data collection in community-based projects must concur with the socio-economic reality of the community in order to be sustainable

## Chapter 4: Interventions

This chapter describes the primary interventions I was involved with during this study: upgrading the database at Nyamaluma, developing a web page, and assisting in a workshop to improve monitoring skills. These activities were chosen based on the review of monitoring needs at the community and project levels, and because they coincided with ongoing activities in ADMADE.

### *Upgrading the Information System at Nyamaluma*

Since the beginning of ADMADE, one of the major roles of Nyamaluma has been as a research center. Applied research has been an important component in ADMADE, because many of the strategies for working with rural communities to manage natural resources had never been tested before and had to be pioneered. The capacity of the research unit at Nyamaluma to examine experiences, synthesize lessons learned, and provide feedback to the program has been an important asset that has enabled the program to survive and adapt to new circumstances.

One of the main tools in Nyamaluma's research wing, used for both research and presenting monitoring feedback to ADMADE communities, is the information and GIS system. Developed in the early days of the project, Nyamaluma's database has enabled thousands of dataforms to be analyzed, and hundreds of tabular and graphical summaries to be generated for community use and applied research. Nyamaluma pioneered the use of GIS software for community-based conservation, and digitized dozens of Survey Department maps for the production of flipchart-sized summary maps of monitoring data. The maps and summaries produced by Nyamaluma have proven to be an effective means of conveying monitoring feedback to community members and catalyzing dialogue around key resource issues. Many community-initiated land use resolutions, that would be considered innovative by any standard, originated at meetings where a group of people gathered around a map showing the locations of hunting revenue, human settlements, habitat, disturbances, animal movements, etc.

As pioneering as Nyamaluma's information system was in the early days, it was constrained by the software and hardware of the early '90s, and its performance was severely limited in a number of regards. By the time this project commenced in 1998, Nyamaluma has acquired newer and more powerful hardware and software. Hence it was a timely opportunity to upgrade the database and take advantage of the newer technology.

### **PREVIOUS INFORMATION SYSTEM**

Upgrading the database began with an examination of the existing information system. After long periods of observation and discussion with the research staff at Nyamaluma, the following constraints of the old system and objectives for a new system were identified:

### **CONSTRAINTS**

#### **Difficult to operate**

The old system used a combination of Lotus 123, dBase IV for DOS, and ArcView GIS. Most of the tabular data was entered through Lotus, a process which was semi-automated with macros, and summaries were produced using Lotus and dBase. Maps and graphical summaries were designed manually in ArcView, using imported summaries that were created in Lotus and dBase. Due to the number of software packages involved, and the difficulty of doing much of the work manually, only a very small number of staff could operate the system, and only the technical advisor could make any real significant changes to

the design or structure of the data. Operating the database was also time intensive, as only a small part of the data processing was automated.

### **Restricted to single-area, single-year summaries**

In the original system, the files for each Unit were saved in separate directories, and additional sub-directories created for each year. For the tabular data, each year was saved on a separate worksheet and each dataset was saved in a separate workbook. The spatial data was also divided into separate coverages for each Unit. While this file structure was useful in keeping data organized, it made conducting analyses across years or across multiple GMAs tedious almost to the point of almost being impossible. While this was not a major constraint in providing data summaries for individual units, it made seeing the 'big picture' rather difficult.

### **Little error checking**

Due to the limitations of spreadsheets, error checking depended heavily on the skills and experience of the data entry clerk. Problems such as inconsistent units of measurement, inconsistent spelling of names, incorrect dates, and occasional outliers limited the reliability of certain types of analyses. For example, it was difficult to get an accurate count of all staff who worked in a Unit over time because some names appeared twice under different spellings, while others could have just been copied over from the previous year without further inspection, etc.

### **Unwieldy file system**

Maintaining the files in the old information system was an administrator's nightmare. The hundreds of directories, sub-directories, and files made copying or backing up the database challenging. A more severe constraint that may have impacted data quality was the use of multiple computers for entering data, making it incumbent upon the technicians to keep track of which files on which computers are the most up to date. Updating files on other machines carried a risk that more recent data could be overwritten with older data.

### **Difficult to expand**

Adding new datasets into the information system was challenging, because new files had to be integrated into both the directory system, data structure, and multiple software formats. Creating new summaries of data was equally difficult, because summaries had to be either done manually or by programming new Lotus macros. This constraint on the system's expansion and flexibility not only affected staff time, but also the number of datasets that could be entered. Very important datasets, including all field patrol observations, observations from safari hunts, were not entered into the old information system at all because of the limitations of the software. Other datasets, such as poacher case records, and crop damage, were entered but not integrated with other data, so could not analyzed against other variables.

### **Map production was manual**

As mentioned previously, one of the most important outputs of Nyamaluma's information system were the flipchart-sized maps of monitoring data that were returned to communities. Creating these maps in ArcView, although flexible, involves a complicated series of steps that requires a significant amount of training and many hours of staff time.

### **Data never left Nyamaluma**

Because it was difficult to extract data except in the limited preset formats, and the clunky file and software system made it impossible to share data electronically, Nyamaluma's research unit struggled to meet the information needs of its many external stakeholders in Zambia and abroad. Among the donors

and wildlife sector, Nyamaluma developed a reputation of being miserly with data, failing to share results with even its closest institutional partners.

## **OBJECTIVES FOR A NEW INFORMATION SYSTEM**

### **Integrate datasets**

Many of the constraints of the old information system stemmed from the disjointed data and file structure. Hence a key objective of the new system was to integrate the major datasets under one relational structure. In other words, all datasets for all years and all Units should be combined together. This would enable producing summaries and analyses based on data from different years and/or GMAs.

### **Make user-friendly**

It was desired that any new database system should be a lot more user-friendly. This would allow a greater number of Nyamaluma staff to input data and generate outputs, and would minimize the amount of disruption in the program resulting from transitions in technical staff. A user-friendly interface would also decrease the likelihood that certain types of errors would occur, and allow the highly capable technical staff to spend less time on repetitive tasks and focus more on the analytical side of data management.

### **Improved error checking**

Enforcing data integrity and developing built-in error checks were other desired features for the new database system. The strategy of storing the names of Units, species, scouts, etc. with identification numbers instead of text strings is one example of a strategy that can reduce potential data errors. Other desired error checking features included automatic checking for numbers which should fall within a certain range (e.g., trophy sizes, dates, etc.), and ensuring that records are not entered more than once.

### **Automate standard outputs & analyses**

To save staff time and improve reliability, there was a need to automate many of the standard outputs of the database, including tabular summaries, maps, and charts. Automating the standard analyses also improves the consistency of the outputs produced. One of the weaknesses of the old system was that the manually created maps and charts often used different color schemes, column headings, layout design, etc. Although such variations might be insignificant to people who are well trained, they can disorient rural people who may be less visually literate.

### **Provide multi-user features**

More and more of the staff at Nyamaluma are using computers in their work, including some extension teams who even carry laptops with them on field visits. One of the hopes for this new database was that monitoring data could be entered in the field, and summaries provided to communities immediately, eliminating the long feedback delay caused by transport to and from Nyamaluma. Hence the new database had to provide multi-user features such as the ability to synchronize datasets across non-networked computers. Another one of the troubles with the old system was that there were normally multiple copies of the same files on different machines, and it was left to the computer staff to remember which was most recent.

### **Facilitate future expansion**

An information system which supports a program as dynamic as ADMADE needs to be able to grow with the times. New datasets, new summaries, new layers of spatial data, new maps, and new users, are all examples of likely changes the database will need to accommodate over its life span.

### **Improve documentation**

Documentation was an important component for many of the desired features in the new database, including user-friendliness, multi-user features, and expansion. Nyamaluma's first information system was fairly well documented in a technical manual, although many of the 'tricks' were only acquired through experience, and expansion of the system was not a topic in the manual. Documentation for the new database required not just the standard printed materials, but also context sensitive online help. Furthermore, since the new database was going to have multiple architects and an order of magnitude greater number of ready-made summaries and outputs, there was a need to integrate documentation for the individual outputs. In other words, every tabular summary, map, and graph needs a mechanism to allow the user to find out what the summary is trying to capture, how it is calculated, and who created it.

### **Capture qualitative data**

Information systems are most adept at capturing and analyzing quantitative data, however in programs as complex as CBNRM projects much of the most interesting data and almost all of the interpretation can only be expressed qualitatively (i.e., through text or pictures). In addition to the substantial use of dataforms, which are designed to capture quantitative observations, we should not forget that ADMADE's research unit has amassed a significant quantity of qualitative data, much of it written down in the form of field reports, correspondence, trip plans, workshop proceedings, and land use resolutions. This qualitative data is critical to interpreting the quantitative results of monitoring data, and also needs to be available to the user through a common interface.

### **Make accessible to wider audience**

Although it will be some time before rural communities will have the capacity to use computers, there are a host of other potential users for ADMADE's monitoring database. These are described more fully in Chapter 2, but some of the main ones include senior officers in ZWA, USAID, and ADMADE's institutional partners within Zambia. With a cleaner, more robust information system, ADMADE for the first time could have the technical capacity to share all or some of its raw data or summaries with other institutions, either electronically or in hard copy. There are numerous considerations to regard when sharing raw data, it was desired that the new database should at least remove some of the technical hurdles that had been hampering ADMADE's ability to disseminate monitoring results.

### **RESULTS: THE ADMADE DATA MANAGER**

To achieve the above objectives, we decided to develop a new information system built around Microsoft Access and ESRI MapObjects. MS Access, which is included in the widely used MS Office Professional edition, was the natural choice as the main software tool for the database, because it is commonly available, relatively cheap, customizable, and quite powerful for small to medium sized databases. MapObjects is an ActiveX control from ESRI, the makers of ArcView and ArcInfo GIS software, which enables the integration of GIS features into development environments such as Visual Basic, Visual C++, Delphi, or Access.

The new database, called the ADMADE Data Manager (ADM), is now the working information system at Nyamaluma and is also being used at the ADMADE coordinating office in Chilanga and USAID in Lusaka. ADM uses a combination of built-in Access features and customized enhancements, explained below.

## BUILT-IN ACCESS FEATURES

### Relational data structure

Like most modern databases, Access supports relational data structures, which simply means that related data is divided into different tables. For example there is a table for staff, a table for species, a table for Units, a table for field patrols, etc. The information in all of these tables are linked together with ID numbers, which computers can process much faster than text. Using a relational data structure saves a significant amount of disk space and improves performance when querying or summarizing data.

### Enforced data integrity

Access is well equipped to ensure that data saved in related tables does not violate referential integrity rules, and that all required fields are filled in. When data integrity is enforced, it becomes impossible to add the same record twice (in most cases), and impossible to enter incomplete data. For example, you couldn't enter a new field patrol record unless there was a valid value for the date it took place and Unit where it originated from. This feature, along with the relational data structure, eliminates many of the potential errors that can be caused by inconsistent spellings, partial records, etc.

### Replication

Replication is another built-in feature of Access that allows multiple copies of the same database to communicate with each other and synchronize the data. Replication is a real lifesaver in a facility like Nyamaluma, where two or three copies of the database are needed just for data entry workstations, and others may be needed for performing analyses and generating outputs. With replication, it is relatively simple to make certain all copies of the database are using the most up-to-date data, and each copy has the latest preset summaries and outputs.

## CUSTOM DESIGNED FEATURES

**User-friendly menu system.** A database with as many different types of datasets and summaries as ADMADE requires a menu system to navigate among the many different choices. ADM features a standard three-tiered point-and-click Main Menu, and a simple single document interface, which means you only see one window at a time. Choices on the Main Menu can be easily expanded or modified using the Menu Manager. The menu system also features integrated object filtering and documentation, which are described below. See Appendix IV for a listing of the choices on the ADM Main Menu (as of May1999).

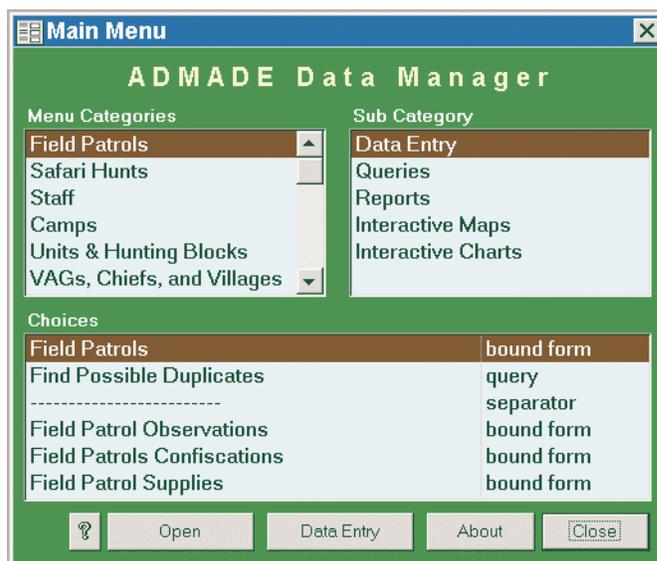


Figure 8 – The ADM Main Menu

### Object filtering

Because ADM stores monitoring data for all years and Units in the same tables, it needs a mechanism to allow the user to specify which years, Units, species, villages, etc. should be presented in the different summaries. This is achieved through a "Filter Manager", which is integrated into the menu system and

pops up each time the user opens a new summary, chart, map, etc. The Filter Manager features an easy point-and-click interface, and offers several different ways users can select the data they're interested in.

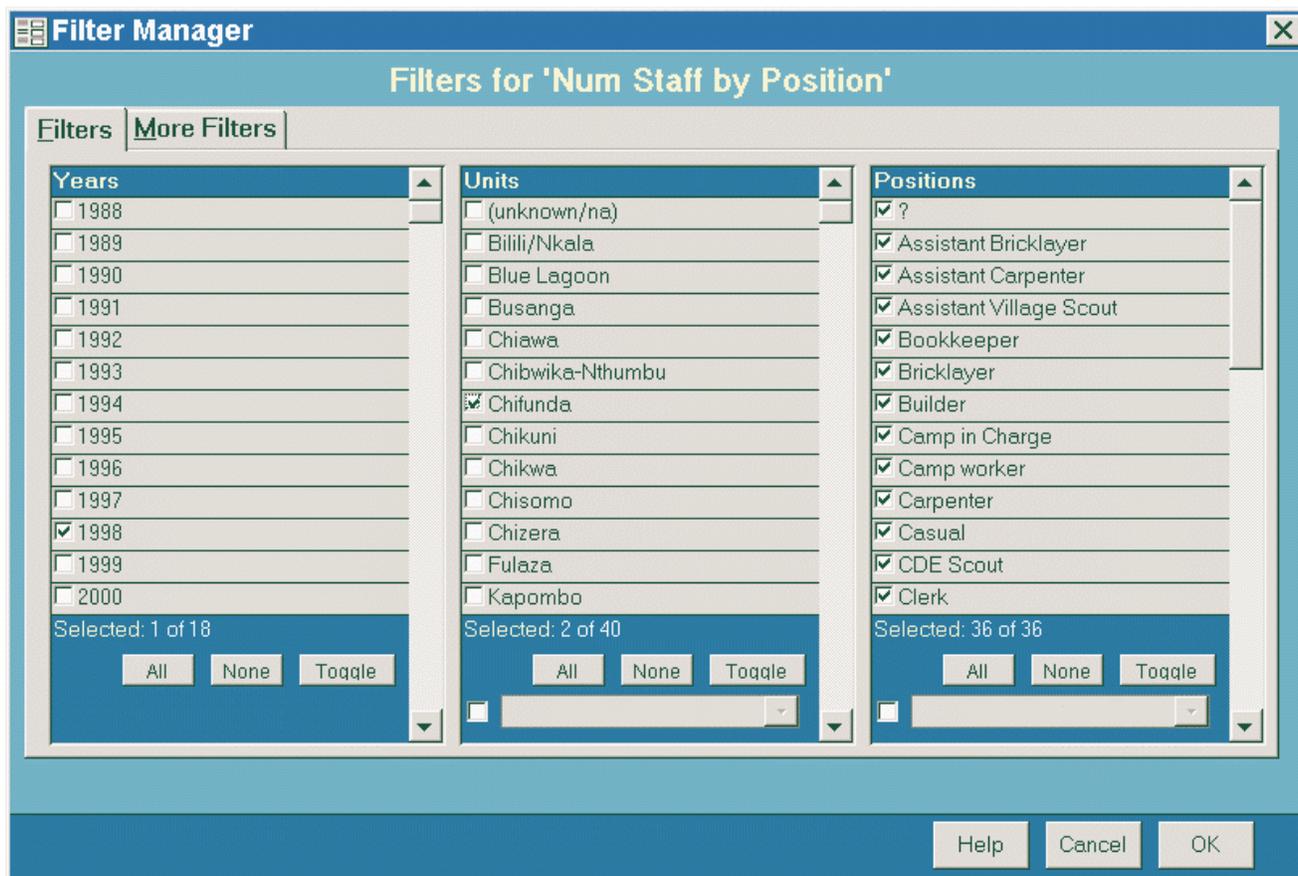


Figure 9 – The ADM Filter Manager

**Integrated object documentation.**

In addition to the Users Guide, which explains how to use and expand ADM as a whole, the menu system also features individual object documentation. This means that for every data entry form, every tabular summary, every interactive graph, every report, and every map, the user can quickly see in plain English who designed the object, when it was created, what it is trying to represent, and how it is calculated. This information is available both at the Main Menu or after an object has been opened. This feature is critical to enable summaries and analyses to be reused over and over, and allows new users to become quickly oriented to the available analyses.

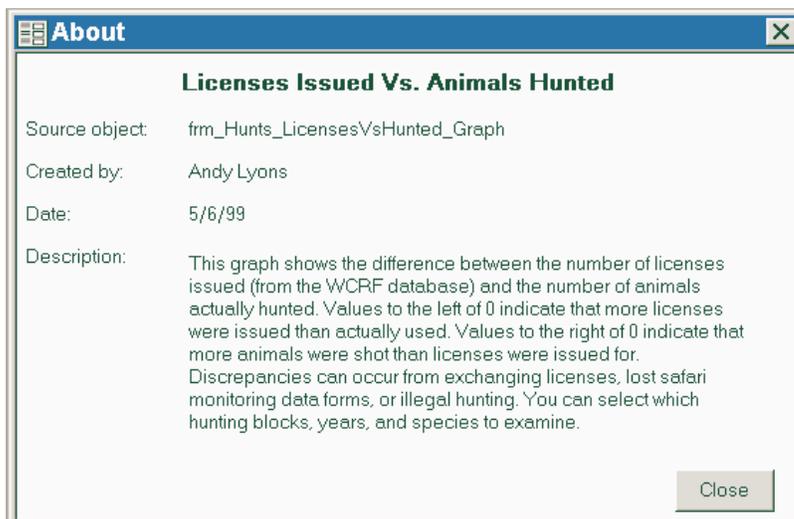


Figure 10 – The ADM About window – part of the integrated object documentation

### **Data logging**

ADM is a true multi-user application, and will be used by multiple data-entry technicians, some at Nyamaluma and some possibly in the field. ADM's data logging feature keeps track of which records are being added, deleted, or changed. The log saves information about when data was altered, which table and which records were changed, and who made the change. Subsequently, if there are any questions about records getting accidentally altered, duplicate data entry, or synchronization problems, the data log can be opened and the problem investigated. The data log is primarily a precautionary feature, but has already proven useful for problem-solving on several occasions.

### **Integrated mapping capability**

Using MapObjects to serve as the link between the tabular and spatial data, ADM includes user-friendly Interactive Maps for visualizing the spatial element of monitoring data. These maps present spatial summaries of data, such as an annual summary of which grids are used by safari clients, where poaching activity has been observed, which areas generate the most revenue, field patrol effort, etc. Interactive Maps have many of the same toolbar options as ArcView, including the ability to add labels, change display colors or the classification scheme, make additional layers visible, create a legend, pan and zoom, etc. New maps can be easily created and added to the menu system by entering a new map definition, which specifies properties such as the layers which should be added, data the map should be linked to, etc. All interactive maps can be printed, copied to the clipboard, or sent to PowerPoint, and all make use of the standard features of the menu system, including filtering with the Filter Manager and plain-English documentation.

ADM's interactive maps use many of the spatial layers that have been digitized at Nyamaluma, as well as a few others collected from various sources. All layers are national in scope, allowing maps to be produced of multiple GMAs. The following GIS layers are available:

Hunting blocks*	Provincial capitals
Units*	National roads
5km2 grids*	National rivers
Scout camps*	Railroads
GMA roads*	Utility lines
GMA rivers*	Airports
National parks	Villages
Districts	Wetlands
Provinces	

*\*digitized at Nyamaluma*

**Poster-size layouts.** One of the most important outputs of Nyamaluma's database are the large poster-sized layouts of monitoring data, which are used in community meetings and workshops. ADM uses a programming technique called OLE automation to automatically create new layouts using PowerPoint using data from Access. PowerPoint is the Microsoft graphics-presentation application that also comes with Office 97, and contains a number of drawing tools and commands. Layouts that are created by ADM using PowerPoint can contain any combination of maps, charts, text, or summary tables. They can create in 3-4 minutes what previously took a trained technician a couple of hours to produce, a significant time savings when multiplied by 15-20 Units two or three times a year. New layouts can be designed by creating a "Slide Template" definition, which specifies the layout of different elements on the page. Users can use the Filter Manager to select which data should be summarized when creating the layout. Once created in PowerPoint, users can adjust the layout, add other elements such as digital photographs or clipart, and finally print it out on a color printer or plotter.

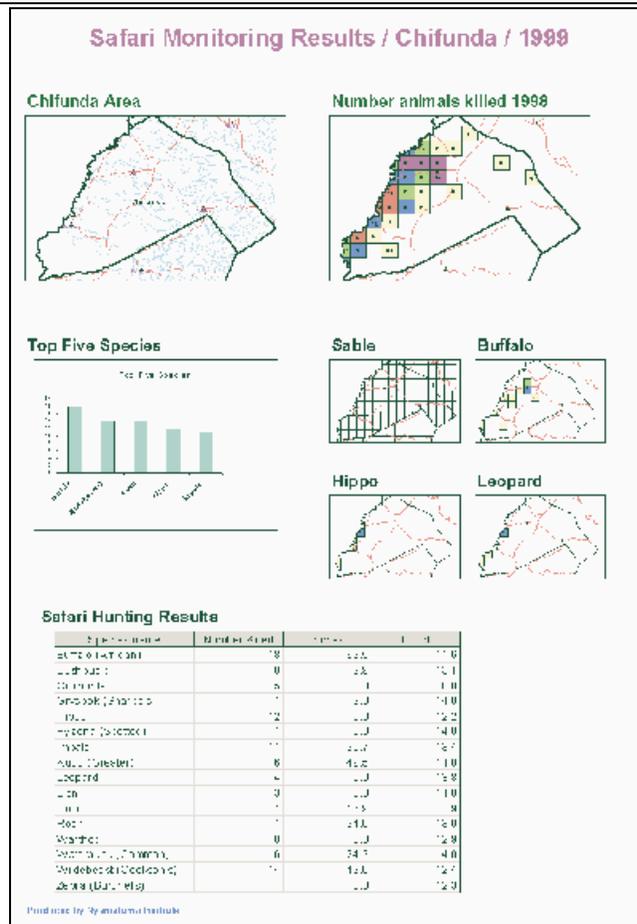


Figure 11 – ADM automates the creation of poster-sized printouts that combine maps, graphs, and tables

**Import-Export Object wizards**

ADM is already being used at different sites within Zambia, and may one day be used at sites on different continents. The Import-Export Object wizards make it possible for an ADM user at one site to design new summaries, data tables, maps, slide templates, etc., export those objects to a temporary file, email that temporary file to a different user, and then seamlessly import the objects into the ADM menu system at the other site. These wizards make it feasible to provide long-distance tech support for ADM users who may not have the technical experience or familiarity with Access, an important feature if monitoring data is to become a tool for decision makers.

**Documentation**

A comprehensive Users Guide has been written describing how to use ADM. The Users Guide has sections both for novice users as well as technical staff who need to know how to maintain and expand the system. The Users Guide comes both in printed format as well as a context-sensitive Windows help file (which means that the 'Help' buttons in ADM will take you the correct section of the Users Guide). A complete copy of the ADM Users Guide, as well as a shorter overview guide, can be downloaded from <http://nersp.nerdc.ufl.edu/~alyons/zm/adm.html>.

### ***Developing a Web Site***

Another activity of this research project was providing technical assistance for the development of ADMADE's premier web site (<http://www.admade.org.zm>). The web is a potentially powerful medium that ADMADE can exploit to help explain the program, educate people, advertise Zambia's hunting areas, and share monitoring results.

The web is an appropriate medium for ADMADE to use for several reasons. Using the web resolves one of the biggest hurdles ADMADE has faced in disseminating information: the difficulty and expense in producing and distributing hard copies. Nyamaluma, where the vast majority of monitoring and publicity materials are produced, is quite remote and only has one reliable photocopy machine. In addition to not wanting to overwork the photocopier, paper and toner are in short supply and expensive to buy locally. Transporting hardcopy documents is expensive and logistically complicated. Zambia is a large country where transport costs are relatively expensive. Creating enough copies of every report, newsletter, educational or publicity material for all potentially interested stakeholders is simply not feasible for this shoe-string program.

The web removes many of the barriers of distributing information. Although some of ADMADE's stakeholders do not have access to the internet, in particular local communities, many of the national and international stakeholders do have web access. Zambia is fortunate to be relatively well 'wired' into the internet, with at least one national ISP and dial-in services in many parts of the country. ADMADE can all but eliminate the costs and technical barriers to distributing information to these stakeholders.

ADMADE is also particularly well placed to share data electronically because most of its program and monitoring materials are already prepared in electronic format. Nyamaluma pioneered the use of database and GIS technology for CBNRM monitoring, and has been using word processing, digital photography, and desktop publishing software for years to prepare education materials, newsletters, and reports. Converting these materials to a format suitable for the web is technically trivial with commonly available software tools. Even Nyamaluma's recently upgraded monitoring database could be put online, either statically or interactively.

To develop the web site, a list of the potential audiences was first developed. These included members of the wildlife sector in Zambia, international conservation organizations, tourists, safari hunters, academics, donors, and the general public. Secondly, a list of thematic menu sections was developed. These included introductory material about ADMADE, wildlife conservation accomplishments, community development, safari hunting, Nyamaluma, monitoring and GIS, publications, bibliography, and related links. Finally pages were designed for each of the sections, largely using text and images from existing documents.

ADMADE's web page made its debut in January 1999. Although it still has a long way to go, the general public is now able to get first hand information about ADMADE, its mission, strategies, and results.

### ***Increasing Local Capacity for Data Analysis***

As was noted in previous chapters, ADMADE Units have been heavily dependent on extension staff from Nyamaluma for assistance in managing and analyzing data. Other than making a cursory overview, most Unit leaders and their deputies do little quantitative or graphical summarizing of their data. One notable exception where Unit staff are analyzing dataforms on their own that was described to me several times comes from the field patrol dataform, where the list of supplies taken and returned on field patrols is of keen interest to the Unit staff.

In order to strengthen monitoring capacity at the Units, Nyamaluma scheduled an advanced course for village scouts and deputy unit leaders, about  $\frac{3}{4}$  of which focused on topics related to monitoring. This one-week workshop was held in May 1999, and was attended by 44 scouts from all ADMADE areas. The workshop objectives related to monitoring included:

- to review monitoring as one of the roles of village scouts
- to discuss how monitoring information can be used
- to review common mistakes on dataforms
- to review techniques for measuring trophies
- to introduce a new technique and new dataform for conducting snare surveys
- to explain how "data collection" patrols around fish camps and waterholes differ from standard anti-poaching operations
- to explain how scouts can use base maps to keep summaries of monitoring data
- to discuss setting monitoring targets and developing work plans

Other sessions during the workshop addressed:

- the ADMADE Vision
- developing lesson plans for civic education
- new dataforms for a pilot community based licensing system
- individual participant interviews to update Nyamaluma's database on staff, roads, etc.

Most of the workshop sessions were held in the classroom, but were participatory in nature. There were two outside practical sessions, one on conducting snare surveys and another on trophy measurement. To pass the course and receive their certificates, students were required to make presentations on the last day of the workshop, reviewing the topics they had learned during the course. Workshop evaluations were overwhelmingly positive, although many participants wish the workshop could have continued longer. See Appendix V for a copy of the workshop handout and summary of the different sessions.

Monitoring will be covered in other courses scheduled for 1999. A workshop for Unit leaders held in June addressed monitoring issues, and various workshops for the newly elected Community Resource Boards also touched on monitoring. ADMADE will need to continue to provide training, both at Nyamaluma and in the field, in order to enable Unit staff and communities to analyze their own monitoring data for exercises such as quota setting, setting work targets, and resolving land use conflicts.

## Chapter 5: Conclusion

### *The Way Forward*

ADMADE's monitoring system has steadily improved itself since its inception using very few resources. The amount of data collected, the quality of that data, and the number of applications for the data have all been on the rise. While the monitoring system functions very well at many levels, plans for the future should (1) focus on the chronic problems that continue to limit the effectiveness of monitoring to improve the ADMADE program, and (2) address new information needs that have arisen from recent structural changes in the program. Some broad recommendations are presented below.

#### **Improve financial monitoring**

The most glaring information gap for ADMADE, commonly acknowledged both within the program and from the perspective of outsiders, focuses on revenue flow within the project. At the national level, total revenue from safari license sales is fairly well known and accessible, thanks largely to the computerized licensing system at the Wildlife Conservation Revolving Fund<sup>9</sup>. However revenue flows within the WCRF, between the WCRF and local communities, and within local communities, are far less transparent.

Lack of transparency in ADMADE's financial flows is an ongoing problem which breeds confusion and mistrust, and creates opportunities for mismanagement of resources. Both department field staff and leadership of local communities commonly suspect the WCRF is intentionally withholding their money and delaying disbursement because it is used for other purposes. Delays in disbursement is disruptive and costs the communities money because they don't receive any generate interest generated from their revenue. This has interfered with program activities at the field level on several occasions, and erodes the foundation of trust between government and communities upon which the program is based. More than one chief has suspended or threatened to suspend all activities in their area until the department releases their funds.

The WCRF in turn withholds payments from communities because there are suspicions that previous impresses have not been used and cleared properly, which in many cases is true. In some Units, revenue flows through the regional command, adding another layer to the transaction and creating more doubts in the community as to whether they are receiving everything they are supposed to. In almost all Units, planning field operations and community development projects is hampered by a lack of knowledge of how much money the area has earned or is projected to earn. Clearly the lack of transparent accounting and limited dissemination of financial data is causing damage at all levels.

Unlike some monitoring problems, which can be addressed satisfactorily by interventions of Nyamaluma alone, improving financial monitoring will require an integrated approach with leadership from the highest levels of the department. Although improved information flow will certainly need to be part of the solution, communities also need to be trained in and responsible for accounting procedures, with closer field support and auditing from ADMADE. The WCRF needs to strengthen its reporting of revenue use and educate people about the policies and formulas used for distribution, and perhaps computerize analysis of community financial reports which only they receive. Most importantly, mechanisms for sharing financial data between all parties need to be strengthened.

---

<sup>9</sup> In 1999, a decentralized licensing system is being pilot tested, which might make monitoring license sales more difficult

Monetary issues are by their nature highly charged political hot potatoes, however failing to address and improve financial monitoring may ultimately prove to be ADMADE's Achilles heel.

### **Monitor project impacts**

The impact of community development projects has not been well studied. Information that has been systematically collected about projects so far includes the start and completion dates, amount of money spent on the project, and the source. However data on the number of beneficiaries, as well as the value and nature of the goods or services from the project, has not been institutionalized and is only collected on an ad-hoc basis.

Monitoring project impact is important not only to meet donor reporting requirements and determine whether a community has used its financial benefits efficiently, but also to assess whether the community development efforts are indeed complementary the other objectives of ADMADE. Recently there has been a growing realization that many of the most popular community development projects, such as schools and clinic, do not directly address the number one threat to wildlife in many areas - poaching driven by hunger, and may not represent the collective will of the community. This type of finding can be used to better plan community development needs, and prioritize those projects which address food security and land use issues which are more important to ADMADE's long term survival.

### **Improve dissemination of results**

Nyamaluma, in its role as ADMADE's central nervous system for monitoring data, has long recognized a need to improve communication of results to stakeholders, particularly to organizations working at the national level. Sharing findings with other groups will likely play an even greater role in the future as ADMADE attempts to expand the portfolio of services it can offer to communities, develop partnerships with other organizations, and diversify its funding base. Each type of structural change in the program is accompanied by new information needs for planning and evaluation.

In the past, ADMADE's monthly newsletter has been its primary link to the outside world, even to the point of using it as a substitute for quarterly reports to USAID. However if ADMADE wishes to maintain support within the new ZWA leadership, donor community, and wildlife sectors domestically and internationally, there is clearly a need for more in-depth and regular results reporting.

One of the strategies ADMADE has employed in the past, and should continue to pursue, is taking advantage of the advances in information technology to disseminate results. As described in Chapter 4, the program now has a state-of-the-art database and web site which could serve as a clearinghouse for monitoring data. The web site is currently under utilized, however there are numerous evaluation reports, monitoring summaries, and special studies that could be posted with little effort.

Another strategy ADMADE would be wise to pursue is to utilize the coordinating office in Chilanga as a national repository of data on ADMADE. Some of the most important audiences for monitoring results at the program level are officers within ZWA, the donor and conservation organizations in Lusaka, and the media. The coordinating office should serve as a liaison with these groups, and have at their disposal materials for talks, presentations, and program planning. Many of these audiences do not require the latest, cutting-edge analyses from the field, but simply very basic information on what-where-why-when-how of ADMADE. Misperceptions of ADMADE and its approaches are common, even with the professional conservation and development communities.

### **Coordinate with other national monitoring initiatives**

As described in the stakeholder analysis section, there are several parallel projects and organizations in Zambia directly involved in wildlife monitoring. These include the National Environmental Monitoring and Information Network, and the Wildlife Resources Unit at Environmental Council of Zambia. ADMADE has yet to solidify its relationship with these other initiatives, and define whether it will be an active or passive partner with other monitoring programs. ADMADE has much to contribute to other monitoring programs, not only in terms of data but also in methodology and experiences. Conversely, ADMADE could also benefit from other monitoring programs, through improved dissemination of ADMADE's accomplishments, complementary datasets in adjacent protected areas, validation of findings, cooperation in organized censuses such as aerial surveys, and sharing experience with monitoring methods that ADMADE has yet to develop, such as vegetation, agricultural, and socio-economic monitoring. As a program of the government of Zambia, ADMADE also has a certain degree of obligation to coordinate with and support other government monitoring programs. At a very minimum, coordination with other environmental monitoring initiatives is needed to avoid conflict and duplication of efforts.

### **Revisit incentives for data collection**

From the very beginning, ADMADE's policy towards incentives for data collection has been to discourage material incentives in order to reduce the likelihood of data falsification. The fear is that scouts will make up nonexistent field patrols in order to collect an additional bonus for data collection. As an alternative to material incentives, the ADMADE model predicts that scouts will be motivated to do additional work in data recording from a sense of pride emanating from the belief that their dataforms will ultimately help their community.

Units are encouraged however to recognize and praise scouts who are involved in data recording in non-material ways. Nyamaluma itself at one time sponsored a national competition for the best data recorder, however it was eventually abandoned under the rationale that Units should be responsible for providing awards for data collection. Invitations to attend additional training courses at Nyamaluma is also thought to be an incentive for scouts to excel in monitoring.

Not surprisingly, the lack of incentives for monitoring is not popular with scouts. Because some scouts are involved with monitoring and others are not, it is seen as an additional function above and beyond the primary role of law enforcement. The concern about data falsification may be warranted, however the benefits of providing scouts with incentives for monitoring need to be further explored. This issue may resurface on its own as scouts have recently been asked to conduct specialized field patrols specifically for the purpose of collecting data (e.g., snare survey, fish camp patrols, water holes patrols).

Village scout salaries average between \$20 and \$40 a month, a rate which forces many to live with their families in poverty, unable to afford to send their children to school, buy food during the hungry season, or live in decent housing. One could even argue that scouts are indeed being exploited by the government and their own communities for their labor, as their civil servant counter parts do the same work and get paid two or three times as much. Providing incentives for additional monitoring duties may help alleviate the condition of village scouts, and rather than increase the likelihood of unethical behavior actually reduce the chances that they will be susceptible to accept bribes or resort to poaching for their own survival.

### **Prioritize data needs**

Under the new wildlife act, ADMADE has recently introduced several new structures at the community level: the community resource board, the village area group, peer groups, and three technical committees.

Introducing these new structures comes with its own data issues and a new layer of monitoring, needed to ensure that the changes are having the desired effect. Community participation in meetings, community development needs, and allocation of project revenue are all examples of monitoring needs that have only recently been introduced. Additional calls for monitoring the impacts of community development projects, conducting snare surveys, fish camp and waterhole patrols, household demography, and collecting data on food security issues, are other examples of monitoring activities that have recently come aboard.

ADMADE/Nyamaluma needs to prioritize their data needs in light of their capacity to collect, process, and analyze data, else they may find themselves struggling to swim in an ocean of monitoring data. Nyamaluma has in the past introduced new dataforms or changes to dataforms that it was unable to process or analyze. Although Nyamaluma's new information system significantly removes many of the technical barriers to managing data, time and manpower are still limiting factors.

Many of the new dataforms introduced in 1999 were designed to be used primarily within the community. It remains to be seen whether communities will have the capacity and interest in using so many new dataforms. ADMADE may also wish to examine the community-based monitoring methods in other rural development projects, such as the community self-monitoring ledgers in the CARE Livingstone Food Security Project, or the methodology for developing local level business plans in CLUSA Zambia's Rural Group Business Program. Although ADMADE has substantial experience in monitoring wildlife and law enforcement, other NGOs have greater experience in community mobilization and development reporting, lessons which may be of benefit to ADMADE.

#### **Increase community capacity in data analysis**

Nyamaluma's 1999 workshops in monitoring skills were a good step in developing the capacity of communities to analyze their own data. These efforts need to be continued and expanded in order for communities to be equipped with the skills to perform functions such as quota setting and running land use planning workshops. Increasing the capacity of communities to use their own data would also reduce the turn around time between data collection and useful results, relieve the pressure on Nyamaluma's extension service so that it can focus more on improving its training programs.

The capacity building process would likely be hastened if ADMADE supplemented its centralized training programs at Nyamaluma with a field-based network of support staff. Developing skills such as managing a filing system, summarizing data spatially and tabularly, interpreting results, and presenting findings to others are best taught 'on the job' through trial and error. Visits from Nyamaluma staff are very beneficial, however their frequency and rapid pace limits the amount of interaction and support possible.

#### **Monitor the monitoring**

Lastly, making the monitoring system a subject of itself would provide needed feedback for improving how information is being used at all levels. Monitoring the monitoring would not necessarily require introducing a new dataform. Simple measures can be made of the amount, frequency, and spatial representation of each of the datasets. Many of these analyses can already be performed with the new database. A standard questionnaire or interview guide could also be developed to evaluate how adequately ADMADE is meeting the information needs of its primary stakeholders.

#### **Other Research Needs**

Like all proper inductive research, this study identified as many new areas for research as it was able to illuminate. This section describes some of the broad topics that need further work, while research studies on several more specific topics are outlined in Appendix VI.

### **Data Quality Framework for Indices**

Measures of data quality in the context of using indirect indicators are still relatively undeveloped. Developing a methodology for measuring the quality of data of indices would allow comparisons of monitoring data over time, as well as give users an idea of which data is more trustworthy<sup>10</sup>. The variables which impact data quality for indices are already well known, and include:

- the "closeness" of the relationship between the observed phenomenon and the wildlife population
- sampling frequency
- sampling coverage
- number of samples
- variance in measurement
- number of indicators used and agreement
- sensitivity of the indicator

What remains is to develop a framework and coding system which operationalizes each of these elements into a data quality index for a dataset. ADMADE, with its heavy use of indicators, would be the perfect setting to develop and test such a framework.

### **Using Information for Local Resource Plans**

ADMADE would also be an excellent testing ground for developing and testing a framework for using information to negotiate community-level co-management plans, and land use plans. Community level resource planning is one of the ultimate aims of CBNRM, but the process is often directed by outsiders. The land-use planning workshops in ADMADE provide a natural experiment to measure how information is made available, presented, understood, trusted, interpreted, ignored, etc. by the various stakeholders in community-level resource planning workshops. Compiling case studies and developing a framework would guide the planning and facilitation of other resource planning efforts, including those addressed to non-wildlife resources such as forest products, fisheries, and mining.

### **Cost-Benefit Curve of Monitoring**

ADMADE's present challenge to prioritize its data needs in light of its limitations offers another opportunity for research on the cost-benefit curve of monitoring. Donors, government agencies, and projects alike eventually have to deal with this issue at one scale or another: when do the additional investments in monitoring no longer warrant the additional benefits? Monitoring costs are not only financial, but can also be measured in terms of staff time and the number of new skills/activities that can be realistically absorbed by communities within a finite timespan. Developing a methodology for calculating a cost index for each type of dataset, as well as a way to measure the importance of each type of data, could help programs like ADMADE strategically plan their data needs. This in turn may help avoid the unfortunately too common de-facto method of data prioritization – continuing to add new monitoring elements until the program can no longer cope with all the training, supervision, and data processing requirements, eventually resulting in one or more datasets haphazardly dying from neglect.

---

<sup>10</sup> The Africa Elephant Database by IUCN has developed a simple 1-3 data quality rating system for elephant count data. The index system was developed to help aggregate a multitude of local and national dataset into a continental database, as well as give users a reference to determine which population estimates are more likely than others.

## Appendix I - Bibliography

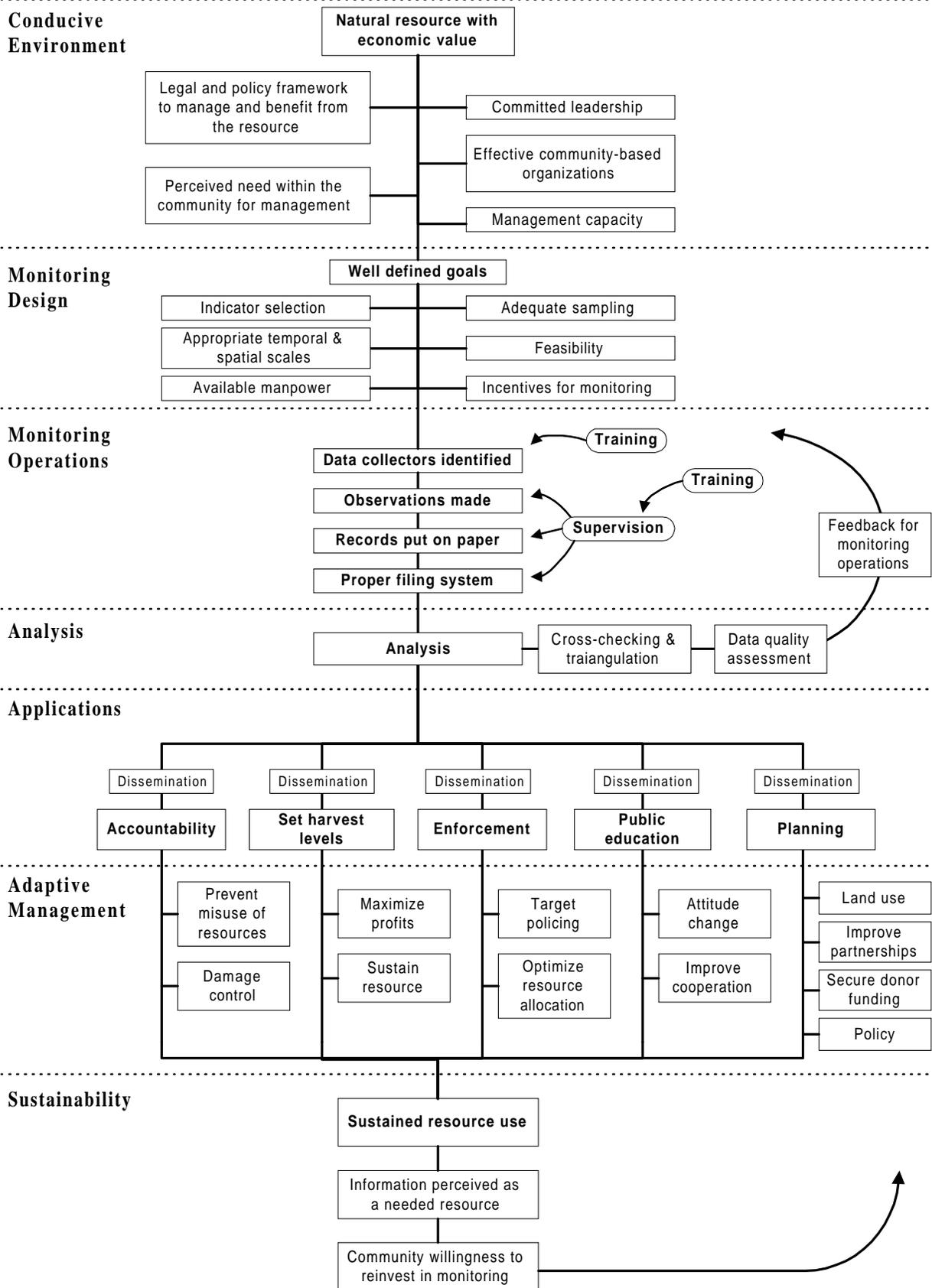
- Abel, N. and P. Blaikie (1986). "Elephants, people, parks and development: the case of the Luangwa Valley, Zambia." Environmental Management **10**(6): 735-751.
- Alpert, P. (1994). "USAID's expanded program to conserve biodiversity in sub-Saharan Africa." Ambio **23**: 167.
- Alpert, P. (1996). "Integrated Conservation and Development-Projects - Examples from Africa." Bioscience **46**(11): 845-855.
- Alpert, P. and P. A. DeGeorges (1992). Midterm evaluation of the Zambia Natural Resources Management Project. Lusaka, Zambia, USAID/Zambia.
- Anderson, D. and R. Grove (1987). Conservation in Africa: people, policies, and practice. Cambridge, UK, Cambridge University Press.
- Balakrishnan, M. and D. Ndhlovu (1992). "Wildlife utilization and local people: A case-study in Upper Lupande Game Management Area, Zambia." Environmental Conservation **19**(2): 135-144.
- Bernard, H. R., P. Killworth, et al. (1984). "The Problem of Informant Accuracy: The Validity of Retrospective Data." Annual Review of Anthropology **13**: 495-517.
- Bodmer, R. E. (1994). Managing wildlife with local communities in the Peruvian Amazon: the case of the Reserva Comunal Tamshiyacu Tahuayo. Natural connections: perspectives in community-based conservation. E. Western, R. Wright and S. Strum. Washington, DC, USA, Island Press: 113-134.
- Brandon, K. E. and M. Wells (1992). "Planning for people and parks: Design dilemmas." World Development **20**(4): 557-570.
- Buckland, S. T., D. R. Anderson, et al. (1993). Distance sampling: estimating abundance of biological populations. New York, New York, USA, Chapman & Hall.
- Child, B. (1996). "The practice and principles of community-based wildlife management in Zimbabwe: the CAMPFIRE programme." Biodiversity and Conservation **5**: 369-398.
- Child, G. (1996). "The role of community-based wild resource management in Zimbabwe." Biodiversity and Conservation **5**: 355-367.
- DeGeorges, P. A. (1992). ADMAD: An evaluation today and the future policy issues and direction. Chilanga, Zambia, USAID and NPWS.
- Ellis, S. (1994). "Of elephants and men: Politics and nature conservation in South Africa." Journal of Southern African Studies **20**(1): 53-69.
- Gajadhur, T. (1999). Regional inventory of practical strategies in community based natural resources management. Botswana, Netherlands Development Organisation (SNV).
- Gibson, C. C. (1995). Politicians, peasants and poachers: The political economy of wildlife in Zambia. PhD dissertation. Durham, NC, Duke University.
- Gibson, C. C. and S. A. Marks (1995). "Transforming rural hunters into conservationists: An assessment of community-based wildlife management programs in Africa." World Development **23**(6): 941-957.
- Hannah, L. (1992). African people, African parks: an evaluation of development initiatives as a means of improving protected area conservation in Africa. Washington, DC, USA, Conservation International.
- International Institute for Environment and Development (1994). Whose Eden? An Overview of Community Approaches to Wildlife Management. London, Overseas Development Administration.
- Jachmann, H. (1996). Aerial survey of the Luangwa Valley animal abundance and population trends 1996. Chipata, Zambia, Luangwa Integrated Resource Development Project.
- Jachmann, H. (1998). Aerial Sample Survey of the Central Luangwa Valley, 1998. Lusaka, Zambia, Wildlife Resource Monitoring Unit, Environmental Council of Zambia.
- Jachmann, H. (1998). Monitoring illegal wildlife use and law enforcement in African savanna rangelands. Lusaka, Zambia, Wildlife Resources Monitoring Unit, Environmental Council of Zambia.

- Jachmann, H. and G. Kalyocha (1994). Surveys of large mammals in nine conservation areas of the Central Luangwa Valley (1994). Chipata, Zambia, Luangwa Integrated Resource and Development Project.
- Jachmann, H. and M. Billiow (1997). "Elephant poaching and law enforcement in the central Luangwa Valley, Zambia." Journal of Applied Ecology **34**: 233-244.
- Kiss, A., Ed. (1990). Living with wildlife: wildlife resource management with local participation in Africa. Technical Paper No. 30. Washington, D.C, World Bank.
- Leader-Williams, N. and E. S. Milner-Gulland (1993). "Policies for the enforcement of wildlife laws: The balance between detection and penalties in Luangwa Valley, Zambia." Conservation Biology **7**: 611-617.
- Lewis, D. (1990). "Lesson under a mango tree: Advice from a sage African chief to a young biologist helps rescue wildlife across Zambia." International Wildlife **20**(4): 40-43.
- Lewis, D. and A. Phiri (1998). "Wildlife snaring - an indicator of community response to a community-based conservation project." Oryx **32**(2): 111-121.
- Lewis, D. and N. Carter, Eds. (1993). Voices from Africa: local perspectives on conservation. Washington, DC, WWF.
- Lewis, D. M. (1993). Human sensors vs satellite sensors: horizons for conservation in Africa. Proceedings of the Thirteenth Annual ESRI User Conference. Redlands, CA, Environmental Systems Research Institute, Inc. **1**: 195-201.
- Lewis, D. M. (1995). "Importance of GIS to community-based management of wildlife: lessons from Zambia." Ecological-Applications **5**(4): 861-871.
- Lewis, D. M. and G. B. Kaweche (1985). "The Luangwa Valley of Zambia: Preparing its future by integrated management." Ambio **14**: 362-365.
- Lewis, D. M. and P. Alpert (1997). "Trophy hunting and wildlife conservation in Zambia." Conservation Biology **11**(1): 59-68.
- Lewis, D. M., A. Mwenya, et al. (1991). "African solutions to wildlife problems in Africa: Insights from a community-based project in Zambia." International Journal on Nature Conservation **7**(1): 10-23.
- Lewis, D. M., G. B. Kaweche, et al. (1988). Wildlife conservation outside protected areas, lessons from an experiment in Zambia. Nyamaluma Conservation Camp, National Parks and Wildlife Services.
- Lungu, F. B. and P. Wegge (1989). An introduction to the Luangwa Integrated Resource Development project in Zambia. Mammal conservation in developing countries: a new approach, Rome, Italy.
- Lupande Development Workshop (1983). Proceedings of the Lupande Development Workshop : an integrated approach to land use management in the Luangwa Valley, Zambia. Lupande Development Workshop, Nyamaluma Wildlife Conservation Camp, Lupande Game Management Area, Chipata, Zambia.
- Lyons, A. (1998). A profile of the community-based monitoring systems of three Zambian rural development projects. Lusaka, USAID/Zambia.
- Mano Consultancy Services (1998). An Evaluation of the ADMADE Programme. Lusaka, USAID.
- Margoluis, R. and N. Salafsky (1998). Measures of Success. Washington, DC, Island Press.
- Marks, S. A. (1976). Large mammals and a brave people: Subsistence hunters in Zambia. Seattle, WA, University of Washington Press.
- Marks, S. A. (1979). "Profile and process: Subsistence hunters in a Zambian community." Africa **49**: 53-67.
- Marks, S. A. (1984). The imperial lion: Human dimensions of wildlife management in central Africa. Boulder, CO, Westview Press.
- Marks, S. A. (1991). Some Reflections on Participation and Co-management from Zambia's Central Luangwa Valley. Resident Peoples and National Parks. P. C. West and S. R. Brechin. Tucson, The University of Arizona Press.

- Marks, S. A. (1994). "Local hunters and wildlife surveys: A design to enhance participation." Journal of African Ecology **32**: 233-254.
- Marks, S. A. (1994). Managerial ecology and lineage husbandry: Environmental dilemmas in Zambia's Luangwa Valley. Conserving culture: new discourse on Heritage. M. Hufford. Champaign, IL, University of Illinois Press: 111-121.
- Marks, S. A. (1996). "Local hunters and wildlife surveys: An assessment and comparison of counts for 1989, 1990, and 1993." African Journal of Ecology **34**.
- Marks, S. A., H. Mutelele, et al. (1989). Interviews with local hunters, Lupande Game Management Area. Mimeo Consultancy Report. Chipata, Zambia, LIRDPA.
- Martin, R. B. (1994). The influence of governance on conservation and wildlife utilisation. Mimeo. Harare, Zimbabwe, Department of National Parks and Wildlife Management.
- McNeely, J. A. (1988). Economics and biological diversity: Developing and using economic incentives to conserve biological resources. Gland, Switzerland, IUCN.
- McNeely, J. A., Ed. (1995). Expanding partnerships in conservation. Washington, DC, USA, Island Press.
- Murphee, M. W. (1990). Community conservation and wildlife management outside protected areas - southern African experiences and perspectives: Implications for policy formation. A report to the African Wildlife Foundation.
- Murphee, M. W. (1991). Communities and institutions for resource management. National Conference on Environment and Development, Maputo, Mozambique.
- Mwenya, A. N., D. M. Lewis, et al. (1990). ADMADE: Policy, background and future. Lusaka, Zambia, National Parks and Wildlife Service.
- Mwenya, A. N., G. B. Kaweche, et al. (1988). Administrative management design for game management areas (ADMADE). Chilanga, Zambia, National Parks and Wildlife Service.
- National Parks and Wildlife Service (1998). Achieving ADMADE Sustainability, Quarterly Report to USAID, 4th Quarter 1998. Mfuwe, Nyamaluma Institute.
- National Parks and Wildlife Service (1999). Achieving ADMADE Sustainability, Quarterly Report to USAID, 1st Quarter 1999. Mfuwe, Nyamaluma Institute.
- National Parks and Wildlife Service and Wildlife Conservation Society (1999). ADMADE Sustainability Project 2nd quarterly report results and analysis. Mfuwe, Zambia, Nyamaluma, Institute.
- National Parks and Wildlife Services (1990). ADMADE Dataform Handbook. Nyamaluma, Zambia, National Parks and Wildlife Services.
- National Parks and Wildlife Services (1993). ADMADE monitoring designs and methodologies. Mfuwe, National Parks and Wildlife Services, Nyamaluma Community-Based Wildlife Management Centre.
- National Parks and Wildlife Services (1993). The ADMADE Geographic Information Systems Staff Manual.
- National Parks and Wildlife Services (1994). Understanding YOUR safari hunting industry: a training manual for local residents in ADMADE areas. Mfuwe, National Parks and Wildlife Services.
- National Parks and Wildlife Services (1995). ADMADE Unit Monitoring Summary Report, 1993-94. Nyamaluma, Nyamaluma Institute.
- National Parks and Wildlife Services (1995). ADMADE Unit Monitoring Summary Report, 1995. Nyamaluma, Nyamaluma Institute.
- National Parks and Wildlife Services (1996). A Portfolio Sample of Monitoring Results from Selected Units in the ADMADE Programme, 1996. Nyamaluma, Nyamaluma Institute.
- National Parks and Wildlife Services (1996). ADMADE Institutional Framework and Evaluation of Programme Objectives. Nyamaluma, Nyamaluma Institute.
- National Parks and Wildlife Services (1999). ADMADE Data Manager An Introduction. Mfuwe, Zambia, Nyamaluma Institute.
- National Parks and Wildlife Services (1999). ADMADE Data Manager Users Guide. Mfuwe, Zambia, Nyamaluma Institute.

- National Parks and Wildlife Services, Ed. (1994). Wildlife industries in Game Management Areas: Strategies and solutions for safari hunting in Zambia, National Parks and Wildlife Services, Ministry of Tourism, Republic of Zambia.
- National Parks and Wildlife Services (1992). NPWS Field Manual for wildlife staff and community participants in the ADMADE programme, Nyamaluma Community-based Wildlife Management Training and Research Center.
- Nawa, N. (1990). The role of traditional authority in the conservation of natural resources in the Western Province of Zambia, 1878-1989. Lusaka, Zambia, University of Zambia.
- Newmark, W. D., D. N. Manyaza, et al. (1994). "The conflict between wildlife and local people living adjacent to protected areas in Tanzania: human density as a predictor." Conservation Biology 8(1): 249-255.
- Norton-Griffiths, M. (1978). Counting Animals. Nairobi, Kenya, African Wildlife Foundation.
- Pinney, B. A. (1991). A study of Geographic Information Systems: Applications for land planning and natural resource management in sub-saharan West Africa - A rationale for a community-based approach. Landscape Architecture. Arlington, Texas, University of Texas at Arlington: 129.
- Sutherland, W. J., Ed. (1997). Ecological census techniques: a handbook. Cambridge, Cambridge University Press.
- Tropical Research & Development (1992). Zambia Natural Resource Management Strategy. Lusaka, USAID/Zambia.
- Warner, M., C. Robb, et al. (1996). A manual for community participation in the resolution of resource conflicts within Game Management Areas in Zambia. London, Bartlett School of Planning.
- Wells, M., K. Brandon, et al. (1992). People and parks: linking protected area management with local communities. Washington, DC, World Bank.
- West, P. C. and S. R. Brechin, Eds. (1991). Resident peoples and national parks: social dilemmas and strategies in international conservation. Tuscon, AZ, USA, University of Arizona Press.
- Western, D. (1994). Linking Conservation and Community Aspirations. Natural Connections. D. Western and R. M. Wright. Washington, DC, Island Press: 499-511.
- Western, D., R. M. Wright, et al., Eds. (1994). Natural Connections. Perspectives in community-based conservation. Washington, DC, Island Press.
- World Wide Fund for Nature (1997). Quota setting manual. Harare, Zimbabwe, World Wide Fund for Nature.
- Zambia Wildlife Authority (1999). Future directions for the safari hunting industry of Zambia: At a crossroad of opportunity. Mfuwe, Zambia, Nyamaluma Institute.

## Appendix II - A Framework for Effective Community Based Monitoring



## Appendix III - Menu System of the ADMADE Data Manager

### Field Patrols

#### Data Entry

Menu Item	Type	Description	Object	Author	Date
Field Patrols	bound form	This is the main data entry form for Field Patrol data.	frm_FieldPatrols	Andy Lyons	10-Dec-98
Field Patrol Observations	bound form	This is the data entry form for the lookup table for observations on field patrols.	flkp_FieldPatrolsObservations	Andy Lyons	18-Apr-99
Field Patrols Confiscations	bound form	This is the data entry form for the lookup table for objects confiscated on field patrols.	flkp_FieldPatrolsConfiscatedObjects	Andy Lyons	18-Apr-99
Field Patrol Supplies	bound form	A data entry form for the different types of supplies taken on field patrols	flkp_FieldPatrolsSupplies	Andy Lyons	22-Apr-99
Find Possible Duplicates	query	This query shows possible duplicate field patrols for the selected Unit(s) and Year(s).	qry_FieldPatrols_PossibleDuplicates	Andy Lyons	28-Apr-99

#### Queries

Menu Item	Type	Description	Object	Author	Date
Num Grids Visited Per Year	query	This query shows the total number of grids visited on field patrols for the selected Unit(s) and Year(s). Both the 'old' data from Lotus and new data are represented in this query	qry_FieldPatrols_TotalGrids_OldAndNewXTab	Andy Lyons	22-May-99
Total Area Patrolled Per Year	query	This query shows the total area patrolled each year for the selected Unit(s) and Year(s). Both the 'old' data from Lotus and new data are represented in this query. The query uses the area of each grid from the GIS cover	qry_FieldPatrols_TotalGrids_OldAndNewXTab_Area	Andy Lyons	22-May-99
Number of patrols per year by Unit	query	This query shows the number of patrols recorded per year for each Unit. You can select the Unit(s) and Year(s) you want included.	qry_FieldPatrols_NumPatrolsPerYearByUnit	Andy Lyons	07-Dec-98
Total patrol man-days per year by Unit	query	This query shows the number of man-days of patrolling recorded per year for each Unit. You can select the Unit(s) and Year(s) you want included.	qry_FieldPatrols_PatrolManDaysPerYearByUnit	Andy Lyons	10-Dec-98
Total patrol days per year by Unit	query	This query summarizes the number of patrol days per year for each Unit. You can select the Unit(s) and Year(s) to include.	qry_FieldPatrols_PatrolDaysPerYearByUnit	Andy Lyons	10-Dec-98

*Appendix III – ADM Menu System*

Range of dates per year by Unit	query	This query show the earliest and latest date of field patrol data for each Unit and Year specified.	qry_FieldPatrols_DateRangesPerYear	Andy Lyons	10-Dec-98
Total patrol man-days for VS and RS by Year	query	This query shows the total number of man-days for Village Scouts and Regular Scouts by Year for all Units marked. You can select which Year(s) you want included and which Unit(s) to add in the analysis, but the query is not broken down by Unit.	qry_FieldPatrols_TotalManDaysForVRSandRSByYear	Andy Lyons	11-Dec-98
Patrol length statistics	query	This query gives a variety of statistics about field patrol lengths, such as average patrol length, total number of patrols, total patrol days, minimum and maximum patrol length, and percent of patrols which are day patrols. The summaries are grouped by U	qry_FieldPatrols_PatrolLengthStatistics	Andy Lyons	10-Dec-98
Avg Visits Per Grid	query	This query shows the average number of times a grid has been visited in the selected Unit(s) and Year(s).	qry_FieldPatrols_VisitsPerGrid_OldAndNewXTab	Andy Lyons	15-May-99

**Reports**

Menu Item	Type	Description	Object	Author	Date
Field Patrol Summary Box File	report	This report presents a annual summary of information from field patrols. It is primarily used for the boxfiles at the Unit headquarters.	rpt_FieldPatrol_Summary	Andy Lyons	26-May-99
R2: Field Patrol Annual Summary by Camp	report	This report shows an annual statistical summary of field patrols for the selected camp(s) and year(s). It include patrol dates, total patrol days, man-days, poachers arrested, average length of patrol, average number of scouts on patrol,	rpt_FldPatCampStatistics	Andy Lyons	13-Jan-99
R3: Individual Field Patrols	report	This report lists individual field patrols for the selected camp(s) and year(s).	rpt_FldPatIndividualPatrols	Andy Lyons	15-Jan-99

**Interactive Maps**

Menu Item	Type	Description	Object	Author	Date
Pre '99 Field Patrol Grids	interactive map	This map will show you the number of times grids were patrolled for the selected Unit(s) and Year(s)	Field Patrol Grids - Pre 99	Andy Lyons	01-Feb-99
Pre 99 Field Patrol Observations	interactive map	This map shows the locations of observations (e.g., snares, poacher camps, poached carcasses, etc.). You can select the Unit(s), Year(s), Type(s) of observation, and Species (in	Field Patrol Observations - Pre 99	Andy Lyons	05-Feb-99

		the case of animal sightings or carcasses).			
Field Patrol Observation w Figures	interactive map	This interactive map shows where observations were made on field patrols. Only field patrol data that has been entered in Access is included (I.e., the earlier field patrol summaries that was entered in Lotus is not included). You can select which year(s)	Field Patrol Observations	Andy Lyons	11-Jun-99
Animal Sightings	interactive map	This interactive map shows where animals have been seen on field patrols for the selected Unit(s), Species, and Year(s).	SlideMap Field Patrols Animal Sightings W Figures	Andy and Phillip	15-May-99

**Interactive Charts**

Menu Item	Type	Description	Object	Author	Date
Number of Grids Visited By Unit	unbound form	This graph shows the number grids which have been visited by at least one field patrol for the selected Units and Year(s). This graph only shows aggregate summaries before 1999.	frm_FieldPatrols_NumGridsVisited Graph	Andy Lyons	15-May-99
Patrol Days by Month	unbound form	This bar chart shows the number of days patrolled each month for each camp in the selected Unit and Year	frm_FieldPatrols_PatrolDaysPerMonth_Graph	Andy Lyons	03-Aug-99
Average Number of Visits Per Grid	unbound form	This graph shows the average number of patrols that has visited a grid. This graph helps to correct for gaps in data since it shows the average number of visits per grid as opposed to total number of grid-visits. Both pre-99 grid summaries from the old Lo	frm_FieldPatrols_VisitsPerGrid_Graph	Andy Lyons	15-May-99

**Safari Hunts**

**Data Entry**

Menu Item	Type	Description	Object	Author	Date
Safari Hunts	bound form	This is the main data entry form for safari hunting monitoring data.	frm_Hunts	Andy Lyons	05-Feb-99
Professional Hunters	bound form	This is a data entry form for the professional hunters.	flkp_PHS	Andy Lyons	18-Apr-99
Safari Hunt Observations	bound form	This is the data entry form for the lookup table on observations made on safari hunts.	flkp_HuntsObservations	Andy Lyons	18-Apr-99

**Queries**

Menu Item	Type	Description	Object	Author	Date
Num. Hunts by Year	query	This query will show the number of hunts in each hunting block for the selected hunting block(s) and year(s).	qry_Hunts_NumHuntsPerYearPerHBlock	Andy Lyons	03-Feb-99
Num. Animals Killed by Year	query	This query shows the number of animals, broken down by species, that were killed for the selected hunting block(s) and year(s).	qry_Hunts_NumAnimalsKilledByYearByHuntBlock	Andy Lyons	03-Feb-99

**Interactive Graphs**

Menu Item	Type	Description	Object	Author	Date
Wildlife Indicators	unbound form	This interactive graph displays the three main indicators used to assess population trends: hunting success, search effort, and trophy size. The graph shows the trend and sample size for the hunting block, species and indicator you select.	frm_Hunts_TrophyGraph	Andy Lyons	03-Feb-99
Trophy Size Distribution	unbound form	This graph shows the distribution of trophy sizes (in field TrophyMeasurement1) for the selected species, hunting blocks, and years	frm_Hunts_Graph_TrophySizes	Andy Lyons	23-May-99
Combined Indicators	unbound form	This form shows four charts which may reveal changes in wildlife populations. The graphs include trophy size, hunting success, hunting effort, and quota. You can select which hunting blocks and years you want analyzed	frm_Hunts_TrophyMultipleGraphs	Andy Lyons	03-Jun-99
Hunts Timeline	unbound form	This graph shows a timeline for the hunts in the selected hunting block(s), selected type(s) of hunts (i.e., classical and/or mini), and selected year(s). For best results, just look at one year and one hunting block.	frm_Hunts_Graph_Timeline	Andy Lyons	02-Sep-99

**Reports**

Menu Item	Type	Description	Object	Author	Date
Safari Hunting - Annual Summary	report	This report shows a summary of safari hunting results for a single year. It includes a summary of the clients who hunted in the GMA and also details about the selected species.	rpt_SafariHuntingResults	Andy Lyons	26-May-99
Safari Hunting - Multi-Year Trends	report	This report shows monitoring data for the selected species hunted in the selected hunting blocks during the selected years. For each year,	rpt_SafariHunting_Trends	Andy Lyons	26-May-99

we see trophy size, number of animals killed, etc.

### Interactive Maps

Menu Item	Type	Description	Object	Author	Date
Trophy Spots With Figures	interactive map	This map shows the location of trophy animals. You should only look at one species at a time to see the figure.	Safari Trophies With Figures	Andy Lyons	05-May-99
Trophy Locations	interactive map	This map show the total number of animal kills in each grid. You can select the species, year(s), and hunting block(s) to view.	Safari Trophies	Andy Lyons	04-Feb-99
Hunting Success	interactive map	The color of each hunting block on this map represents the average hunting success for the selected species and year(s).	Hunting Success	Andy Lyons	05-Mar-99

### Staff

#### Data Entry

Menu Item	Type	Description	Object	Author	Date
Staff Lookup Table	bound form	A data entry form for the Staff lookup table. This table contains information about staff that never changes (e.g., date of birth, NRC number, etc.).	flkp_Staff	Andy Lyons	22-Jan-99
Staff Position Groups	bound form	This form lets you define groups of staff positions (e.g., Regular Scout, Village scouts, community paid employees, etc.) which you can then use in queries	frm_StaffPositionsCategories	Andy Lyons	04-Feb-99
Unit Staff Update	unbound form	This form lets you update staff records for the present year.	frm_StaffUpdate	Andy Lyons	22-Jan-99
Staff Salaries	unbound form	A data entry form for the salaries of staff in the Units	frm_StaffSalaries	Andy Lyons	23-May-99

#### Queries

Menu Item	Type	Description	Object	Author	Date
No Of Unit Leaders Served in a unit	query	This query tells us how many unit leaders have served in a unit.	qry_Staff_No_Of_Unit_Leaders	Phillip Ngulube	21-May-99
Staff List by Unit, Year, and Position	query	Includes all fields from the staff update table. You can select which Unit(s), Year(s) and Position(s) to include	qry_StaffByUnitYearAndPosition	Andy Lyons	22-Jan-99
Number of staff per camp	query	This query will present in a crosstab format the number of staff at each camp for the Unit(s),	qry_StaffNumStaffByCamp	Andy Lyons	24-Jan-99

Appendix III – ADM Menu System

		Year(s) and types of staff position(s) you select.			
Number of staff per Unit	query	This query will present in a crosstab format the number of staff for the Unit(s), Year(s) and types of staff position(s) you select.	qry_StaffNumStaffByUnit	Andy Lyons	24-Jan-99
Num Staff by Position	query	This crosstab query will total up the number of staff, broken down by each position, in the selected Units. Each column is the name of a position, and each row represents the total number of staff for a particular year. You can select which year(s), Unit	qry_Staff_NumStaffByPosition	Dale Lewis	08-Feb-99
Fate Histories	query	This query shows the first and last year that a person has appeared in the staff update table, and their most recent fate.	qry_Staff_MostRecentFate	Phillip	19-Apr-99
Length of Employment by Staff Position	query	A query to tell us how long a person has stayed in a unit.. You can select which Unit and which positions to view.	qry_StaffUnitLeaderStayInUnit	Phillip Ngulube	21-May-99

**Graphs**

Menu Item	Type	Description	Object	Author	Date
Average Family Size by Camp	unbound form	This graph shows the average family size of Unit employees at the selected Unit, for the selected year(s), position(s), and staff status.  Creating this graph is described in the ADM Users Guide.	frm_Staff_FamilySizeGraph	Andy Lyons	06-Feb-99

**Reports**

Menu Item	Type	Description	Object	Author	Date
R6: Staff List by Unit & Year	report	This report lists the updated information for staff at each Unit. You can select which Unit(s), Year(s), and Position(s) to print.	rpt_StaffByUnit	Andy Lyons	22-Jan-99
R8: Unit Staff History by Person	report	This report lists the updated information for staff at each Unit. Records are grouped by individual, so you can see how long and in what capacity a person has been working at a Unit. You can select which Unit(s), Year(s), and Position(s) to print.	rpt_StaffByUnit_ByName	Andy Lyons	01-Feb-99

**Interactive Maps**

Menu Item	Type	Description	Object	Author	Date
No Of Staff Per Camp	interactive map	This interactive map shows the number of staff per camp for a chosen year(s) and unit(s).	No of Staff per camp	Phillip	03-May-99

**Camps**

**Data Entry**

Menu Item	Type	Description	Object	Author	Date
Camps	bound form	This form allows you to edit the Camps lookup table. Note that to set the status of camps for each year, use the Camps Status form.	flkp_Camps	Andy Lyons	12-Jan-99
Camps Update	unbound form	This form allows you to enter the status of each camp for each year. E.g., the Unit it belongs to, the water source, number of staff, etc.	frm_CampsUpdate	Andy Lyons	12-Jan-99

**Reports**

Menu Item	Type	Description	Object	Author	Date
R1: Camps by Unit	report	This report will print all the scout camps for all of the selected Units for all of the selected Years	rpt_CampsByUnit	Andy Lyons	12-Jan-99

**Interactive Maps**

Menu Item	Type	Description	Object	Author	Date
Simple Base Map	interactive map	This interactive map shows us the camp locations and camp names.	Simple Base Map	Andy and Phillip	01-May-99
Number of Staff Per Camp	interactive map	The color of the camp represents the number of staff for with the selected status and position(s) for the selected year(s) and Unit(s)	Number of Staff Per Camp	Andy Lyons	01-May-99

## Units & Hunting Blocks

### Data entry

Menu Item	Type	Description	Object	Author	Date
Units	bound form	This form allows you to edit the Units lookup table.	flkp_Units	Andy Lyons	12-Jan-99
Hunting Blocks	bound form	A data entry form for the Hunting Blocks lookup table.	flkp_HBlocks	Andy Lyons	22-Apr-99

### Unit Profiles

Menu Item	Type	Description	Object	Author	Date
Unit Profiles	unbound form	This form shows a variety of information about the selected Unit(s), including a graph of WCRF Revenue, camps, hunting blocks, map, staff, hunting statistics, available documents, etc. The profile can be printed or viewed on screen.	frm_UnitProfiles	Andy Lyons	03-Mar-99

### Queries

Menu Item	Type	Description	Object	Author	Date
GMA's and Units	query	This is a simple list of all the GMA's and their corresponding Units and the alternate names of the Units.	qry_List_GMA'sAndUnits	Andy Lyons	09-Dec-98
GMA's, Units, and Hunting Blocks	query	This is a list of the GMA's, the Units in each GMA, and the Hunting blocks in each Unit.	qry_List_GMA'sUnitsHBlocks	Andy Lyons	09-Dec-98

### Reports

Menu Item	Type	Description	Object	Author	Date
R4: VAG's by Unit	report	This report will print all the VAG's for the selected Unit(s).	rpt_VAG'sByUnit	Andy Lyons	12-Jan-99
R5: GMA's, Units, and Hunting Blocks	report	A list of the selected GMA(s), and their associated Units and GMA's	rpt_GMA'sUnitsHBlocks	Andy Lyons	15-Jan-99

## VAGs, Chiefs, and Villages

### Data Entry

Menu Item	Type	Description	Object	Author	Date
VAGs	bound form	Data entry form for VAGs	flkp_VAGs	Andy Lyons	22-Apr-99
Villages	bound form	A data entry form for villages.	flkp_Villages	Andy Lyons	22-Apr-99
Chiefs	bound form	A data entry form for the Chiefs lookup table	flkp_Chiefs	Andy Lyons	27-Apr-99

## Species, quotas and licenses

### Data Entry

Menu Item	Type	Description	Object	Author	Date
Species Biology	bound form	This form lets you view or enter biological data for species. If available, you can also view an image of each animal.	frm_SpeciesBiology	Andy Lyons	24-Feb-99
Species	bound form	A data entry form for the species lookup table	flkp_Species	Andy Lyons	22-Apr-99
Population Trends Survey	bound form	A data entry form for the population trends survey	frm_PopulationTrendsSurveys	Andy Lyons	22-May-99
Quotas	unbound form	This form helps to enter the quotas	frm_QuotasEntry	Phillip Ngulube	17-Apr-99
License Prices	unbound form	A data entry form for hunting license prices	frm_LicensePrices	Andy Lyons	29-Apr-99
Quota Exercise Trends	unbound form	This form lets you input trend data from the community quota setting and allocation worksheet.	frm_SpeciesIndicators	Andy Lyons	19-Jul-99

### Queries

Menu Item	Type	Description	Object	Author	Date
License Prices	query	This query is a list of license prices for animals. You can select which year(s) and species to include.	qry_List_LicensePrices	Andy Lyons	10-Dec-98
Number of species on quota	query	This will list the number of species of quota (NOT the number of animals on quota) for the hunting block(s), year(s), species, and type of quota (I.e., community rec or NPWS) that you	qry_Quota_NumSpeciesOnQuota	Andy Lyons	24-Jan-99

		select.			
Number of individual animals on quota	query	This query shows in crosstab format the number of animals on quota for the hunting block(s), year(s), specie(s), and type of quota (e.g., community recommendation or NPWS) that you select.	qry_Quota_NumAnimalsOnQuota	Andy Lyons	26-Jan-99
Animals on Quota	query	This query shows the number of animals on quota for each of the different categories of quota (e.g., safari, non-resident, resident, etc.) for the selected hunting block(s), year(s), quota type(s), and species.	qry_Quotas_ByQuotaType	Andy Lyons	08-Apr-99
Licenses issued vs animals taken	query	This query compares the number of licenses sold (from the WCRF database) with the number of animals actually shot (from Safari Hunting Monitoring) for the selected species, hunting blocks, and years. Discrepancies can occur from exchanging licenses, lost s	qry_Hunts_AnimalsTaken_Combined	Andy Lyons	06-May-99
Indicator Agreement	query	This query summaries the agreement between indicators from the community quota setting worksheet. For each hunting block-year, the number of species for which indicator information is available, the average number of indicators available, and the coeffici	qry_SpeciesIndicators	Andy Lyons	31-Jul-99

**Interactive Graphs**

Menu Item	Type	Description	Object	Author	Date
Licenses Issued Vs. Animals Hunted	unbound form	This graph shows the difference between the number of licenses issued (from the WCRF database) and the number of animals actually hunted. Values to the left of 0 indicate that more licenses were issued than actually used. Values to the right of 0 indicate	frm_Hunts_LicensesVsHunted_Graph	Andy Lyons	06-May-99
Population Trends Survey	unbound form	This graph compares the responses on population trends surveys	frm_PopulationTrendsSurveys_Graph	Andy Lyons	22-May-99

### Reports

Menu Item	Type	Description	Object	Author	Date
Combined License Form - Classical & Mini	report	The combined license form is used in the new community based licensing system.	rpt_CombinedLicenseForm	Andy Lyons	11-May-99
Combined License Form Old - Classical & Mini	report	The combined license form is used in the new community based licensing system.	rpt_CombinedLicenseForm_Old	Andy Lyons	11-May-99
Combined License Form - Secondary Area	report	This is the new combined license form for hunts in secondary areas,	rpt_CombineLicenseForm_SecondaryArea	Andy Lyons	13-May-99

### Poacher Case Records

#### Data Entry

Menu Item	Type	Description	Object	Author	Date
Weapon Types	bound form	A basic data entry form for weapon types	flkp_WeaponTypes	Andy Lyons	22-Apr-99
Poacher Case Records	bound form	Data entry form for poacher case records. Poacher case recs can also be entered from the Field Patrol data entry form	frm_PoacherCaseRecs	Andy Lyons	22-Apr-99
Forfeited Objects	bound form	Data entry table for different types of objects that have been forfeited by convicted poachers as part of their sentence.	flkp_PoacherForfeitedObjects	Andy Lyons	22-Apr-99
Offenses	bound form	A data entry form for offenses committed by poachers	flkp_PoacherOffenses	Andy Lyons	29-Apr-99

### Demography

Demography	unbound form	This is the data entry form for VAG demographic data	frm_DemogData	Andy Lyons	08-May-99
------------	--------------	--	---------------	------------	-----------

### Interactive Charts

Menu Item	Type	Description	Object	Author	Date
Age Structure By VAG	unbound form	This graph shows the age structure for the selected VAG and year.	frm_Demog_Graph_AgeStructureByVag	Andy Lyons	08-May-99
Comparative Age Structure by VAG	unbound form	This chart shows the age structure for the VAGs in the selected Units, Year(s), age class(es), and gender(s):	frm_Demog_Graph_AgeStructureByUnit	Andy Lyons	08-May-99
Population and Density Per Unit	unbound form	This graph shows the total population and density in people per km2 for the selected Unit(s).	frm_Demog_Graph_PopulationByUnit	Andy Lyons	08-May-99

## WCRF

### Queries

Menu Item	Type	Description	Object	Author	Date
35% Rev by Month	query	This query shows the amount of the 35% WCRF revenue earned by each hunting block each month for the selected year(s), hunting block(s), and deposit type(s).	qry_WCRF_35PercentIncome	Andy Lyons	06-Mar-99

### Graphs

Menu Item	Type	Description	Object	Author	Date
Revenue by Source and Year	unbound form	This bar charts shows year by year the WCRF revenue for a specific hunting block broken down by type of payment. You can select which hunting block, years, and types of payment to select.	frm_WCRF_Graph_RevenuePerBlockByDepType	Andy Lyons	17-Feb-99
Revenue by Hunting Block	unbound form	This graph from the WCRF database shows the amount of revenue to the WCRF for each hunting block for the select year. You can select which payment type(s) and hunting block(s) to include in the graph.	frm_WCRF_Graph_RevenueByHBlock	Andy Lyons	17-Feb-99
Revenue by Year	unbound form	This graph shows the total revenue to the WCRF by year for the selected hunting block. You can select which years and payment types to include in the graph	frm_WCRF_GraphRevenueByYearForOneBlock	Andy Lyons	17-Feb-99
Pie Chart: Rev by Source	unbound form	This pie chart shows a breakdown of the revenue to the WCRF according to revenue source (i.e., type of payment). You can select which hunting block(s) and payment type(s) to include in the chart	frm_WCRF_PieChart_RevenueBySource	Andy Lyons	17-Feb-99

### Interactive Maps

Menu Item	Type	Description	Object	Author	Date
35% Revenue Earned By Each Hunting Block	interactive map	This map represents the amount of revenue earned for community development (i.e., 35%) for the selected hunting block(s), year(s), and payment type(s).	35% Revenue by Hunting Block	Andy Lyons	03-May-99
WCRF Revenue by Hunting Block	interactive map	This interactive map shows the total amount earned by each hunting block for the WCRF. You can select which payment type(s), and year(s) to include.	WCRF Revenue by Hunting Block	Andy Lyons	08-Jun-99

Revenue Bar Chart	interactive map	This map shows the amount of revenue collected by year for each of the selected hunting blocks.	WCRF Revenue	Andy Lyons	21-Feb-99
-------------------	-----------------	---	--------------	------------	-----------

## Data Availability

### Queries

Menu Item	Type	Description	Object	Author	Date
Hunting Block Records	query	This query shows for the selected hunting blocks the number of available records by year for hunts, trophies, WCRF data, and quoats. You can select which year(s) and hunting block(s) to include	qry_HBlockRecs_AllXTab	Andy Lyons	17-Feb-99
Unit Records	query	This query shows for each of the selected Units and year the number of records in ADM for each dataset: Staff, Camps, and Field Patrols. You can select which Unit(s) and Year(s) to include in the report	qry_UnitRecs_AllRecsXTab	Andy Lyons	17-Feb-99

### Interactive Maps

Menu Item	Type	Description	Object	Author	Date
Records per Unit	interactive map	This map displays the number of records from each Unit for the selected year(s) and dataset(s)	Number of records by Unit	Andy Lyons	09-Jun-99

## Data Logging

### Edit Data Log

Menu Item	Type	Description	Object	Author	Date
Edit Data Log	bound form	This form allows you to look at the records in the data log. Old records can be deleted, or you can look at who's been modifying the tables. You can select which user(s), table(s), and action(s) to review.	frm_DataLog	Andy Lyons	16-Feb-99

**Reports**

Menu Item	Type	Description	Object	Author	Date
L1: Data Log	report	This report shows records from the data log, which records changes that have been made to the main tables.	rpt_DataLog	Andy Lyons	11-Feb-99

**Setup**

Menu Item	Type	Description	Object	Author	Date
Logable Tables	bound form	In this form you list the tables which can be logged (meaning changes are recorded in them). Note to put logging into action the data entry form must be designed properly (i.e., with the correct code attached) and the 'Enable Logging' must be checked (und	frm_LogTables	Andy Lyons	11-Feb-99
Logable Forms	bound form	In this form you set the options for those data entry forms which have been set up for automatic data logging.	frm_LogForms	Andy Lyons	11-Feb-99

**Documentation**

**Documents**

Menu Item	Type	Description	Object	Author	Date
Documents	bound form	This is a catalog of documentation on ADAMDE. Some of the documents are available online.	frm_Documents	Andy Lyons	10-Apr-99

**PowerPoint Slides**

**Slide Templates**

Menu Item	Type	Description	Object	Author	Date
Create Slide Templates	bound form	Create/generate templates for PowerPoint slides	frm_SlideTemplates	Andy Lyons	27-Apr-99
Preset Charts	bound form	A data entry form for charts which can be used on Slide Templates	frm_SlideTemplates_Charts	Andy Lyons	28-Apr-99
Map Definitions	bound form	Create map definitions for interactive maps, slide templates, and forms with Map Objects controls	frm_MapForms	Andy Lyons	27-Apr-99

## Admin

### Maintenance

Menu Item	Type	Description	Object	Author	Date
Filters	bound form	You can use this forms to set up your lookup tables so that they work with the Filter Manager	frm_Filters	Andy Lyons	09-May-99
Program Options	bound form	Program Options lets you change settings for how the ADMADE Data Manager operates.	frm_ProgramOptions	Andy Lyons	09-Dec-98
Reminder Messages	bound form	In this form you can set reminder messages that will automatically pop up on the date(s) that you specify when the main menu is first opened.	frm_ReminderMessages	Andy Lyons	23-Jan-99
Menu Manager	unbound form	The Menu Manager is used to add or edit items on the menu system.	frm_MenuManager	Andy Lyons	09-Dec-98

### Wish Lists

Menu Item	Type	Description	Object	Author	Date
Access Development Notes	bound form	This form provide a space where you can enter miscellaneous reminder notes about developing the ADAMDE Data Manager. For example you can make notes about strange error messages, buttons that don't work, things that need to be improved, etc.	frm_AccessDevelopmentNotes	Andy Lyons	09-Dec-98
Objects needed	bound form	This form allows a place you to jot down ideas for items you'd like to see in the database, sub as new forms, reports, or queries.	frm_WishList	Andy Lyons	06-Jan-99

### Reports

Menu Item	Type	Description	Object	Author	Date
Menu System - Compact	report	This is essentially the same report as R7, but prints out the contents of the Menu System in a more compact format.	rpt_MenuSystem_Compact	Andy Lyons	01-Jun-99
R7: Menu System	report	This report lists all the choices on the menu system.	rpt_MenuSystem	Andy Lyons	23-Jan-99

### Mapping Setup

Menu Item	Type	Description	Object	Author	Date
Custom Color Ramps	bound form	A data entry form for custom color ramps. Custom color ramps are used in interactive maps	frm_MapCustomColorRamps	Andy Lyons	25-Apr-99
GIS Covers	bound form	This form lets you select the GIS covers which are used by severa forms in the ADMADE Data Manager.	frm_MapCovers	Andy Lyons	29-Jan-99
Map Definitions	bound form	This form lets you define maps which appear in interactive maps, PowerPoint slide templates, and forms which use Map Objects	frm_MapForms	Andy Lyons	29-Jan-99
Add Relate Tables	bound form	In this form you define the Access tables which can be used to make joins with GIS covers on interactive maps. See the online users guide for more info.	frm_MapRelateTables	Andy Lyons	18-Feb-99

### Import-Export

Menu Item	Type	Description	Object	Author	Date
Menu Item Export Wizard	unbound form	This form allows you to export Menu Items and their related database objects to a temporary MDB file, which can then be imported into another copy of ADM.	frm_MenuExportWizard	Andy Lyons	26-Jun-99
Menu Item Import Wizard	unbound form	This form lets you import menu items and their associated database objects from transfer files that have been created with the Export Menu Items wizard.	frm_MenuImportWizard	Andy Lyons	26-Jun-99

### Replication

Menu Item	Type	Description	Object	Author	Date
Make Partial Replica	bound form	You can use this form to make partial replicas. See the online users guide for more details.	frm_PartialReplicaDefinitions	Andy Lyons	21-May-99

## Appendix IV - Data Analysis Training Conceptual Framework

### Introduction

The following framework outlines the important concepts and skills which are required for analyzing and using data in ADMADE GMAs. This conceptual framework is intended to assist the planning of training programs in data analysis at the local level. The target audience for such training programs includes Unit Leaders, Deputy Unit Leaders, and members of the Community Resource Board and the three management committees.

### 1) Basic Definitions and Concepts

- a. MONITORING
  - i. monitoring: the collection, storage, analysis, and use of information
  - ii. can include any kind of information, such as household demography, wildlife numbers, poaching, money spent on projects, amount of fish being caught, etc.
- b. DATA
  - i. data: the numbers and remarks which are written down on dataforms.
  - ii. data doesn't usually tell us very much just by looking at it
- c. INFORMATION
  - i. information: data which has been given meaning through analysis and interpretation
- d. DATA ANALYSIS
  - i. data analysis: things we can do to change raw data into meaningful information. These include making mathematical summaries (such as totals and averages), looking for patterns with older data, presenting data on maps, discussing it in group, etc.

### 2) Monitoring in ADMADE Units

- a. DATA COLLECTION ACTIVITIES
  - i. Safari monitoring
  - ii. Field patrols
  - iii. Poacher case records
  - iv. Demography
  - v. Financial records
  - vi. Projects
  - vii. Community questionnaires and surveys
  - viii. Other
- b. USES OF INFORMATION AT THE COMMUNITY LEVEL
  - i. Planning anti-poaching operations
  - ii. Recommending hunting quotas
  - iii. Preventing mismanagement and corruption
  - iv. Land use planning
  - v. Identifying and prioritizing projects
  - vi. Public education
  - vii. Presenting evidence in court
  - viii. Becoming aware of problems before they become too serious

c. IMPORTANCE OF INFORMATION

- i. Many of the decisions/actions at a Unit are part and parcel of administration and must be made regardless of available information. The question is whether these decisions will be based on the best available information or by guess work.
- ii. When no monitoring information is available to guide a decision or action, people tend to base their actions on other factors, such as convenience, political or economic gain. This type of decision making can have a negative impact on natural resource management programs.
- iii. Monitoring data belongs to the community. The community has financed the collection of the data and has the most to gain from using the monitoring data properly.
- iv. Information can be a tool for empowerment. One of the factors that often prevent communities from developing is not knowing how to use information to plan development. Businesses and organizations which know how to use information to plan their activities always do better than those that don't.
- v. Information can also serve as a tool to develop community cohesion and facilitate dialogue. Building cohesion is very important in community based resource management. People often feel united when they all know the same information.
- vi. Often the real underlying issues of a problem come out when discussing monitoring data. For example, an RMC might show a map displaying the grids where there is illegal firewood gathering. During the discussion, it may come out that those people need the firewood to make charcoal to sell, because they can't find a market for their crops. The CRB may decide that a solution would be to use the community tractor to take farmer crops to the boma two times after the harvest. Although the solution could be quite simple, the problem never would have been resolved if the monitoring data wasn't there to stimulate the dialogue.

**3) Information Uses for Other Stakeholders**

a. REGIONAL COMMAND

- i. Planning anti-poaching operations
- ii. Knowing wildlife numbers
- iii. Planning projects/operations with other organizations
- iv. Determining staffing needs, managing staff
- v. Working with the courts

b. NYAMALUMA

- i. Planning training courses
- ii. Planning visits to GMAs
- iii. Soliciting donor assistance for Units (e.g., electric fence)
- iv. Meetings with Professional Hunters
- v. Advertising ADMADE areas at SCI
- vi. Influencing wildlife policy changes and legislation

c. CHILANGA/ZWA

- i. Approving quotas
- ii. Ensuring that wildlife laws are not broken
- iii. Planning staffing needs
- iv. Identifying priority areas for assistance
- v. Setting license prices
- vi. Awarding safari concession leases
- vii. Planning programs with other government departments
- viii. Designing projects with donors

- ix. Monitoring the status of protected species
- x. Applying for funding from central government
- xi. Answering parliamentary inquiries
- xii. Ensuring species protection required by CITES

d. USAID

- i. Measuring impact on household livelihood
- ii. Evaluating sustainability of the ADMADE approach
- iii. Funding renewal for ADMADE
- iv. Accountability of US government funds
- v. Reporting to USAID/Washington and the US Congress
- vi. Planning programs with other donors

e. OTHER ZAMBIAN WILDLIFE ORGANIZATIONS/NGOs (WILDLIFE RESOURCES MONITORING UNIT, COMMUNITY ENVIRONMENTAL MANAGEMENT PROGRAM, NATIONAL ENVIRONMENTAL MONITORING NETWORK, WWF, IUCN, ETC.)

- i. Compare ADMADE's results with other surveys
- ii. Learn from ADMADE's methodology
- iii. Plan new programs for the wildlife sector

f. ZAMBIAN PUBLIC

- i. Status of Zambia's wildlife – national resource
- ii. Accountability for government resources
- iii. Environmental education - schools

g. INTERNATIONAL PUBLIC

- i. Safari hunters interested in Zambia
- ii. People interested in Zambia's unique wildlife – global resource
- iii. Lessons for other conservation projects
- iv. Students and research
- v. International wildlife laws and treaties
- vi. Making private donations to ADMADE or other conservation programs

**4) Information Flow in ADMADE**

- i. To meet the information needs of so many stakeholders, a system of information flow has been developed for ADMADE Units. Data is first collected by scouts or other data collectors, then comes to the Unit headquarters, then to Nyamaluma, and then back to the Units.
- ii. Nyamaluma is generally responsible for collecting and summarizing monitoring data for all Units, and sharing the results with external stakeholders. Nyamaluma staff can do this efficiently because they use computer technology. However the role of Nyamaluma is to assist Units in using their data at the Unit. It should not be seen that the monitoring data is only for people outside the Unit.
- iii. Information flow can break down at any point in the chain. For example, at the camp data forms can get torn or dirty. At the Unit headquarters they can become misplaced. In transit to Nyamaluma they can get lost or mis-directed. At Nyamaluma they can become misplaced or entered in to the computer incorrectly. When there is a breakdown in one part of the information chain, all the work by other people in other parts of the chain becomes wasted.

## 5) Basic Concepts: Direct Measures vs. Indices

- a. DEFINITIONS
  - i. Direct measure – something which is counted or measured directly
  - ii. Index – measuring one object to tell us something about another object
- b. EXAMPLES
  - i. Direct measure – demographic counts, financial record keeping
  - ii. Index – trophy size, hunt effort, search time, poacher camps, carcasses, dung piles, etc.
- c. ADVANTAGES AND DISADVANTAGES
  - i. Direct measure
    - 1. Advantages
      - (a) gives good information
    - 2. Disadvantages
      - (a) can take a long time
      - (b) expensive
      - (c) labor intensive
      - (d) just takes a "snapshot" of the system
      - (e) some things are impossible to measure directly (e.g., attitudes)
  - ii. Indices
    - 1. Advantages
      - (a) cheap
      - (b) if done right gives pretty good information
    - 2. Disadvantages
      - (a) we usually don't know how good the information is
      - (b) requires more data
      - (c) usually only able to measure changes over time instead of absolute quantities
- d. PROPERTIES OF GOOD INDICES/INDICATORS
  - i. Directly related to the object of interest
  - ii. Sensitive
  - iii. Measurable
  - iv. Objective

## 6) Basic Concepts: Sampling vs. Measuring Whole Population

- a. DEFINITIONS
  - i. Sampling – only a part of the area/population is observed/measured
  - ii. Measuring whole population – every member of the population is measured
- b. EXAMPLES
  - i. Sampling – field patrol observations
  - ii. Measure whole population – client questionnaire

## 7) Basic Concepts: Measurement and Unit of Analysis

- a. MEASUREMENT
  - i. Monitoring is all about measurement. Measurement can be quantitative (numbers) or qualitative (text).
  - ii. Sometimes you need a tool to help you measure something, such as a tape. Other times you just need your eyes and ears. These observations are still considered a kind of measurement.
  - iii. Often recording the spatial aspect (i.e., location) is a very important part of measurement.

- iv. Examples of measurement: measuring size of a trophy, asking how many people live in a household, weighing the amount of fish at a fishing camp, estimating the area of a grid which has been burned, etc.
  - v. Measurement should be objective. A measurement is objective if two people come up with the same result. Objectivity is important if we want to measure the same thing again in the future to look for a difference or trend.
- b. UNIT OF ANALYSIS
- i. The thing that we measure is called the Unit of analysis. It could be an animal, a person, or a grid.

## 8) Basic Concepts: Sampling

- a. WHY SAMPLING IS NEEDED
- i. When we don't have the resources to measure the whole area/population, we have to take a sample. Sampling can save a lot of time and money. If done correctly, sampling can give us almost as good results as if we had measured the whole population. For example, we can't measure the size of every animal in the GMA, but we can measure the ones which have been shot by hunters, and this gives us almost as good information.
- b. REPRESENTATIVENESS
- i. Definition: a sample is representative of the whole population when the members of the sample have not been selected in such a way that leaves out a certain part of the population
  - ii. A sample can be of unrepresentative when it is not chosen properly. For example if we only have field patrol observations from one camp, their field patrol results won't give us a true picture of the whole GMA. If we only survey community attitudes from households who live near an ADMADE school, we won't get a true picture of the whole GMA.
  - iii. Selecting members randomly can help ensure that the sample represents the whole population. This is why transects have to be selected randomly, and household surveys are often selected randomly.
  - iv. Summaries of monitoring data won't be meaningful unless we know how well our sample represents the entire population. We need to think about how our sampling might effect our summary. For example, if we only survey attitudes about ADMADE from people who live in the Chief's village, we might not have a true picture of the whole GMA. If we suspect that our results might be off because of sampling, we should report it when we present the analysis.
  - v. Stratification is sometimes needed is used to make certain our sample will include all of the important groups within the population. We decide on the groups for our stratification based on some characteristic such as gender or vegetation type.
- c. SCALE
- i. Temporal scale refers to how often and for how long we measure things. For example, if we only have field patrol data for the dry season, will that give us a true picture of poaching activity?
  - ii. Spatial scale refers to what part of the GMA is measured/visited. If the Professional Hunter avoid taking his clients to the hills, will the safari monitoring results really tell us how the wildlife is doing in the GMA?
  - iii. The temporal and spatial scales we need to use depend on the reason why we are collecting the data. If we want to know how ADMADE is helping to improve household food security, we may only need to do a survey once every three years. However if we want to know how wildlife is doing so that we can set the annual quota, we need to take measurements more often.

d. **SAMPLE SIZE**

- i. The size of our sample is important. If our sample is too small, it may not give a true picture of the population.
- ii. There are mathematical formulas which can help us determine how big a sample should be, but it often takes someone with advanced training to calculate the minimum sample size.
- iii. Even when a sample is not big enough or is not representative, it doesn't mean that our monitoring data is useless. It only means that our summaries of the monitoring data can not be extended to describe the whole population.

e. **SAMPLING METHODS**

- i. To make a sample, we first need a list of the entire population. The population could be grids, households, fishing camps, poachers, etc.
- ii. We can make a random selection of the population by drawing names out of a hat, rolling dices, selecting every nth member, etc.

**9) Basic Concepts: Extrapolation/Inference**

a. **WHEN DO WE NEED TO EXTRAPOLATE DATA?**

- i. When we want to know something about the whole area/population but we have measured less than the whole population

b. **ASSUMPTIONS EXTRAPOLATION IS BASED ON**

- i. The sample is representative of the whole population
- ii. Good sample size
- iii. If these conditions are not met, we should not try to extrapolate the monitoring results. For example, if we know how many snares were found near the village, can we multiply this amount by some factor to know the total number of snares in the GMA? No – because snaring is probably more common near village than in far away areas.

**10) Basic Concepts: Errors and Confidence Limits**

a. **INACCURACY IN MEASUREMENT**

- i. Dataforms sometimes have mistakes. These can be caused by human error when making a measurement, writing it down, copying it to another piece of paper, or entering it into a calculator or computer. Some types of mistakes can be spotted, but others can not.
- ii. Examples of mistakes: recording the same group of animals twice, writing down the incorrect grid number, forgetting to put down some information, etc.
- iii. Training can help prevent mistakes, however the best way to prevent mistakes is close supervision of the data collection activity.
- iv. If a mistake is not caught, the effect of the mistake will spread when you do an analysis. However if the mistake is spotted and the record remove, the effect will not spread.

b. **CONFIDENCE LIMITS**

- i. Confidence limit refers to how much we trust the results of our monitoring data. Many things can affect our confidence in our data. We may suspect the data has mistakes in the recording, or we may think that the sample is not representative or not big enough.
- ii. When we report our analysis, we should state how much confidence we have in the results. Confidence can be stated qualitatively (by describing the possible errors) or quantitatively (using statistics).
- iii. How much confidence we have in our monitoring data is particularly important when we are trying to detect trends. For example, if for one hunting season we get a very low average for trophy size, however we suspect that there were some problems in calculating trophy sizes

that year, it will be very important to note this because that data will continue to be used for the next 3-4 years when looking for trends in trophy size.

- iv. We can improve the confidence we have in our data if more than one indicator shows the same trend. This is known as triangulation

### 11) Basic Concepts: Trends

#### a. DEFINITION

- i. Trend: a consistent change in one direction. Usually to detect a trend we need 3 or more years of data

#### b. IMPORTANCE

- i. When managing wildlife or community development programs, we often want to know about how things are changing. For example, we need to know if wildlife populations are increasing or decreasing, if household incomes are increasing or decreasing, or if attitudes are getting better or worse. Sometimes the trend is even more important than the absolute quantity.
- ii. When we are monitoring indices instead of direct measurements, often all we can tell from the data is a trend. For example, trophy size can not tell us how many animals are in the GMA. However if we have several years worth of trophy size measurement, we can tell if the number of trophy animals in the GMA is increasing or decreasing.

### 12) Basic Concepts: Triangulation

#### a. DEFINITION

- i. Triangulation is the practice of using more than one type of monitoring data to answer a question.
- ii. Triangulation gets its name from a navigation technique use in the bush

#### b. IMPORTANCE

- i. Often we don't have enough confidence in our indicators to trust them completely. For example, we may want to use hunting success to find out whether the number of animals in the GMA is increasing or decreasing, however we know that there are many other things that can affecting hunting success, such as the skill of the professional hunter and the time of year. However if other indicators, such as trophy size and hunting effort, also show the same trend as hunting success, then we can have more confidence in our conclusion from hunting success is correct.
- ii. Triangulation is quite important when you use indirect measures in monitoring. If your indicators don't agree, it's better to make the most conservative conclusion about the data. Likewise, if you only have one or two indicators, then you also have to be careful in how you interpret the results because one of the indicators may be off and you might not know it.

### 13) Data Forms

#### a. ADMADE DATA FORMS

- i. Data forms are at the heart of ADMADE's monitoring system. Data forms help to (1) remind us what were supposed to write down, (2) make sure everybody collects data in the same way, (3) gives us a permanent record for storage.
- ii. Nyamaluma has developed a series of data forms which meet most of the information needs of Units. These data forms are presented in the ADMADE Data Form Manual.

b. DATA FORM MANAGEMENT

- i. Data forms are the property of the Unit, and should be treated with as much as care and attention as you would treat other Unit property such as firearms or financial documents.
- ii. Data form management has been a big problem in most ADMADE Units. A lot of work of scouts and Unit staff has been wasted because data forms were not managed properly. Managing data forms is not difficult, most of the time data forms are not managed carefully because of carelessness.
- iii. Proper data form management is required at all stages, from before the data forms are even filled out, to when they are stored for future use. Before data forms are passed out, they should be numbered. When a scout or other person is issued a dataform, the number(s) should be recorded in the Data Form Tracking Sheet. When returned, data forms should be inspected by the Unit leader or Deputy, signed, and filed appropriately. Usually, data forms should be put in separate folders according to year.
- iv. Even after they have been analyzed or summarized, data forms should be properly filed and stored. They may be needed again in the future.

**14) Dissemination**

a. IMPORTANCE

- i. Data forms don't do any good if they're just sitting in a file cabinet. In order for them to be useful, monitoring information must be delivered to the people who need it.

b. PEOPLE WHO NEED ACCESS TO MONITORING DATA

- i. Accountability – Unit leader, FMC, CRB, bookkeeper, Chilanga
- ii. Recommending hunting quotas – RMC, Unit Staff, PH, Chilanga
- iii. Land use planning – CRB, RMC, CDC, Unit Staff
- iv. Planning anti-poaching operations – Unit staff, RMC
- v. Identifying projects – CDC, FMC, CRB
- vi. Public education – whole community
- vii. Working with court system – Unit Staff, RMC, police, command HQ

c. MEANS OF DISSEMINATING MONITORING DATA

- i. Reports
- ii. Public meetings
- iii. Posters & flipcharts
- iv. Drama
- v. School programs

**15) Skills: Analyzing Safari Hunting Data**

a. SAFARI HUNTING MONITORING DATA FORMS

- i. SAFLICE
- ii. HUNTREC
- iii. TROPHY
- iv. CLIENT

b. SUMMARIZING DATA WITH MAPS

- i. The Unit HQ or RMC can maintain a cumulative summary of safari monitoring data using base maps. Use one base map for each type of data (e.g., kill, bait, disturbances, etc.). Cumulative base map summaries should be kept in a binder if possible.

- ii. Use hash marks each time the object is encountered in the grid. On the back of the base map record which hunts have been already recorded on the map so that a hunt isn't accidentally record twice.
  - iii. At the end of the year, create a finished version of the map by coloring in the grids according to the number of hash marks. Use a consistent color scheme for all maps. You can also make a flip-chart size version of the map.
- c. TABULAR SUMMARIES FROM SAFARI MONITORING DATAFORMS
- i. SAFLICE – hunting success, hunting effort
  - ii. TROPHY – average trophy size
  - iii. HUNTREC – huntable trophies not hunted, grid locations
  - iv. CLIENT – disturbances
  - v. See the Quota Setting Manual for sample worksheets and more details on calculating hunting statistics
- d. HUNTING STATISTICS LEDGER
- i. The hunting statistics ledger should be maintained to keep a permanent, organized, record of hunting statistics from year to year. See Quota Setting Manual for more details.

#### 16) Skills: Analyzing Field Patrol Monitoring Data

- a. FIELD PATROL DATA FORMS
- i. FLDPAT1
  - ii. FLDPAT2
- b. SUMMARIZING DATA WITH MAPS
- i. The Unit HQ or RMC can maintain a cumulative summary of field patrol monitoring data using base maps. Use one base map for each type of data (e.g., poacher camps, species sightings, patrol locations, etc.). Cumulative base map summaries should be kept in a binder.
  - ii. Use hash marks each time the object is encountered in the grid. On the back of the base map record which patrols have been already recorded on the map so that a patrol isn't accidentally record twice.
  - iii. At the end of the year, create a finished version of the map by coloring in the grids according to the number of hash marks. You can also make a flip-chart size version of the map.
- c. TABULAR SUMMARIES FROM FIELD PATROLS
- i. Average patrol length
  - ii. Average number of scouts on patrol
  - iii. Total patrol man-days, patrol man-days per month for regular scouts and village scouts
  - iv. Number of arrests, total and average per patrol
  - v. Confiscated objects: total and number of per patrol

#### 17) Skills: Presenting Results

- a. OPTIONS FOR PRESENTING INFORMATION
- i. Orally
    - 1. Advantages
      - (a) requires less preparation
      - (b) reaches everyone, regardless of their education or language ability
      - (c) can be entertaining
    - 2. Disadvantages
      - (a) ideas may be presented disorganized
      - (b) easily forgotten

- (c) can be distorted when repeated
    - (d) sometimes boring
  - 3. Appropriate for
    - (a) informal presentations
    - (b) education programs
- ii. Descriptive text
  - 1. Advantages
    - (a) can capture difficult concepts, qualitative findings
    - (b) won't be distorted when copied
  - 2. Disadvantages
    - (a) preparation time
    - (b) difficult to reproduce
    - (c) difficult to present to large groups
    - (d) can't reach illiterate people
  - 3. Appropriate for
    - (a) Reports
    - (b) Flipcharts
    - (c) Summarizing main points of a talk
- iii. Tables
  - 1. Advantages
    - (a) can organize lots of data
    - (b) good for simple figures (e.g., income)
  - 2. Disadvantages
    - (a) difficult to see the 'big picture'
    - (b) may not be understood by all
    - (c) may require supplementary explanation
  - 3. Appropriate for
    - (a) when its important for the actual figures to be known (e.g., financial data)
    - (b) matrices
    - (c) educated audiences
- iv. Charts
  - 1. Advantages
    - (a) usually easily understood
    - (b) interesting to look at – more likely to be remembered
    - (c) can be posted permanently – message continues to be delivered
  - 2. Disadvantages
    - (a) take long time to produce
    - (b) specific values difficult to read
    - (c) may require supplementary explanations
    - (d) only works with quantitative data
  - 3. Appropriate for
    - (a) displaying data showing trends (bar and line charts)
    - (b) displaying data showing comparisons (bar charts)
    - (c) displaying data showing proportions (pie charts)
- v. Maps
  - 1. Advantages
    - (a) easily understood
    - (b) interesting to look at – more likely to be remembered
  - 2. Disadvantages

- (a) takes the longest time to produce
- (b) may require supplementary explanation
- (c) can only show one variable per map, can't show trends very easily
- 3. Appropriate for
  - (a) displaying simply data where the spatial aspect is important

### 18) Skills: Preparing Graphs and Flipcharts

#### a. CREATING GRAPHS

- i. Pie charts
  - 1. Plan the look in advance
  - 2. Use a formula to calculate angles of each slice
  - 3. Don't use too many pie slices
  - 4. Combine small slices together
  - 5. Use colors to differentiate slices
- ii. Bar and line charts
  - 1. Plan the look in advance
  - 2. Draw axes first, then calculate the scale for each axis
  - 3. Practice on graph paper
  - 4. Bar charts easier to see from a distance than line charts
  - 5. Make a legend

#### b. CREATING A FLIP CHART

- i. Flipcharts should be prepared in advance of the meeting or presentation. Allow plenty of time to make flipcharts. One flipchart can take from 10 minutes to an hour to draw, depending on how complex it is and how carefully its done.
- ii. Design your flipchart first on scrap paper. Keep it simple – one topic only per page.
- iii. Minimize the amount of text on a flipchart. Main topics only.
- iv. Use pencil to draw guidelines, then use a marker. Use colors if possible to make it more interesting.
- v. Make it big enough so that people five meters away can clearly see everything.
- vi. Leave space on the flipchart for adding comments and remarks during the meeting

### 19) Skills: Mapping Data

#### a. USE OF MAPS

- i. Maps can be an effective way to present monitoring results. They are easy to understand by most people and quickly show relationships between the features in an area (e.g., distance to roads or rivers) and the problems in that area.

#### b. MAKING A PRESENTATION MAP

- i. Decide what to put on the map – keep it simple, one topic only.
- ii. Material required – flipchart paper, markers, pencil, time
- iii. Allow plenty of time to draw the map, at least 1 to 2 hours per map.
- iv. Tracing the outline from a master copy. Use pencil first and then marker. Use colors if possible to make it more attractive.
- v. Use clear colors, symbols, labels, etc. to make the map easy to understand.
- vi. Remember to make a legend.

## 20) Using Monitoring Information: Quota Setting

- a. SEE QUOTA SETTING MANUAL

## 21) Using Monitoring Information: Public Education

### a. DEFINITION OF PUBLIC EDUCATION

- i. Public education: any time people from the local community learn something about ADMADE
- ii. Public education doesn't have to be only in schools. Public education should be built into every community function
- iii. Public education doesn't have to be lectures. Posters, presentations from theatre groups, and information conversations, are all examples of public education
- iv. Public education is a two-way process. We learn from others in the community and they learn from us.
- v. Education is a life-long process. There are no 'experts'. We should never think we have learned all there is to know.

### b. EXAMPLES OF PUBLIC EDUCATION

- i. Public meetings
- ii. Theater presentations
- iii. School programs
- iv. Informal discussions
- v. Posters

### c. IMPORTANCE OF PUBLIC EDUCATION

#### i. Building Community Cohesion

1. ADMADE can only be successful if the community works together. We have many examples where different groups of people in a Game Management Area were not working together causing the whole area to suffer (e.g., people who don't benefit from projects may continue to support poaching).
2. Education helps people work together. It does this because
  - (a) People feel like a team when they all have the same knowledge
  - (b) People have more trust and confidence in the strategy of the program when they understand it completely
  - (c) People are able to have more input into a program when they understand what rights and responsibilities they have
3. We know from experience that ADMADE works best in GMAs where the community works democratically. Education is an important part of democracy.

#### ii. Creating allies in the community

1. When people understand and support the concept of ADMADE, they can provide assistance to the program. Assistance can include providing information about poaching, donating time or resources to community development projects, altering land use practices to be more wildlife-friendly, resolving conflicts with scouts or wildlife in an appropriate manner, reporting problems with scouts or illegal resource use, participating in ADMADE committees, etc.

#### iii. Developing the community leaders of tomorrow

1. School children are going to be the leaders of tomorrow. Or they may become the poachers of tomorrow if we fail to educate about them different ways wildlife can be used.
2. Children can influence their parents and relatives. By teaching school children, we may also reach other members of the family.

d. SAMPLE MESSAGES FOR PUBLIC EDUCATION PROGRAMS

- i. ADMADE is a program that is a partnership between government, the community, and the safari industry. Each partner receives a benefit from the program and each partner has a specific role to play.
- ii. The money for community development projects comes from safari clients.
- iii. There are several community-based organizations that have been set up to help the community play its part in ADMADE (i.e, CRB, VAG, FMC, AMC, CDC). Each organization has a specific function to play. Members of the community should understand these organizations and use them to make their voice heard.
- iv. How safari revenue is spent is left to the community. Proper management of finances is an important issue that all members of the community should be interested in.
- v. The safari industry depends on the production of wildlife. Animals need certain things to live: food, water, and space. Some land-use practices conflict with the needs of wildlife, however others don't.
- vi. Poaching threatens healthy populations of wildlife, and is a wasteful use of wildlife compared with safari hunting. Poaching benefits one or two people at the expense of the whole community.
- vii. To stop local people from poaching we must find ways to meet their food security needs. To stop outside poaching, we need good village scouts to do anti-poaching operations.
- viii. Village scouts are employees of the community. Village scouts who work hard should be respected and assisted. Village scouts who are lazy should be expected to do better.
- ix. Villagers have certain rights when it comes to dealing with conflicts with wildlife. There are appropriate and inappropriate ways of dealing with wildlife conflicts.

e. PLANNING PUBLIC EDUCATION

- i. To be effective, education programs have to be
  1. organized
  2. simple
- ii. Ineffective education programs are quickly forgotten and don't result in any change in people's behavior. Unless people's behavior change, our education efforts are not effective.
- iii. The key to making public education effective is proper planning. Without proper planning, education may be disorganized and incomplete. The steps in planning are:
  1. Think about the audience
  2. Select a topic
  3. Think of the most important points to cover (keep it simple)
  4. Plan how you're going to deliver the message
- iv. The golden rule of teaching:
  1. Tell them what you're going to teach (i.e., introduce the topic)
  2. Teach them (i.e., explain it in detail)
  3. Tell them what you just taught them (i.e., summarize)
- v. Evaluation is an important part of education. Evaluation doesn't have to be formal or complicated. The questions you ask in evaluation include:
  1. Did the message get across?
  2. Why, or why not?
- vi. Education is a long process. Don't try to cover everything at once. You may have to go back and review the topic more than once before it really sinks in.

- f. SCHOOL PROGRAMS
  - i. Teachers are required to cover specific topics by the Ministry. However it is not difficult to include topics on natural resources, management, into subjects such as science, social studies, and even mathematics.
  - ii. Most teachers are excited about getting new material to help them teach more effectively.
- g. USING MONITORING DATA IN PUBLIC EDUCATION
  - i. Monitoring information can support an educational message, but is not the message itself
  - ii. Monitoring information is an effective way to support educational messages because it is
    - 1. relevant (i.e., concerns the community)
    - 2. timely
  - iii. Examples of monitoring information which can support public education:
    - 1. Financial reports – money spent on projects
    - 2. Safari monitoring data – population trends, revenue, hunting policies, quotas
    - 3. Results from client questionnaires – disturbances to the safari industry
    - 4. Field patrol data – land use patterns, poaching pressure
    - 5. Demographic data – population growth, immigration and emigration
  - iv. Groups within communities can get involved in research. For example fishermen can keep track of their catches. Students can keep records on household food stocks. CBD agents can record demand for family planning services. Honey collectors can be given base maps and asked to record where they see wildlife or habitat disturbances. These can all be used for public education and planning.

## **22) Using Monitoring Information: Co-Management Plans**

- a. ABOUT CO-MANAGEMENT PLANS
  - i. A co-management plan is an agreement between the community and government
  - ii. “Co” comes from the word ‘cooperation’. It means that several stakeholders will work together to manage the resources in the GMA.
  - iii. “Management” includes activities which determine how the resource will be used, how it will be protected, and how it will be monitored.
  - iv. Co-management plans should cover all natural resources in the area, not only wildlife, including fish, forest products, and minerals.
  - v. Co-management plans are required under the 1998 Wildlife Act. A co-management plan is required in order for communities to continue to get benefits from safari hunting.
  - vi. Co-management plans are legally binding and hence should be realistic. The community should not promise to do things they aren’t capable of. Likewise government departments and other stakeholders should not promise to do things they aren’t capable of.
  - vii. Co-management plans must be signed by all stakeholders involved in managing the resource. This includes local government, traditional rulers, central government, private companies, and the community.
  - viii. Community Resource Boards are the representatives of the community when developing a co-management plan. However they should not be the only ones involved in developing the co-management plan.
- b. ELEMENTS OF A CO-MANAGEMENT PLAN
  - i. The co-management plan should have a separate section for each type of resource (forest resources, wildlife, fisheries, minerals, etc.)
  - ii. Each section of the co-management plan should include:
    - 1. A description of the resource (inventory)
    - 2. A map showing the distribution of the resource in the GMA

3. A list of the different stakeholders of the resource (e.g., users, managers, legal stewards, etc.). Stakeholders should include both organized groups (e.g., forestry department) as well as non-organized groups (e.g., women, honey collectors). The “community” usually is not a stakeholder by itself, because the “community” can be broken down into smaller groups based on gender, livelihood, wealth, access to land, etc.
  4. A description of how the resource is currently being used and whether that use is sustainable.
  5. A description of how the resource is currently being protected
  6. An action plan for improving the use and protection of the resource. The action plan should clearly state the responsibilities of each stakeholder.
  7. A plan for how conflicts between stakeholders over use and management of the resource will be resolved.
  8. A plan for how the resource will be monitored.
  9. A plan for how the co-management plan itself will be periodically reviewed and adapted if needed.
- c. DEVELOPING A CO-MANAGEMENT PLAN
- i. Identify a small team of individuals to oversee and be responsible for development of the co-management plan.
  - ii. List resources in the GMA and stakeholders. See note in previous section about defining stakeholders.
  - iii. Assemble all available information on resource use, protection, inventory, etc.
  - iv. Identify new information needed and collect if possible.
  - v. Prepare profile of each resource.
  - vi. Schedule a workshop for all stakeholders to develop co-management plan.
  - vii. After a plan has been agreed upon, organize open meetings to educate the public on the plan
  - viii. Getting help on developing a co-management plan (e.g., Nyamaluma, NGOs, CBNRM program).
- d. INFORMATION NEEDS FOR DEVELOPING CO-MANAGEMENT PLANS
- i. Information on each resource must be collected and compiled before the co-management plan workshop
  - ii. Resource inventory - how much of each resource, trends
  - iii. Resource distribution – where it is
  - iv. Current resource use – where and how much, sustainability
  - v. Current management – practices, constraints, needs
  - vi. Filling in the gaps – gathering new data
    1. Surveys & interviews
    2. Measuring resource use

## Appendix V - Advanced Scout Training Workshop Notes

### ADMADE ADVANCED MONITORING WORKSHOP NYAMALUMA INSTITUTE 11-19 MAY, 1999 STUDENT NOTES

#### Roles of Village Scouts

Village Scouts have many different functions or roles. All roles are important. To do only one and ignore the others will not bring success to the Unit. These roles of Village Scouts include:

**Law Enforcement** As wildlife officers, scouts must enforce wildlife laws in the Unit. This includes arresting poachers and ensuring that safari clients only hunt the animals they have paid for. Operations where Law Enforcement is the primary aim include anti-poaching patrols, investigations, and safari monitoring. In Law Enforcement, scouts are working something like police officers.

**Monitoring** As monitors, scouts are the eyes of the Unit. In this way, they are acting like doctors, trying to get information about the problems in order to help the community find good solutions. Monitoring simply means “collecting data”, and is part and parcel of many of the scout operations in the Unit. Operations where monitoring is one of the key aims include safari monitoring, field patrols, crop damage survey. This workshop introduced three new types of operations where monitoring is one of the key aims: the snare survey, waterhole patrol, and fish camp patrol

**Education** In education, scouts are acting like teachers. Education is important if ADMADE is to succeed, because if people don't know how the program works then they can not solve the problems. Village Scouts have a lot knowledge about animals and about ADMADE. If they share this information with people in the community through civic education, then it will make their jobs easier and give the program a chance to succeed.

#### What Can We Do With Monitoring Information?

“Information” can be defined as *what we know about something*. “Information Use” can be defined as what we **do** with that information. There is a big difference between just having “information” and “using information”. Just because we collect information doesn't mean that it will be useful to anyone. For example, if data forms just get packed into a filing cabinet and are never taken out, then those data forms will not be helping anyone. To be helpful, information has to be **used** for something. For example, making a decision such as quota setting, planning field operations, or civic education.

Village scouts collect a lot of information as part of their job. This includes information about field patrols, safari hunting, crop damage, poacher case records, and so on. Data forms are used to help scouts write down information so that other people can know what they have seen.

Information collected by Village Scouts can be used by many different people and for many activities. Some of these are described below:

**Setting quotas.** We use hunting statistics (e.g., hunting success, hunting effort, trophy size, number of clients), client questionnaire, observations from hunts, and knowledge from PH, scouts, trackers. These help us to determine if animals are increasing or decreasing so we can decide if the quota should be increased, decreased, or kept the same.

**Planing field patrols.** To help us plan anti-poaching patrols so that they will be most effective, we need to know where poachers are active, what methods they are using, and when they are poaching. This information is needed by the scouts, Unit leader, and RMC.

**Finding and preventing mismanagement and corruption.** Data forms help us to know if scouts are using their rations and ammunition properly. We can also know how much money the Unit is earning from safari hunting, so we can see if money is being used wisely. Good monitoring can help prevent mismanagement because people will fear to be caught when they know there is good monitoring of activities in the Unit.

**Prosecuting poachers and defending wildlife officers in court.** Monitoring data is sometimes used in court as evidence, to prosecute poachers or defend scouts.

**Plan community development** People will not support ADMADE and scouts if they do not benefit from community development. The information collected by scouts can help the Community to decide which development is needed most, and to know how much money will be available to do projects.

**Help make a land-use plan.** A land use plan tries to identify the major problems in the Unit, and how those problems can be solved. Scouts have a very important role to play in making land use plans, because they are the ones who collect data about wildlife, disturbances, crop damage, poaching, and resource use.

**Advertise Zambia as a good hunting destination.** In order to encourage clients to come to Zambia, PHs and ZWA need to advertise Zambia as a good hunting destination. Monitoring data, such as hunting success, can be used to help clients decide if they want to hunt in Zambia.

**Negotiate Concession Leases.** Community Resource Boards can help decide which safari operator should be in their area. Monitoring data such as hunting statistics can be used to help determine if the safari operator has been good or bad.

## Qualities of a Good Dataform

completeness – all part of a form should be filled in where ever needed

accuracy – data entered onto a form should be reasonably accurate. For example grid numbers indicated on forms must be accurate.

consistency – the data on the form which is to be the same must not conflict. For example the dates on the Safari Hunting Daily Record sheet and that on the Trophy Measurements sheet must match for each animal hunted

delivered – a good data form is that which is finally handed over to the right officers or offices

clear – a data form must be clearly filled-in so that it can be easily read without confusion. Good hand writing is also important

timeliness – a good data form should be handed over to the relevant people without delay

## Snare Survey Patrols

Snaring is a big problem in many areas. Snaring is a problem because it kills animals indiscriminately and only benefits one person at the expense of the whole community. Compared with safari hunting, snaring is also a wasteful way to use wildlife.

Snaring is done mostly by local people. Local people may snare because their food security needs are not met, or they don't support ADMADE because they don't benefit from ADMADE.

Communities can take certain actions to reduce snaring. Increasing patrols is one action, but there are many others. If the reason for snaring is food security, the CRB can use their money for food security projects, such as supporting farmer groups, helping small business, or bee-keeping. If the reason is ignorance, the Unit can use civic education to reduce snaring.

The purpose of a snare survey is to help us to better understand snaring. Without snare surveys, it is difficult to know for certain if snaring is increasing or decreasing, because the number of snares found can depend on so many things, such as the number of scouts on patrol the number of days of the patrol, and the time of year. A snare survey is supposed to be done in a very consistent manner so that we can be certain that the search is always similar.

A snare survey is a bit similar to a transect. You should be able to complete one or more routes in a day. The steps to doing a snare survey include:

1. Select routes in your area where you suspect snares. Routes can be along streams, paths, etc. Don't pick routes that will be difficult for you to visit.
2. Visit these routes on a snare survey from time to time. 3 to 4 scouts should be on the patrol. Scouts should walk about 5 meters apart in an extended line.
3. When the group finds a snare, they should stop and search the area for more snares. If they don't find more snares, they should only spend about 5 minutes searching and then continue on the route.
4. Make a dot on the base map where a group of snares is found and give that dot a location number.
5. On the snare survey data form, for each location number enter the number of snares found, the amount of time spent search, and whether there were any animals in the snare
6. Fill out one Snare Survey data form for each route. On the back of the Snare Survey data form draw a sketch of the route, being certain to indicate the grid number where the route is located. Also attach a base map to the data form with the routes visited indicated.

## Special Monitoring Patrols: Fish Camp Patrols and Waterhole Patrols

In many Units, fishing camps and waterholes are very important land use issues. Many of the problems we have with conserving wildlife occur around fishing camps and waterholes.

For example, fishing camps can be a problem because fishermen may use snares or poison near the fish camp. Also fishing camps can disturb animals who want to come to the river to drink during the dry season. Fishermen sometimes use nets where the holes are too small, which means they catch too many fish. This depletes the resource. Fishermen may also cause other disturbances, such as tree cutting, bush fires, or farming near the river.

Serious problems can also occur around waterholes, especially in the dry season when animals use the waterholes frequently. Poachers often go to the waterholes to find animals, which hurts the safari hunting and decreases the money from safari hunting. Other people are also attracted to waterholes, such as honey gatherers, tree cutters, and farmers. These people can cause other disturbances near water holes, such as snaring, gardens, or fires. With so many disturbances, animals may just decide to move to a different area. The professional hunter may also decide to stop taking clients to the area near the waterhole because the animals have been depleted.

These problems can often be solved by the community through various actions such as civic education. Communities can also decide to move fishing camps closer together or require that fishermen have licenses. Scouts can also increase anti-poaching operations in these areas. However the community needs good monitoring information about the problems around fish camps and waterholes before they can decide which actions to take. Monitoring is also needed to see if the actions are working to solve the problem.

To get information about fish camps and waterholes, scouts can make special patrols, called Fish Camp Patrols and Waterhole Patrols. The primary aim of these special monitoring patrols is just to gather information that can be used by the community to solve the problems. From time to time, scouts should visit the fish camps and water holes in their area, just to collect information which can be used in land-use planning. Information you should record about fishing camps and waterholes includes:

### Fish Camps

- Number of fishermen
- Location
- Do the fishermen have licenses?
- Type of fish being caught
- Types of nets being used
- Disturbances around the fish camp, such as snares, fires, poison, gun shots, etc.

### Waterholes

- Location
- If the waterhole has water
- Snaring activity
- Signs of poisoning
- Other disturbances or other animals that use the waterhole

To record these special monitoring patrols, use the Field Patrol Data Form. On the front side, cross out FIELD PATROL and write FISH CAMP PATROL or WATER HOLE PATROL. Fill out the data form the same way you would for an anti-poaching patrol, but on the back side record your observations at the fish camp or waterholes. You can use the columns where you would normally indicate species sighted to record your observations.

Also, attach a base map to your data form which shows the location of each waterhole or fish camp that was visited on the patrol. Remember, the main purpose of these patrols is to collect information, not law enforcement, so try to visit as many places as possible.

## New Licensing System

Beginning in 1999, a new licensing system is being tested in four hunting blocks: Mwanya, Chanjuzi, Chifunda, and Lunga-Busanga. If successful, this licensing system may be expanded to the entire country in 2000. Below are some of the main differences between the new licensing system and the old licensing system

Old License System	New License System
client pays all fees before the hunt	client pays GMA and concession fees before the hunt, but pays license fees <i>after</i> the hunt
separate safari hunting license for each animal	no individual licenses – replaced with the combined license form
scout monitor records the license numbers on SAFLICE	Monitors do not put license numbers on SAFLICE. However all other sections of SAFLICE are filled in as normal
all money gets deposited into the WCRF	the money for the community (35% & 40%) is deposited directly into the community's bank account
quota is kept track of in Chilanga	Quota is kept track of at the Unit. A ledger book is kept at the safari camps and the Unit Headquarters. Each time an animal is shot, the ledger is updated.

## Civic Education

Civic education is one of the roles of village scouts. Civic Education is important because it is one of the methods we can use to reduce poaching. It can also improve public relations and understanding of ADMADE. Civic education can help the community improve land use plan practices, and make the best use of benefits from safari hunting. Education about wildlife and ecology is important because we can not manage the resources sustainably unless we know how they work.

The first step to doing civic education is to select the group you want to work with. Groups in the community include schools, church groups, clubs, peer groups, women groups, and VAGs.

The second step is to consider is the topics you want to cover with your group. You should cover topics that you have knowledge about and an interest. Some suggested topics include:

**children** – wildlife identification, animal behavior, habitat, disturbances to animals, how people benefit from animals, how people can harm animals, and how animals can harm people, how ADMADE works

**adults** – different sources of money (fees) and how they are divided, the negative effects of snaring and poaching, new ADMADE structures, benefits of safari hunting, land-use problems and solutions, monitoring results, importance of family planning

### Teaching Children Versus Teaching Adults

After you have selected the group you want to work with and thought about the topics, the third step is to think about the approach you want to take. Children and adults have different learning styles. These are summarized below:

Children	Adults
need to be entertained	are interested in serious matters
accept information easily	don't believe at first. Need to learn for themselves
short attention span	can sit for a while
like activities, role playing, games	prefer discussions
learn things quickly	go through a learning process: <ul style="list-style-type: none"> <li>• awareness</li> <li>• interest</li> <li>• evaluation</li> <li>• adoption</li> </ul>

Activities that are good for children include indoor games (e.g., What Animal Am I?), outside games (e.g., Predators and Prey), quizzes, songs, and drama. These activities are not difficult to lead if you come prepared.

Activities that are good for adults include facilitated discussions, reviews of monitoring data, and drama. Adults can also learn from their children. It can take longer to get adults to learn something new, so you have to go slowly and be patient.

### Qualities of a good facilitator

A good facilitator guides but does not control the discussion. A good facilitator gets everyone involved and goes slow enough so that everyone understands. A good facilitator isn't afraid of admitting a mistake. A good facilitator has good presentation skills, for example he speaks clearly and looks at people when he's talking. Finally a good facilitator is always prepared and knows what he wants to teach.

### Qualities of a Good Presentation

A good presentation has an introduction that describes the topic. A good presentation also involves audience participation. A good lesson also includes an introduction and at the end which summarizes the topic. Good presentations don't try to present too much at once.

## Base Maps

Base maps are one of the most important data forms that scouts have. Scouts should be very familiar with base maps because they use them to find their grid location on field patrols and safari hunting monitoring. In addition, base maps can be used for the following monitoring purposes:

**special monitoring patrols** For special monitoring patrols, such as snare survey patrols, waterhole patrols, and fish camp patrols, you should attach a copy of the base map to your dataform. You should put dots on the base map to indicate where you saw a fish camp, water hole, or snares

**safari monitoring** For each client, there should be one base map filled out and attached to the safari hunting dataforms (e.g., SAFLICE, SAFHUNT, and TROPHY). On this base map, you should put a dot to mark the location of each animal shot. These dots should be labeled to show which species was hunted there

**species monitoring field patrols** Each camp should keep one base map for each species which is being monitored. At the top of the base map, you should write the name of the camp and the name of the species. So if for example, the scouts in a camp are monitoring five species, they will keep five base maps at the camp, once for each species. Each time a field patrol returns, the recorder should indicate on the appropriate base map where animals were seen.

**field patrol effort monitoring** Each camp should keep a separate base map at the camp to keep track of where scouts from the camp have gone for patrol. Each time a patrol returns, the recorder should make a tick on the base map in those grids that were visited by the patrol. When the base map becomes too cluttered, begin a new base map.

## Work Plans and Targets

A target is your aim for operations. For example, you may say that for the dry season your camps should do 20 long anti-poaching patrols and 40 day patrols. At the same time, the target for your camp may also be to do 10 snare patrols during the dry season, 5 fish camp patrols, and 10 waterhole patrols. Your camp may also set a target to make 5 school visits, as well as other types of special community patrols.

Targets should be realistic. In other words you should pick targets which you think you can achieve. At the same time try to set high expectations for your camp.

A workplan describes how you plan to achieve your targets. For example, if your target for anti-poaching patrols is 20 long patrols, then your work plan could say you will do 4 long patrols per month for May-September. For each month in your work plan, try

Setting targets is helpful because it makes scouts think about what they want to achieve. It also helps them to set high expectations and allows them to explain to the Unit Leader and RMC members what they are doing.

If you fail to reach the target, then you can discuss what may have caused the failure. For example, maybe the target was too high. Or maybe there were problems that prevented the scouts from doing all the operations they sought to achieve. This can then help improve setting targets for the next season.

## Appendix VI - Additional Research Proposals

Below are outlines of some additional research studies that have been highlighted during this research.

### *Effectiveness of Training*

Training plays a large role in capacity-building in most CBNRM programs, including ADMADE. Over the past ten years, Nyamaluma training center has trained well over a thousand students in a variety of courses including village scout training, financial management, resource management, and specific skills such as leather craft and beekeeping.

Training is an attractive option as an intervention for CBNRM projects because it is attainable, serves an important need in the management of the program, and is popular with participants. A review of documents of CBNRM projects reveals that references to ‘capacity building’ frequently translate to training as the principle, and sometimes only, intervention. It is easy to fall into the perspective of viewing training as a panacea activity in any project which desires to devolve management responsibility to the community level.

Measuring the effectiveness of training, however, is a difficult task grappled by CBNRM programs. Like evaluation activities in general, assessing the impact of training may be a low priority for project staff, and if it occurs at all may very well be initiated by a donor agency for accountability purposes. However projects like ADMADE, which have made a heavy investment in training, have much to gain from conducting a comprehensive review of their training activities. Aside from accounting for donor resources, an evaluation on training will likely lead to ways of making it more effective, efficient, and better targeted.

There has never been a comprehensive external review of ADMADE's training program, although more than one evaluation of ADMADE has recommended this (e.g., Mano Consultancy, 1998). Specifically, there is a need to examine Nyamaluma's methodology and accomplishments in training, focusing on questions such as:

#### *What motivates people for training?*

Participants who attend workshops and courses at Nyamaluma are most likely motivated by a variety of factors, including:

- a genuine interest in learning for learning's sake
- interest in visiting a different part of the country
- personal ambition to improve one's employment opportunities
- a genuine interest in being able to do one's job better
- a sense of prestige in being sent for training
- workshop per diem
- genuine belief in the values promoted by ADMADE
- requested to attend by local traditional leaders
- boredom
- attraction of having food and accommodation needs provided for

Instructors at Nyamaluma can certainly provide ample evidence of participant behavior and comments reflecting each of these types of motivation. While most participants are probably motivated by a mixture

of these factors, some factors are less likely to lead to the desired results of the training. A study of the effectiveness of ADMADE's training activities needs to start with a survey of why people attend training.

*How are people selected for training?*

Another determinant of the effectiveness of training is the method for selection of participants. In general participants are selected for courses by their host community, although increasingly Nyamaluma has set minimum qualifications for courses. The criteria community leaders may use to select participants for training falls along a theoretical continuum. At one extreme, participants may be selected purely on the basis of their connections with the local power structure, such as being a relative to the Chief or a headman. At the other extreme, participants may be selected based solely on their experience, character, and skills. Most participants are probably selected based on a combination of factors. However no one has tried to study the continuum of selection of participants for courses at Nyamaluma, another factor which likely impacts the effectiveness of training programs even before the course starts.

*How are participants' performance/behavior altered by training?*

There are plenty of stories of participants returning from training highly motivated, better equipped, and more confident, and subsequently improving their job performance. However there are a similar number of stories of participants returning from a course, packing their papers in their house, and never sharing their knowledge or improving their interest or performance in their job. Two reasonable questions are what percentage of participants fall into each of the above categories, and what are some of the factors that cause training not to have any perceivable impact on some participants? Perhaps the material for the course was not relevant or not understood. Perhaps the person's reason for attending the course had nothing to do with an interest in their job. Or perhaps there were other barriers in the community that no amount of training could have overcome. These questions have yet to be studied in a systematic manner, and could illuminate more effective strategies towards training.

*Do the course offerings at Nyamaluma cover all the needs of local communities?*

Nyamaluma has developed a wide range of courses. Some offered nearly every year, and others have only been held once during the life of the project. A simple question that has yet to be studied empirically is whether these courses cover the topics and skills needed by community members, and what percentage of the potential beneficiaries in ADMADE areas have been reached.

*What is the perceived value of training in communities?*

As CBNRM programs such as ADMADE strive to become more and more independent of donor input, a pertinent question is how do members of communities perceive the benefits of training programs, and to what degree are they willing to invest in their own training. The experience of many development projects has demonstrated that in general there is a strong correlation between the perceived value of an activity and willingness to invest one's time and/or resources.

With its long history of training in CBNRM, ADMADE probably represents one of the 'high water marks' in terms of developing interest in training. ADMADE communities, which have training opportunities for ten years, have had ample time to gauge the number of benefits that are likely to result from attendance at courses. The questions of perceived benefit and willingness to provide more input into training can be studied. Although most courses held at Nyamaluma require participants to fund their own transport, for the most part training operations for the first ten years of ADMADE were made possible by donor funds. Many courses pay daily per diem as well, allowing participants to earn money while attending. During lapses in donor funding, communities did subsidize some of the operational expenses of courses, however the time is right for a study on whether communities perceive training to be valuable enough to the degree that they're willing to increase their contributions.

### *What are alternatives for delivering training?*

To a degree, education is a part of all community gatherings, including presentations by theater groups and community meetings. ADMADE relies heavily on personnel at the units, such as the Unit leaders, to organize and deliver the messages, with mixed success. However the vast majority of formal training in ADMADE is based at Nyamaluma. The strategy of centralized training is partly due to limited skilled manpower and financial resources, as well as the need to develop and test new course material. However centralization can also partly be traced to ADMADE's historical roots and management style.

There is a need to study the advantages and disadvantages of providing training for the whole country through a single institution, compared with alternative delivery mechanisms such as regional extension networks which are used by many other projects providing services to rural areas. Variables to consider include cost, effectiveness, and the number of participants that can be reached with each approach. Other training strategies worth evaluating include placing a greater emphasis on a training of trainers approach, and supporting community-initiated training activities in the GMAs.

The most appropriate method for delivering training is of course also dependent on the topic and type of training. Certain types of training, such as the large, long village scout courses, have different needs than shorter more specific courses such as financial management or agro-forestry. Some topics and audiences may require more follow-up in the field, while others are more site-specific or require more educational resources such as manuals and presentation aids. Recognizing its own limits as it tries to expand into new areas of service, Nyamaluma/ADMADE would benefit from an evaluation on the best way to support communities.

### ***Poaching and Bushmeat Trafficking***

Poaching activity is commonly grouped into three categories: subsistence poaching, commercial meat poaching, and commercial ivory poaching. ADMADE's collection of law enforcement records is a potentially useful resource in studying trends in the composition of poaching in Zambia. Other interesting questions include: What types of poaching are the ADMADE anti-poaching strategies most effective in reducing? and, What types of poaching pose the greatest threat to wildlife and the safari hunting industry?

Even within the three broad classes of poachers, additional research is needed to shed light on the deeper motivations for poaching. For example, "subsistence" poachers may be poaching because they need meat to eat, need meat to sell for food, need meat to sell for farming inputs, need meat to sell for beer, or because they come from a lineage of traditional hunters and their social standing is tied to being successful hunters. Consequently, certain types of interventions (such as creating opportunities for income generation) may be quite effective against certain types of subsistence poachers, but do little to address the needs of other poachers.

Similarly, interventions targeted at the second largest group of poachers, commercial meat poaching, will be most effective if the commercial meat poaching industry is understood better. Commercial meat poachers can be anything from small scale struggling city dwellers with aspirations for a better lifestyle, to larger operations organized by influential and wealthy businessmen or politicians, to groups tied to police and/or military networks and financed by non-Zambians. In some areas, commercial meat poachers conduct well-equipped expeditions into protected areas to hunt game. In other areas they mostly buy bushmeat from a network of local "subsistence" poachers. The effectiveness and efficiency of anti-poaching operations and other campaigns to reduce illegal hunting will have varying impact depending on the nature of the commercial meat trade, which in many areas is not well understood.

## ***Institutional Structure and Providing Support ADMADE Communities***

ADMADE has recently undergone something of a transformation in the way communities are organized and serviced. A few years ago, there was essentially one body at the community level to deal with (the sub-authority), and a relatively small number of management and development activities. Today, the sub-authority has been replaced with an elected Community Resource Board, supported by a Financial Management Committee, Resource Management Committee, Community Development Committee, multiple democratically elected Village Area Groups, and peer groups. Activities in ADMADE areas no longer include just annual quota setting exercises and planning infrastructure projects, but developing and implementing co-management agreements, facilitating participatory decision making, conducting democratic elections, agro-forestry and family health counseling, drama presentations, and developing land-use plans. Services being provided to communities by Nyamaluma have expanded to include technical assistance in organizing elections, electric fence projects, family planning services, agro-forestry extension, bee-keeping, family planning instruction, small business development, and training theatre groups. In addition to this expansion in community structures and types of services, Nyamaluma is also trying to strengthen its presence in the Kafue area GMAs as well as enter new areas where the introduction of ADMADE is desired by traditional leaders.

This growth is a tangible sign of ADMADE's success, but also raises several questions about the appropriate institutional structures needed to service a CBNRM program like ADMADE. In the past Nyamaluma has been almost the sole provider of services to ADMADE communities and direction of the program as a whole. This was primarily due to the lack of a strong presence of NGOs or other government agencies in the areas where ADMADE operates. However, the situation has also not changed much over the last ten years, in part because ADMADE has not made it a strategic objective at the program level to develop partnerships with other service providing government units or NGOs. This is partly due to the fact that ADMADE has until recently lacked a presence "in town" to cultivate partnerships with other organizations, but also partly due to a desire of ADMADE's leadership to keep the program autonomous and disentangled from other missions.

However the issues of partnerships with other organizations, the capacity of Nyamaluma and ZWA to provide the new array of social services to communities, and ADMADE's leadership structure, are among the issues which need to be reviewed as ADMADE expands both programmatically and geographically. ADMADE has always been distinctive among CBNRM programs in southern Africa because it is relatively donor independent (an estimated 70% of operational costs are covered by safari revenues). However can ADMADE fulfill its vision as a holistic conservation and development program and still remain relatively financially autonomous? Can a single facility such as Nyamaluma adequately provide such a diverse array of services to such a large operational area, and even if it could is this an efficient or cost-effective way of operating? Can ADMADE's leadership structure, which almost completely lacks middle-level management, cope with the new responsibilities and complexities of a program which seems to be growing exponentially every year? These are some of the institutional issues that will continue to surface, either directly or indirectly, over the next few years of ADMADE.

### ***Field Patrol Movements and Search Tactics***

One piece of the puzzle that would help make field patrol monitoring data more rigorous is detailed information on scout movements and search strategies on anti-poaching operations. Currently, there are a number unknown questions about field patrol data, such as:

- what sort of biases are built in to field patrol data?
- what types of phenomenon are field patrols most adept in detecting, and which observations are field patrols less likely to capture?

- what is the sensitivity rate for the various field patrol observations? In other words, how much of a change in X is required before we would expect to see changes in field patrol observations?
- are man-days or man-hours appropriate the appropriate units of search-effort? How much variance is there in detection probability for the standard unit of search effort?

Field research can provide empirical data to help answer some of these questions. Specifically, fieldwork can provide insight on:

- how do scouts pick the areas they patrol?
- what are the different types of search patterns used by scouts on anti-poaching patrols, and what determines which search strategy is used during each part of the operation?
- what is the detection range and probability for each type of observation and each type of search pattern?
- how much time is spent in each grid and how much of a grid is actually inspected during different phases of the operation?
- how accurate is the geo-referencing capability of scouts, and what is the appropriate spatial scale for recording observations?

To perform this study, an observer or a trained scout should accompany several field patrols and record data such as:

- a GPS track of the patrol
- time allocation for different types of activities (walking, searching, waiting, rest, etc.)
- patrol configuration and search strategy
- estimated detection range for the different phenomenon recorded (e.g., poacher camps, gun shots, snares, carcasses)
- other dynamics of the patrol, such as conversation, clumping, stalking poachers, etc., that might affect the monitoring function of the scouts

Results from this study would help improve scout training, monitoring, and planning anti-poaching patrols. It may also suggest new ways that field patrol data can be better analyzed to estimate trends and/or abundances of observed phenomenon.

### ***Cultural Forces in Conservation***

Even a cursory tour of ADMADE areas or observation at community meetings will reveal that there are dynamics at work in ADMADE that don't easily fit into a traditional development framework that predicts outcomes based on patterns in economic growth, ecological sustainability, improved household livelihood, institutional capacity, etc. While these elements are certainly important and in the long run probably the biggest determinants of success or failure, there are without a doubt other "social" or cultural forces at work in ADMADE communities. These other factors, which can greatly affect community attitudes and behaviors, include a perceived sense of empowerment, the comfort of being a member of a group, feelings of righteousness, cohesion developed by fighting for the common good, and encouragement/coercion from traditional leadership.

Cultural forces have always played an important role in ADMADE. Indeed in some ADMADE areas, the material benefits of the program are so scant for the average household, it would be difficult to ascribe support for the program as a result of development activities alone. Other aspects of the program, such as "support groups" for reformed poachers, and ubiquitous messages about the virtues of helping the Community, are also manifestations of the important role that cultural forces have played and continue to play in ADMADE.

ADMADE offers a good opportunity to study the influences of social and cultural forces in conservation programs. Exploring the non-material factors which influence people's support for conservation could result in more effective targeting of communication and education messages, determining the minimal amount of material benefits required to win hearts and souls, developing frameworks for introducing CBNRM into depleted areas — where communities must initially bear the costs of restocking wildlife — and determining the pace at which communities can accept change.

### ***Validity of Informant Data***

ADMADE has for years recognized the value of field experiences of scouts, professional hunters, and trackers in monitoring wildlife trends. These sources of information have been used on an informal basis for quota setting and identifying potential threats to wildlife. While "human sensors" who spend a lot of time in the bush no doubt are rich sources of information, it is difficult to evaluate data quality issues such as bias, accuracy, and interference in informant data. Studies from other fields have revealed that in general human memory is not terribly accurate and informant recall is of questionable value (e.g., Bernard 1984).

Nyamaluma has recently introduced a new method to more rigorously collect informant observations. The Population Trends Survey is a questionnaire on wildlife trends that is designed to be administered individually and consistently to scouts, professional hunters, and trackers. Once a sizable dataset is collected, analyses will be possible on agreement between observers, and consistency of answers for the same observer.

If informant data is to take its place as one of the standard tools of wildlife monitoring, further study is needed on the validity of this method. There are many potential confounds and biases in this method, including hearing stories from other observers, basing opinions on limited field experience, non-representative experiences in the bush, interference effects from the interview, or the unwitting interference from hidden agendas. The Population Trends Survey is a good start, but the results would be more meaningful if data was also collected on independent variables such as the amount of time spent in the bush, spatial distribution of the observer's experiences, and the nature of their activities in the bush.

Some information in Nyamaluma's database already exists on variables that could influence a scout's response to a questionnaire, such including the number of days on patrols, average duration, and location. Similar measures would be helpful for professional hunters and their trackers. Once sufficient data has been collected, correlations could be noted between scout's opinions and other variables, and between the opinions of different informers. Ideally, informant data could also be compared with other, more rigorous monitoring results, such as ground transects, aerial surveys, or hunting statistics. The study could also be expanded to include other people who spend a lot of time near animals, including honey gatherers, local hunters, and firewood collectors<sup>11</sup>. Results from the study could be used to identify which factors are likely to result in reliable observers, and how informant data can be best analyzed.

---

<sup>11</sup> e.g. see Marks' (1996) study on using local hunters to monitor wildlife