PN-ABZ-011

DESFIL
Development Strategies for Fragile Lands

THE COLLECTION AND USE OF INFORMATION FOR MANAGING USAID NATURAL RESOURCES AND AGRICULTURE PROGRAMS:

LESSONS LEARNED FROM THE DEVELOPMENT STRATEGIES FOR FRAGILE LANDS PROJECT

Contract No. DHR-5438-C-00-1090-00
DESFIL: Development Strategies for Fragile Lands

Submitted to:
United States Agency for International Development
Barry Hill, Project Officer

Submitted by:
William Fiebig
Ismael Ouedraogo
Bruce Ross-Sheriff
Michael Selhorst
Elizabeth Adelski

Chemonics International Inc.
Rodale Institute
Abt Associates Inc.
DATEX Inc.

August 1, 1996

1133 20th Street, NW, Suite 600, Washington, D.C. 20036
Phone: (202) 331-1860 • Fax: (202) 331-1871

TABLE OF CONTENTS

List of Acronyms iii
Glossary of Key Terms v

Introduction 1

Section 1 Conclusions and Recommendations 3

A. Women and NRM Programs 3
B. Information Needs 4
C. Indicators 5
D. The Core Dataset 7
E. Sampling Techniques 8
F. Integrated and Standardized Data Collection 9
G. Ground-Truthing Data Collection Methods 10
H. Data Analysis 12

Section 2 The Need for Information: Reporting on Progress and Managing for Results . . 15

A. Reporting on Progress 15
B. Managing for Results 15
C. Measuring Progress 17

Section 3 The Collection and Use of Information 19

A. Introduction 19
B. Indicators 21
C. The Core Dataset 23
D. The Activity Dataset 26
E. Sampling Techniques 26
F. Collecting Data for Performance Monitoring and Evaluation 33
G. Data Management 48
H. Data Analysis 50
I. Reporting and Disseminating Information 55

References Cited 59

Annex A USAID/Senegal: An Information Management System for Strategic Planning and Reporting on an Agriculture and Natural Resources Strategic Objective, by William Fiebig and Michael Selhorst

Annex B USAID/Niger: Designing and Implementing a Natural Resource Management Pre-Test Survey, by Elizabeth Adelski

Annex C INSAH/Mali: A Pre-Test Survey of Natural Resources Management, by Ismael Ouedraogo

TABLE OF CONTENTS, continued

Annex D USAID/Botswana: Reporting on Results: An Example from USAID/Botswana, by William Fiebig

Annex E Reports Produced by the DESFIL Project

ACRONYMS

ADS	Automated Directives System
AID/W	Agency for International Development, Washington, D.C.
ANR	Agriculture and Natural Resources
ASF	Area Sampling Frame
CBNRM	Community-Based Natural Resources Management
CILSS	Regional Committee to Control Drought in the Sahel
CIRAD	International Center for Agronomic Research for Development
CR	Rural Community (Communauté Rurale)
DESFIL	Development Strategies for Fragile Lands Project
DHS	Demographic and Health Survey
DRC	Domestic Resource Cost
DWNP	Department of Wildlife and National Parks (Botswana)
EDC	Eros Data Center
GDP	Gross Domestic Product
G/ENV	Environment Center of USAID's Global Bureau
GIS	Geographic Information System
GON	Government of Niger
GOS	Government of Senegal
GPS	Geographic Positioning System
IMS	Information Management System
INSAH	Institute of the Sahel
IR	Intermediate Result
KAP	Knowledge, Attitudes, and Practices
LAN	Local Area Network
LF	List Frame
LOP	Life of Project
MRI	Multiple Resources Inventory
NGO	Non-Governmental Organization
NMS	New Management System
NRM	Natural Resources Management
NRMP	Natural Resources Management Project
PADRES	Project for Applied Development Research in the Sahel
PM&E	Performance Monitoring & Evaluation
PMP	Program Monitoring & Performance
PRA	Participatory Rural Appraisal
PTS	Pre-Test Survey
PVO	Private Voluntary Organization
R2	Results Review (Report)
RCSA	USAID Regional Center for Southern Africa
RDB	Relational Database
RF	Results Framework
RP	Results Package
RRA	Rapid Rural Appraisal
SADC	Southern African Development Community
SECID	Southeast Consortium for International Development
SO	Strategic Objective

SOT	Strategic Objective Team
SPSS/PC	Statistical Package for the Social Sciences/Personal Computer version
UNDP	United Nations Development Program
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USG	United States Government

GLOSSARY OF KEY TERMS

Activity: An action undertaken to either help achieve a program result or set of results, or to support the functioning of AID/W or one of its missions. In a program context, i.e., in the context of results frameworks and strategic objectives, an activity may include any action used to advance the achievement of a given result or objective, whether financial resources are used or not.

Aggregate: To put together ("collapse") data from different sectors (such as men, women, households, communities, regions) into one category. For example: putting together data from men and women to have household-level data, or collapsing data from numerous households into community-level data. This requires organization beforehand, at the levels of data coding, collection, and computer input.

Baseline study: The first time that data on a set of indicators are collected; the benchmark for assessing change over time in following years.

Causal Relationship: A plausible cause and effect linkage; that is, the logical connection between the achievement of related, interdependent results.

Disaggregate: To separate data from different sectors (such as data from men, women, households, communities, or regions). For example: separating household-level data into men's and women's data. This requires organization beforehand, at the levels of data coding, collection, and input.

Evaluation: A relatively structured, analytic effort undertaken selectively to answer specific management questions regarding USAID-funded assistance programs or activities. In contrast to performance monitoring, which provides ongoing structured information, evaluation is occasional. Evaluation focuses on <u>why</u> results are or are not being achieved, on unintended consequences, or on issues of interpretation, relevance, effectiveness, efficiency, impact, or sustainability. It addresses the validity of the causal hypotheses underlying strategic objectives and embedded in results frameworks. Evaluative activities may use different methodologies or take many different forms, e.g., ranging from highly participatory review workshops to highly focused assessments relying on technical experts.

Follow-up Study: Data collection following a baseline study, using the same methodology and variables as the baseline study in order to assess change over time.

Gender: The social roles assigned to men and women based on their sex. The word "sex" is used to identify men and women biologically.

Ground-truth: A test run, a pilot, or a pre-test study. To test an instrument or activity in the setting where it will be used; to check ideas or methods in the real world.

Intermediate Result: A key result that must occur in order to achieve a strategic objective.

Lesson Learned: The conclusions extracted from reviewing a development program or activity by participants, managers, customers or evaluators with implications for effectively addressing similar issues/problems in another setting.

Participation: The active engagement of partners and customers in sharing ideas, committing time and resources, making decisions, and taking action to bring about a desired development objective.

Partner: An organization or customer representative with which/whom USAID works cooperatively to achieve mutually agreed upon objectives and intermediate results, and to secure customer participation. Partners include: private voluntary organizations, indigenous and other international nongovernment organizations, universities, other USG agencies, U.N. and other multilateral organizations, professional and business associations, private businesses (as for example under the U.S.-Asia Environmental Partnership), and host country governments at all levels.

Performance Baseline: The value of a performance indicator at the beginning of a planning and/or performance period. A performance baseline is the point used for comparison when measuring progress toward a specific result or objective. Ideally, a performance baseline will be the value of a performance indicator just prior to the implementation of the activity or activities identified as supporting the objective which the indicator is meant to measure.

Performance Indicator: A particular characteristic or dimension used to measure intended changes defined by an organizational unit's results framework. Performance indicators are used to observe progress and to measure actual results compared to expected results. Performance indicators serve to answer "whether" a unit is progressing toward its objective, rather than why/why not such progress is being made. Performance indicators are usually expressed in quantifiable terms, and should be objective and measurable (numeric values, percentages, scores and indices). Quantitative indicators are preferred in most cases, although in certain circumstances qualitative indicators are appropriate.

Performance Information: The body of information and statistical data that directly relates to performance toward overall USAID goals and objectives, as well as mission strategic objectives, strategic support objectives and special objectives. Performance information is a product of formal performance monitoring systems, evaluative activities, customer assessments and surveys, AID/W research and informal feedback from partners and customers.

Performance Monitoring: The process of collecting and analyzing data to measure the performance of a program, process, or activity against expected results. A defined set of indicators is constructed to regularly track the key aspects of performance. Performance reflects effectiveness in converting inputs to outputs, outcomes and impacts (i.e., results).

Performance Monitoring Plan: A detailed plan for managing the collection of data in order to monitor performance. It identifies the indicators to be tracked; specifies the source, method of collection, and schedule of collection for each piece of datum required; and assigns responsibility for collection to a specific office, team, or individual. At the AID/W level, it is the plan for gathering data on AID/W goals and objectives. At the mission level, the performance monitoring plan contains information for gathering data on the strategic objectives, intermediate results and critical assumptions included in an mission's results frameworks.

Performance Monitoring System: An organized approach or process for systematically monitoring the performance of a program, process or activity toward its objectives over time. Performance monitoring systems at USAID consist of, inter alia: performance indicators, performance baselines and performance targets for all strategic objectives, strategic support

objectives, special objectives and intermediate results presented in a results framework; means for tracking critical assumptions; performance monitoring plans to assist in managing the data collection process; and the regular collection of actual results data.

Performance Target: The specific and intended result to be achieved within an explicit time frame and against which actual results are compared and assessed. A performance target is to be defined for each performance indicator. In addition to final targets, interim targets also may be defined.

Pilot Study: A small-scale pre-test of an activity that will be implemented on a larger scale; a test run of an activity or process. The major objective of a pilot study is to identify and resolve theoretical and methodological problems before the activity is actually implemented.

Pre-Test: The term has two meanings: 1) to collect data to measure variables before an intervention has been implemented; and 2) a pilot study, as defined above.

Post-test: Collecting data to measure variables after an intervention has been implemented.

Qualitative Data: Prose; written descriptions and analysis.

Quantitative Data: Numbers; numerical or statistical descriptions and analysis.

Result: A change in the condition of a customer or a change in the host country condition which has a relationship to the customer. A result is brought about by the intervention of USAID in concert with its development partners. Results are linked by causal relationships; i.e., a result is achieved because related, interdependent result(s) were achieved. Strategic objectives are the highest level result for which an mission is held accountable; intermediate results are those results which contribute to the achievement of a strategic objective.

Results Framework: The results framework represents the development hypothesis including those results necessary to achieve a strategic objective and their causal relationships and underlying assumptions. The framework also establishes an organizing basis for measuring, analyzing, and reporting results of the mission. It typically is presented both in narrative form and as a graphical representation.

Results Package: A results package (RP) consists of people, funding, authorities, activities and associated documentation required to achieve a specified result(s) within an established time frame. An RP is managed by a strategic objective team (or a results package team if established) which coordinates the development, negotiation, management, monitoring and evaluation of activities designed consistent with: (1) the principles for developing and managing activities; and (2) achievement of one or more results identified in the approved results framework. The purpose of a results package is to deliver a given result or set of results contributing to the achievement of the strategic objective.

The strategic objective team will define one or more RPs to support specific results from the results framework. The SO team may elect to manage the package or packages itself, or may create one or more subteams to manage RPs. In addition, strategic objective teams create, modify and terminate results packages as required to meet changing circumstances pursuant to the achievement of the strategic objective. Thus, typically a results package will be of shorter duration than its associated strategic objective.

Results Package Database: A results package database consists of the data and information related to the actions, decisions, events, and performance of activities under a results package.

Results Review and Resource Request (R4): The document which is reviewed internally and submitted to AID/W by the mission on an annual basis. The R4 contains two components: the results review and the resource request. Judgement of progress will be based on a combination of data and analysis and will be used to inform budget decision making.

Sample: The part of a larger population that is studied; samples usually are designed to be representative of the larger whole.

Sampling Unit: A delimited, identifiable unit. "Men" could be the sampling unit, or "male household heads," or "women over 50 years of age." Other sampling units: households, communities, agricultural fields, forests recognized by the state, or regions.

Strategic Objective: The most ambitious result (intended measurable change) that a USAID mission, along with its partners, can materially affect and for which it is willing to be held responsible. The strategic objective forms the standard by which the mission is willing to be judged in terms of its performance. The time-frame of a strategic objective is typically five to eight years for sustainable development programs, but may be shorter for programs operating under short-term transitional circumstances or under conditions of uncertainty.

Strategic Objective Team: In general, a team is a group of people committed to a common performance goal for which they hold themselves individually and collectively accountable. Teams can include USAID employees exclusively or USAID, partner, stakeholder and customer representatives. An SO team is a group that is committed to achieving a specific strategic objective and are willing to be held accountable for the results necessary to achieve that objective. The SO team can establish subsidiary teams for a subset of results or to manage a results package.

Unit of Analysis: The level at which analysis is done. For example: at the level of individual men or individual women; at the household-level; at the community- or regional-level; at the level of individual agricultural fields, or household fields, or a village's communal lands; at the level of forests recognized by the state.

INTRODUCTION

The Development Strategies for Fragile Lands (DESFIL) project's work has focused on the conceptual and practical issues of managing information to monitor and evaluate the impact of natural resource management (NRM) and agriculture programs. DESFIL's conceptual work was concentrated in two major areas: how to design information management systems for Performance Monitoring and Evaluation (PM&E), and addressing the key methodological issues in monitoring and evaluation, such as sample design and data analysis, to show impact. The products of our work include a series of reports about designing information management systems for PM&E, designing the PM&E plan for USAID/Niger's natural resource management strategic objective (SO), a literature review of land-use management practices for fragile lands and the enabling conditions for their adoption, and an inventory of land-use management practices in West Africa.

DESFIL's work with the USAID Africa Bureau and field missions responded to the practical requirements of designing effective PM&E systems for NRM and agriculture programs, in order to generate the information needed to manage for and report on results in the reengineered USAID. This technical work allowed us to ground-truth and revise our conceptual designs for PM&E systems. DESFIL's technical assistance to the Africa field missions included conducting a pre-test survey of rural households' knowledge and use of NRM technology for USAID/Niger, assisting USAID/Senegal to develop and use a relational database for their PM&E system, and assisting INSAH/Mali with the sampling strategy for a pilot survey of natural resource management. The objective of our work has been to help missions design conceptually sound and practically doable PM&E systems to facilitate their managing for and reporting on results.

This DESFIL report presents lessons learned about collecting and using PM&E information, lessons that are directly related to designing and managing agriculture and NRM strategic objectives and results packages (RPs). The purpose of the report is to use DESFIL's experience to provide USAID officers and their partners, who manage SOs and RPs, with guidelines for organizing the process of PM&E. This process includes identifying a program's key information needs and indicators; deciding which methods to use to collect and analyze data from the field; creating and managing computerized databases; and sharing information. USAID officers need efficient PM&E systems to:

- Inform management decisions, such as allocating funds among RPs and revising an RP's objectives.
- Prepare results review reports on progress (R4s).
- Effectively manage for results.

The report consists of three sections and five annexes. Section 1 presents our major conclusions and recommendations about the collection and use of the information for PM&E, based on our field experience. Section 2 summarizes the USAID context for information management, which is the need to collect information to report on progress and manage for results. Section 3 is organized in terms of the steps in the monitoring and evaluation process, in order to explain the methods that are used in each step. Examples from DESFIL's work with USAID field missions illustrate the process of designing a PM&E system. The first four annexes

are case studies that discuss DESFIL's technical assistance to different missions — Senegal, Niger, Mali, and Botswana. The case studies provide detailed information about designing and using PM&E systems for reengineered NRM and agriculture programs. The fifth annex is a list of all the reports produced by the DESFIL project.

DESFIL is a project of the Environment Center of USAID's Global Bureau (G/ENV). The Productive Sector Growth and Environment Division of the Africa Bureau's Office of Sustainable Development (AFR/SD/PSGE) supported much of the work that was the basis for this report, through the DESFIL requirements contract. DESFIL was implemented through a core contract and a requirements contract with Chemonics International Inc. and through subcontracts with Rodale Institute, Abt Associates Inc., and DATEX Inc. The life-of-project was from September 1991 to September 1996. The original total estimated cost for the performance of the contract plus fixed fee was $3.4 million but, due to budget cuts, the amount obligated to DESFIL was only $2.8 million.

DESFIL's overall objective was to help improve strategies for fragile lands management in order to permit sustainable production from natural resources worldwide. This general objective included addressing the following aspects of fragile lands management: providing research and technical assistance to assess the policy, institutional, and technical aspects of fragile lands problems; documenting "lessons learned"; improving interdisciplinary approaches and methods for sustainable use; and preparing studies on the special topics necessary for understanding fragile lands. DESFIL's goals also were to increase the knowledge base about fragile lands management, improve technical assistance in this area, and disseminate the project's findings to the development community.

During the last two years of the project, three factors influenced DESFIL to focus on PM&E for NRM projects. These factors were USAID's reengineered requirements to show program impact and results; the conceptual and practical issues we encountered designing effective PM&E systems, particularly for NRM programs; and DESFIL's ongoing technical assistance in monitoring and evaluation to the Africa Bureau and field missions. The latter included field work with the missions to assist them with various aspects of designing PM&E systems. USAID's interest in DESFIL's work in PM&E grew as our technical assistance developed, and ultimately resulted in the request to focus our final report on the conceptual and practical issues with which we were working.

SECTION 1
CONCLUSIONS AND RECOMMENDATIONS

		Page
A.	Women and NRM Programs	3
B.	Information Needs	4
C.	Indicators	5
D.	The Core Dataset	7
E.	Sampling Techniques	8
F.	Integrated and Standardized Data Collection	9
G.	Ground-Truthing Data Collection Methods	10
H.	Data Analysis	12

This section presents the major conclusions of the Development Strategies for Fragile Lands project. Our conclusions and technical recommendations are based on our experience working with USAID missions to develop PM&E information systems for NRM and agriculture programs. We believe that these conclusions will be of practical value to others for designing and implementing PM&E information systems. USAID's management of Strategic Objectives and Results Packages relies on the collection, analysis, and use of information to monitor and evaluate program results. Managers use this PM&E information to make day-to-day tactical decisions, justify requests for different levels of support, and as a basis for decisions about allocating funds, personnel, and other resources for development. Therefore it is imperative that missions generate sound, useful information for management and for evaluating program results.

The organization of this section reflects the major steps in the process of organizing a PM&E system. The first step in the process is to define the SO's information needs. The next step is to identify the SO's performance indicators. The other steps for which we make technical recommendations include deciding on sampling techniques, pretesting data collection methods, and managing and analyzing data. First, however, we make a recommendation about the need for gender awareness in collecting and managing information for NRM and agriculture SOs.

A. Women and NRM Programs

A1. Conclusions

Despite decades of gender awareness, an effort still is required to include women as technicians <u>and</u> as respondents in programs that monitor and evaluate NRM and agriculture activities. Women with experience in surveys and interviewing can be found in developing countries, but women with technical training in NRM and agriculture generally are scarce. Men with experience in these areas are not rare in developing countries. Therefore, hiring women to work for PM&E in NRM and agriculture — even as short-term enumerators — generally is considered problematical because they require training, which in turn requires time and funds. Host country nationals generally prefer to hire men for data collection, even though (1) women in developing countries are agricultural producers and therefore natural resource managers; and (2) it is socially preferable to have women interview women.

Similarly, a real effort still is required to collect NRM and agricultural data from women and to represent them equitably in PM&E work. The fact that women in developing countries are agricultural producers and natural resource managers is sufficient justification for representing them equitably in PM&E research. The effort to train women technicians and survey rural women is well rewarded with rich data and information for sound programming. NRM is a social process and development personnel cannot understand how the process works unless they collect information from both major social actors: women and men.

Another powerful reason for collecting separate and equal data from men and women is a rule of data analysis: you can collect identical gender-specific data and aggregate it to the household level, but you cannot collect household-level data and then disaggregate it by gender.

A2. Recommendations

- Both men and women will require training in the specific methods used to collect data for a specific PM&E program, in order to ensure the quality of the data collection.
- USAID NRM and agriculture SO teams must work to build cadres of women with experience in NRM that donors can use regularly and over the long-term as PM&E technicians.

DESFIL examples:

- The women in one village in rural Niger reported that surveys usually focused on men and demanded to be interviewed, in order to add their information to our survey of NRM.
- Several female enumerators were hired for the NRM survey that DESFIL conducted in Niger. Their backgrounds in NRM and agriculture were limited, compared to the male enumerators. However, the survey experience showed that, due to the plethora of NRM techniques and terms that rural producers and donors use, and due to the mission's specific information needs, both classroom- and field-training in NRM were necessary for all the enumerators.

B. Information Needs

B1. Conclusions

PM&E must produce the information that managers need to manage activities and report on results. Designing a PM&E plan therefore begins with an assessment of the information needed for those purposes. Managers then can focus the PM&E work on the information needed at the program and activity levels. This helps to avoid collecting extraneous information. We emphasize that information needs are dynamic: managers must expect them to change over time, due to what the incoming information tells them about their program and field activities, and about the results framework (RF) and its hypotheses. Thus a program should first define its essential information needs and then organize its data collection and analysis accordingly. The incoming

information is used to reformulate the RF and development hypotheses, which in turn requires reformulating information needs. Change will be a constant in this cycle of using incoming information as the basis for reformulating information needs.

B2. Recommendations

- A systematic assessment of information needs must be the basis for organizing a PM&E plan for data collection and analysis. The plan must focus on the essential information needed to evaluate progress and impact.

- The information needs assessment must take into account how each stakeholder will use the PM&E information. The information is useful for a variety of purposes: to assess progress at the activity, results package, and strategic objective levels; and to inform management decisions about activities, RPs, and SO programs. The assessment also must take into account the resources (time, money, and capacity) that are available for data collection, management, and analysis.

- The information needs assessment must specify the types of data to collect as well as who will collect and manage it, the data collection and information dissemination schedule, and the training and other support that partners will need to implement the PM&E plan.

DESFIL examples:

- NRM indicators were the starting-point for designing the questionnaires for the Niger NRM survey, because they represented the SOT's key information needs. We found that it was necessary to design several questions to collect the information needed for each NRM indicator. These questions were the heart of the Niger NRM questionnaire and left little room for questions about other topics. Thus the questionnaire focused on the SOT's essential information needs: its NRM indicators.

- DESFIL organized a workshop for USAID/Senegal's NRM SOT and its partners to participate in identifying their information needs for reporting on results. A working group consisting of two representatives from USAID and each partner (NGOs, contractors, and the GOS) coordinated the iterative process of defining and refining the partners' information needs. The working group reported that when the mutually necessary information was agreed upon that they could proceed to identify the performance indicators needed to generate the information.

C. Indicators

C1. Conclusions

Monitoring and evaluation must be an iterative process, which starts by identifying key results in the RF and intermediate results in the RF's development hypotheses. The SOT relies on

its experience and a literature review to identify indicators for these results. The team should choose indicators that meet these criteria: (1) relevant to the site-specific conditions where the SOT is working, (2) practical to measure over time and space, (3) based on data that can be produced at an acceptable cost, (4) expressed simply for easy understanding, (5) can be produced in an acceptable time frame, (6) based on standardized measurements to allow comparisons across time and space, and (7) reflect measurable change.

The next step in identifying indicators is systematic field testing to determine if the candidate indicators fit these criteria. This is an essential step in finalizing NRM and agriculture indicators. The RF, its development hypotheses, and the information available when the RF and RPs are first written generally are not a sufficient basis for drafting practical, valid indicators.

Information to report on results generally is obtained from formal surveys that measure indicators before an intervention begins (baseline surveys) and again after the intervention has been operating (follow-up surveys). Managing RPs to achieve results requires revising the RF and development hypotheses during the course of the intervention. These revisions cannot be made using only the information about indicators produced by the baseline and follow-up surveys. Additional information from other types of studies (such as topical and community case studies) will be needed for a well-rounded understanding of how and why indicators change.

C2. Recommendations:

- Managers must identify indicators that can measure the status of the key results, assumptions, and conditions in the Results Framework. Managers must not try to design comprehensive sets of indicators that attempt to cover all levels of impact, performance, result, progress, process, and targets.

- Managers must invest adequate funds and time in the first year of the PM&E plan to identify and field test their candidate indicators, in order to produce final indicators that can be used to monitor results over time.

- Managers must plan and budget adequately to include special studies in their PM&E plans. In addition to the formal surveys that produce quantitative data on indicators, PM&E requires special studies such as topical case studies, community case studies, biophysical measures, and other types of data collection activities.

DESFIL examples:

- DESFIL's survey for USAID/Niger included field-testing the NRM indicator "percent of people using new NRM practices." The survey showed that there is no agreement among stakeholders (rural producers, USAID, partners) about the definition of "new" practices. The indicator therefore does not meet three of the criteria above — (1), (2), and (4).

- An RP team requested an activity to report on topsoil losses and sediment deposits in order to measure "decreased soil erosion," which was an intermediate indicator of improvement in agricultural productivity. The team found that understanding changes in soil erosion rates required commissioning a special study to document changes in rainfall, plant cover, and other factors.

D. The Core Dataset

D1. Conclusions

The PM&E systems established to manage agriculture and NRM activities up to the SO level depend on data collected by (1) partners (government units, NGOs, contractors) as a part of their implementation activities and (2) a separate activity that has PM&E as its major or only purpose. When SO and RP teams have more than one field activity contributing to the same result, they will have to aggregate data produced by these different activities. The difficulty of trying to aggregate different types of data from different sources is a common problem with PM&E. USAID/Senegal addressed this problem by developing a *standardized Core Dataset* for all the partners to use to collect the data that they will give to the SOT. The Core Dataset represents a consensus about (1) the standard definitions of concepts, technical terms, and variables; (2) standardized data collection methods; and (3) standardized data management methods (database software and structure). The partners use the Core Dataset's standardized variables and methods to produce the data that they share with the SOT. Partners are free to use their own definitions and data collection methods to develop their activity dataset and produce the additional information that they may need. The Core Dataset should consist of variables that the partners as well as the SO and RP managers need to monitor.

D2. Recommendations

- When the SOT identifies indicators for PM&E it also should specify (1) the data that will be needed to measure them; (2) the schedule for collecting the data, and (3) who will collect the data. If the data will be collected by field activity partners, such as NGOs or government agencies, then the SOT must negotiate a consensus with the partners regarding the method and schedule of the data collection. USAID may be required to allocate funds to partners specifically for data collection and management.

- When data from different partners must be aggregated to the RP and SO levels, USAID will need to provide funds and technical assistance to enable partners to produce and manage a standardized data set. The SOT must allow time for negotiating a consensus

among partners about the content and methods of the Core Dataset, and the time that partners will need to acquire the capacity to collect and manage the data.

DESFIL examples:

- DESFIL drafted a questionnaire for USAID/Senegal based on the variables in the mission's Core Dataset for its NRM SO. These variables included: household landholdings and perceived land tenure security, major cash and food crops, access to credit for agricultural production, knowledge and use of NRM technology, sources of information about NRM technology, and reasons for using or not using NRM technology. The questionnaire was field-tested and revised by DESFIL and all of the mission's NRM field activities to ensure its utility to collect information for the Core Dataset.

- USAID/Senegal's NRM program had generated large amounts of data from special studies done during the nineties. DESFIL's data management specialist converted these data into a format that will allow them to be used in conjunction with the data collected for the mission's NRM Core Dataset.

E. Sampling Techniques

E1. Conclusions

Information to assess change comes from surveying samples of people and biophysical variables. A random sample is necessary if the survey results will be generalized to people or variables outside the sample. (A random sample simply means that each unit on a list has an equal chance of being chosen, so that there are no biases in choosing the sample). A non-random sample is acceptable if the use of the information is more limited, such as some rapid insights about a new topic or place. Information from non-random samples also can be used to help design random samples.

Random samples are drawn from lists of people or places, or from maps. Random samples usually are drawn from lists (also called list frames) so that periodic resampling requires updating the lists to make them accurate, which may be costly in terms of time and funds. Drawing random samples from maps (area sampling frames) is a useful alternative to making accurate lists at the national or regional levels. Area sample frames can be used for several years once they are established. However, they are expensive to establish and experts to design them may be difficult to find.

Existing information is the first resource to use to decide about sampling techniques and sizes. It can be used to help determine appropriate sample size and to design a sample for accurate and cost-effective data collection. For example, existing information can be used to stratify a population, which generally improves the sample's representation of populations or places that have considerable variation.

E2. Recommendations

- Designing samples must begin with a thorough review of existing information.
- A random sampling method must be used if the data will be generalized beyond the sample.
- The SOT should consider establishing an area sample frame if its indicators will be measured at the regional or national levels over long time periods. Lists of people and places can be used to measure indicators in limited geographical areas. The ideal sampling strategy for long-term monitoring over large areas is to combine an area sample frame with list frames.

DESFIL example:

- Drawing a random sample of regions and villages for pretesting a survey questionnaire, or any other data collection instrument, is a simple and useful way to eliminate biases in choosing work sites. In Niger, using a random sample ensured that neither the expatriate nor the national staff made biased choices, such as choosing to work in villages that were near paved roads, close to home, where they had friends, or where development activities had been particularly successful.

F. Integrated and Standardized Data Collection

F1. Conclusions

A PM&E plan must consist of a set of complementary data collection methods, because **no one method is the silver bullet.** This means using a set of complementary methods to produce the information needed for monitoring and evaluation, including managing for results and assessing impact. Using complementary methods will produce different types of data, with different strengths and limitations, that together will tell the story of change. Managing for results certainly requires conducting formal surveys to produce quantitative data. Results management also requires using both informal data collection to produce qualitative data and biophysical measures to produce objective data. An integrated PM&E plan must include these complementary data collection methods in order to give the SOT and its partners a well-rounded perspective on impact and change.

Managing for results and assessing impact is done at both the activity and program level. Activity-level data about these topics must be aggregated to the program level. This is most efficiently done by standardizing data collection, as we discussed in the preceding Core Dataset section. Standardizing data collection methods means that a program's different field activities all must use the same variables, sampling techniques, data collection instruments, and data collection schedule. Standardization will produce data that can be compared directly among field activities

and aggregated easily to the program level. Standardizing data collection is essential to assess program-level impact and to give field level activities direct access to data about the larger picture of change and impact.

F2. Recommendations

- A program must identify its information needs as the basis for defining the integrated set of data collection methods needed for its PM&E plan. Combining different data collection methods to produce complementary data is necessary for all programs.

- Standardizing data collection methods requires an up-front investment of time and funds. The methods must be pretested before the actual data collection is done. Several months will be required to plan and field test the standardized methods. Time and funds for this task must be built into the PM&E plan.

- Standardizing data collection is only one part of standardizing the PM&E process. The process also requires using a Core Dataset, as well as standardized data management systems (software), data analysis, and reporting format. Standardizing the entire process of collecting, analyzing, and reporting information will facilitate the task of producing information and sharing it with partners.

DESFIL example:

- One of USAID/Senegal's RF objectives is "sustainable increase in household income." Based on consultation with the SOT and fieldwork with farming households in Senegal, DESFIL recommended an integrated set of data collection methods to measure progress toward this objective. The set of methods included: (1) formal surveys to produce a large database of quantitative data on topics such as the use of NRM practices, access to credit, and household material status; (2) formal surveys to collect anthropometric data, which are an objective measure of nutritional status; (3) biophysical measurements of major crop yields and soil quality; and (4) informal and participatory surveys to produce qualitative data on topics such as people's reasons for using or not using NRM practices, and their perceptions of changes in household income.

G. Ground-Truthing Data Collection Methods

G1. Conclusions

All of a PM&E plan's data collection methods must be pretested on a small scale before the actual data collection is done. This allows the stakeholders to ground-truth their hypotheses and methods in the real world where they will be used. PM&E is an iterative process of theorizing, designing methods to test the theories, collecting real-life data, and using those data to revise the hypotheses and methods in order to do a better job. Ground-truthing means systematically checking "USAID reality" with "local reality" in order to adapt USAID's methods to local

conditions. All the types of data collection activities that comprise a PM&E program must be pretested. Site-specific conditions—including a program's specific information needs, indicators, and strategic objectives—have a strong effect on how data collection should be designed and implemented.

PM&E plans often do not allocate adequate time and funds to pretest the components of their plans. As a result they skimp on pretesting. The consequence is poor quality data when the actual data collection is done, which produces unreliable information for management. Managers often recognize the need for pretesting after a major data collection activity begins and the work is delayed while funds and experts are sought to correct problems. "Trial runs" and "product testing" are built into the private sector's development plans and into scientific research; they should be built into USAID's PM&E programs as well. No data collection method works well the first time in untested conditions, so systematic pretesting always is necessary to produce good data.

G2. Recommendations:

- SO teams must examine the components of their PM&E plans and allocate resources to pretesting each one before the plan's budget and schedule are finalized.
- Both formal and informal data collection methods should be pretested on a small scale before they are implemented at the activity, RP, or SO level. Methods such as using an area sample frame instead of list frames for sampling or training technicians to measure biophysical variables also require pretesting.
- NRM indicators must be systematically field-tested to determine if they are practical, measurable, and appropriate measures of what they are intended to measure. There is no substitute for systematic field-testing for revising and finalizing indicators.

DESFIL example:

- USAID/Niger allocated seven months and $200,000 to DESFIL to do a Pre-Test Survey for their NRM SO. The Pre-Test Survey (PTS) was specifically designed and implemented to pretest each step of a large, national-level survey that the mission planned to do the following year. The PTS surveyed 135 households; the national-level survey planned to survey 1,500 households. DESFIL made numerous practical recommendations to the mission based on the PTS experience. We found that most of the NRM indicators were impractical to measure or not relevant to site-specific conditions (i.e., the mission's target figures already were exceeded). The PTS also showed which partners' technical capacity was insufficient, that both men and women enumerators required training in NRM to do their work well, and that local lists were available to draw the survey sample as an alternative to establishing an expensive area sample frame. USAID/Niger reported that the PTS report was an excellent document for assessing their NRM indicators and planning their national-level survey.

H. Data Analysis

H1. Conclusions

There are various analytical techniques for reporting on results for NRM and agriculture programs. Descriptive statistics (percents, means, medians) can be used to show how indicators change over time. Geographical analyses that use computerized mapping can show how indicators change in the dimensions of space and time. These analytical techniques are good to report on results although they do not show cause and effect relationships and therefore do not explain why results were or were not achieved.

Management decisions—working with the RF and development hypotheses to achieve results—should be based partly on understanding the cause and effect relationships in the RF. The SO and RP teams are expected to revise the development hypotheses and assumptions using data and experiences from their field activities. There are various statistical analytical techniques that can be used to test such hypotheses and assumptions. Techniques such as cost-benefit analyses, policy analysis matrices, systems dynamics, and geographic modeling can be used to identify assumptions that are appropriate for rigorous statistical tests.

The assumptions to be tested and the kinds of data that are available determine which analytical methods to use to test the development hypotheses. Cost-benefit analyses and policy analysis matrices can provide detailed insights into why farmers and other stakeholders in a specific agricultural system do or do not use different NRM practices. Regression analysis can be used to test cause and effect assumptions, if adequate time series data exist or can be collected from random samples. Regression analysis is particularly useful for testing assumed causal relationships between biophysical variables, such as the relationship between the use of fertilizer and soil erosion.

However, we point out that social, cultural, and economic dynamics are so complex that causal inferences must be viewed skeptically, even if they are the result of sound methodology. SO teams and their host-country colleagues must recognize that causal analyses do not necessarily lead to a clear and correct understanding of the complex socioeconomic factors that affect agricultural systems.

H2. Recommendations

- With the reengineered approach to agriculture and NRM SOs, management teams should employ analysts who are expert in descriptive and inferential statistics, and expert with methods such as geographic information systems, cost-benefit analysis, policy analysis matrices, and systems simulation. The analysts also should have expertise in analyzing agricultural and NRM data for the purposes of reporting on and managing for results.

- Data analysis experts should be involved early in the process of specifying key and intermediate results indicators, designing sampling and data collection methods, and choosing which development hypotheses and assumptions to test.

DESFIL examples:

- DESFIL designed the USAID/Niger NRM Pre-Test Survey to produce separate datasets for men, women, and villages. The men's and women's datasets were analyzed separately, to produce gender-specific information, and then the two datasets were combined, to produce household-level information. Designing identical questionnaires to interview men and women separately made these two levels of analysis easy to do. The village dataset contained identical data from nine "project villages" (with NRM projects) and nine "non-project villages" (without NRM projects). This enabled us to easily analyze and compare the data from project and non-project villages, and to analyze the village-level dataset as a whole. The three datasets (men, women, villages) also were coded to allow analysis by geographical region. Designing the survey and the questionnaires so that all these different analyses could be done was the key to easy, rapid data analysis after the survey was completed.

- DESFIL used the logistic regression technique to analyze USAID/Senegal's KAP data, to explore which variables were related to the use or non-use of NRM practices. The purpose of the analysis was illustrative: we used it to suggest which variables potentially were associated with the use of NRM practices. The analysis indicated that the use of compost is associated with these variables: villages that are marketplaces, the use of manure, a village school, and having a source of water.

SECTION 2
THE NEED FOR INFORMATION: REPORTING ON PROGRESS AND MANAGING FOR RESULTS

	Page
A. Reporting on Progress	15
B. Managing for Results	15
C. Measuring Progress	17

The reengineered USAID has adopted a results orientation, which is defined as managing to achieve results. This means defining clear objectives and targets, collecting information to assess progress, and adjusting programmatic strategies as indicated by the PM&E process. To meet USAID's reengineered requirements, managers must have access to information in order to track progress toward achieving their objectives and targets. This information is produced by identifying indicators that can be monitored during the life of a program. A well-designed information management system provides managers with information about the status of their activity(s) and the potential need for adjusting their intervention(s).

A. Reporting on Progress

Performance monitoring and evaluation, one of the three key functions of USAID's new operations system, is essential for achieving development results effectively and efficiently. PM&E can be used to assess progress, guide programming and resource allocation decisions, and report to stakeholders on results.

PM&E is a source of information about the effectiveness of the actions undertaken to achieve SO and RP results. It also is the basis for informed decision making by SO and RP teams.

SO and RP teams need information from their field activities because the teams are responsible for:

- Monitoring results that represent agreed-upon objectives with the next management level.
- Monitoring additional conditions or results needed to manage SO and/or RP activities.
- Answering questions and responding to suggestions from stakeholders within and outside USAID.
- Designing and implementing evaluations to assess the validity of the development hypotheses in the results framework.
- Recommending changes in expected results or in the results framework's resource levels.

B. Managing for Results

Strategic objective and/or result package teams must regularly collect, review, and use information on performance in order to effectively manage for results. At the AID/W and mission levels, information about performance can be used for both planning and management decision making. Sources of performance information include but are not limited to: performance monitoring systems; evaluations; research, customer surveys, secondary data and experience from other development organizations, and informal sources such as feedback from partners and customers.

Previous Page Blank

Performance information is used to manage for results by:

- **Improving the effectiveness and performance of development activities.** The SO and RP teams will monitor performance indicators and analyze data from them to assess progress toward results. The teams will use these analyses to decide how to adjust field activities' goals, objectives, and expectations as well as how to adjust the activities' technical approaches, timing, and levels of effort.

- **Guiding decisions on resource allocations.** Having established resource goals and a PM&E system, SO and RP managers will be able to take an active stance toward critical resource issues. Using the flow of PM&E information, management can make major or minor resource allocation adjustments that may be required to achieve goals or, if necessary, initiate actions early enough to avoid significant problems.

- **Revising and planning new programmatic strategies.** One objective of USAID's new management system is to establish flexible management units at the SO and RP levels. These units are fully responsible for, and have authority over, the resource allocation decisions needed to achieve their results within a specified time frame. If the original strategy decisions prove to be inappropriate, new strategies may be developed.

- **Developing shared visions, common understanding of successful approaches, and planning more effectively for the future with development partners.** An RP team will need ready access to information on the RP indicators, in order to make good use of the lessons learned, their resources, and their control of those resources.

- **Deciding whether to abandon programs, strategies, or objectives that are not working.** The RF is a management tool designed to focus the team on planned results and to organize the work necessary to achieve those results. PM&E information assists managers to take the necessary steps to ensure that program strategies are appropriate to achieve their program objectives, meet their targets, and report on results.

Requirements for Effective PM&E Information

- The information can be used to ensure program continuity through staff changes.
- The information can be used for standard auditing requirements and to respond to questions that arise during audits.
- Resources must be allocated to develop information feedback loops about the program's indicators and the methods used to collect data about them.
- The information must allow the ongoing assessment of RP progress. It must be returned efficiently to the RP team and manager so that they can adjust their RP interventions.

C. Measuring Progress

Performance monitoring, evaluation, and research are different ways of measuring progress and reaching conclusions about development programs and processes. These three approaches to assessing change can be linked and mutually informative, but methodologically they are somewhat different approaches to collecting, analyzing, and using performance data. They are different approaches to ensuring accountability, improving program management, and improving development understanding.

C1. Performance Monitoring

Performance monitoring is primarily relevant to management review, accountability, and improvement. It focuses on tracking progress in achieving planned results and analyzing the difference between actual and planned results. Performance monitoring generally is based on using a relatively small number of simple and practical performance indicators, and focuses on these performance indicators. Its greatest applicability is in tracking lower-level results as a basis for operational decision making. Effective performance monitoring requires managers and teams to clearly understand expected results, how these results will be measured (indicators), and how much change is expected (targets). Although performance monitoring may help to identify the key variables in an RF to track, it is not an appropriate method for testing hypotheses and showing cause-and-effect relationships. Thus, it cannot be used to assess the validity of the RF's development hypotheses and strategy.

Performance monitoring is useful to help managers and teams make decisions. It can help identify problem areas in which results are not being achieved, where changes in strategy may be necessary, and where more management attention may be needed. Performance monitoring also can help identify successes, the areas in which results are being achieved more effectively than expected, and where decisions also may be necessary. Performance monitoring indicates when resource decisions may be appropriate although it does not provide a formula for resource allocation that replaces management judgement.

C2. Evaluations and Research

Evaluations are done mainly to assess program impact. In the reengineered USAID, managers use the flow of information from monitoring performance indicators to evaluate progress. In contrast to performance monitoring, which is continuous, evaluations are conducted periodically. Evaluations generally focus on issues such as program effectiveness, impact, and sustainability. This is done by measuring program indicators before an intervention begins and after it has been operational for some time. Evaluations can be done using formal methods of sampling, data collection, and data analysis, which allows a program to report its impact in terms of quantitative measures and statistical analyses. Evaluations also can be done using informal methods, such as focus groups or Participatory Rural Appraisals, which generate mainly qualitative analyses of impact. Recommendations for adjusting a program's approach and tools often are included in evaluations.

Conducting "research" means that formal, scientific methods are used. Research generally consists of collecting and analyzing a broad range of data about development variables and outcomes. Research methods are appropriate to test hypotheses, validate theory, and investigate causal relationships. These methods can be used to measure change over time in human behavior, a key aspect of program impact, as well as biophysical change. Compared to performance monitoring and evaluations, research is best for analyzing **how** and **why** the development process occurs, because investigating these issues essentially consists of testing hypotheses and exploring causal relationships.

SECTION 3
THE COLLECTION AND USE OF INFORMATION

		Page
A.	Introduction	19
B.	Indicators	21
C.	The Core Dataset	23
D.	The Activity Dataset	26
E.	Sampling Techniques	26
F.	Collecting Data for Performance Monitoring and Evaluation	33
G.	Data Management	48
H.	Data Analysis	55
I.	Reporting and Disseminating Information	59

A. Introduction

The overall purpose of PM&E is to document change over time, meaning progress toward an SO, by documenting change in the program's indicators and other key variables. (A variable is something that can have more than one value, such as principal cash crops, sources of knowledge about NRM technology, expenditures on fertilizer last season). Some of the variables that a mission decides to track over time may be drawn from its RF, so that the information about change can be used in the short-term to assess and orient programmatic planning. The information about changes in NRM variables over time also can be used to evaluate the long-term results of NRM activities and programs. Given these important uses of PM&E information, missions clearly need good quality information.

There are several key characteristics that define "good information" for PM&E. Two important characteristics are that the user knows the degree of accuracy of the information and how well it represents the population from which it came. Some other important characteristics of good information are defined by the standard terms below. **Good information is** (or good data, which are the "raw" materials that are analyzed to become information):

- **Representative:** It fairly represents the population from which it came. This allows the user to generalize information from a small part of a population (a representative sample) to the larger population. Obviously, information from an unrepresentative (or biased) sample is dangerous because it leads the user to inaccurate conclusions about the larger population.

- **Valid:** The information collected actually is the information that was sought. A formal definition of "validity" is "the degree to which . . . observations actually measure or record what they purport to measure" (Pelto 1970). For example, interviewing farmers about sensitive topics such as their incomes or the number of livestock they own may produce pages of information, but there is no certainty that the information corresponds to reality. On the other hand, asking farmers about their ethnicity or the crops they cultivated last year probably produces valid information — information that does correspond to reality.

- **Useful to outsiders:** A report on NRM-related information includes a summary of how and where the information was obtained (a methods section), a glossary of key terms, and a guide to reading the tables.

- **Timely:** It is available when expected. This results from the researchers' expertise in allocating the correct amount of time to collecting and analyzing data, and to writing up the information. Underestimating the amount of time necessary to produce good information is a common problem with PM&E.

- **In budget:** The cost of producing the information matches the allocated funds. This also is the result of expert planning by people with experience in doing PM&E. Underestimating the amount of funds necessary to produce good information is another common problem with PM&E.

A PM&E program tracks change over time by collecting data that can be compared across time and geographical space. Therefore the data must be **standardized** — which means that the variables' definitions and the data's form must be the same in each data collection activity, in different times and locations. This is particularly true for the variables that are tracked with quantitative data. For example, if the variable "percent of men using NRM technology" originally is defined as "percent of men using NRM techniques to manage their private natural resources (land, trees, wells)" and later is defined as "percent of men using NRM techniques to manage private and communal natural resources (land, trees, wells)," the two datasets will not be comparable, because the first dataset could be missing some cases.

Standardizing variables' definitions is essential when an NRM program consists of several field activities and the program needs to compare and aggregate data from those different sources. The program-level needs to compare and aggregate data also makes a standard format for data obligatory. Essentially this means that activities and programs must use standardized definitions for variables, use the same instruments to collect their data, record responses in a standard format, and report the data in a standard format. Using the same software system to manage the computerized data facilitates this process. For example, the numerical codes to record responses on questionnaires and in computerized databases should be standardized: if "1=yes" and "2=no," then "0=no" is not an option.

Standardization also is important with qualitative data (written descriptions and analysis) for PM&E. The objective of collecting qualitative data for PM&E is the same: to collect comparable data over time, in order to explain change. Qualitative data (from informal surveys such as PRAs and RRAs) can be standardized, to some extent, by using standardized variables and data collection instruments. If a PRA collects information from men about the variable "cash crops" and only sometimes (or in some places) collects the information from women, the data to tell the story of change over time will have gaps. If the variable is standardized as "men's and women's cash crops" and the PRA method is standardized to interview both men and women in all locations, the story will be more complete. Collecting comparable qualitative data over time, within an activity and among different activities, thus requires using standard definitions for variables, using similar instruments each time data is collected, and reporting information in a standard format.

The purpose of this section is to explain the major steps in the process of collecting and using information for PM&E. The steps are presented in the order in which they must be done, which is the logical process of organizing and conducting research. The research process begins with identifying the indicators and other key variables that are the heart of a PM&E program, and the focus of its reporting. Therefore our discussion below begins with the topic of "Indicators."

B. Indicators

This sub-section defines indicators, presents the criteria for selecting them, and discusses their use. We do not provide a universal catalogue of indicators as they are specific to each results framework.

B1. Defining Indicators

An indicator is information that shows the status of a phenomenon or signals that a complex phenomenon exists. Indicators range from simple statistics to complex aggregated indices (Tunstall 1994). For example, change in the color of litmus paper is a direct indicator of change in an object's acidity; increases in a household's material possessions may be a direct indicator of an increase in household income. The proportion of men or women using compost is a simple statistic. The cost-benefit ratio for compost use in cereal production is an aggregated measure and the domestic resource cost of local cereals, which measures comparative advantage, is a complex index.

Socioeconomic and biophysical indicators exist at both the micro- and macro-levels. Examples of micro-level socioeconomic indicators are annual expenditures on modern agricultural inputs or the number of times a farming household obtained cash credit in a year. Both of these indicators could reflect change in a macro-level indicator: increased agricultural production. The micro-level indictor "the percent of farmers who adopt the NRM practice of composting" could be an intermediate indicator of increased agricultural productivity. Examples of macro-level biophysical indicators are deforestation rates, desertification rates, and aggregate soil erosion rates. Macro-level indicators consist of aggregated data from the micro-level.

B2. Proxy Indicators

A proxy indicator is a <u>substitute</u> indicator that is used to show changes in another indicator that cannot be measured directly. A proxy indicator thus is an indirect measure or reflection of another indicator. It is an "indirect measure to be used when data for a better, direct indicators are not available or feasible to collect at regular intervals" (USAID Workshop on Reengineering). A preferred indicator may be measurable in the future or change very slowly. In the meantime, a proxy indicator provides an indirect measure and can show if change over time occurs.

B3. Identifying Indicators

Identifying useful indicators is based on the user's information needs. Identifying indicators also is influenced by the types of data that must be collected about them. Identifying indicators is

an iterative process of theorizing, field-testing, revising, and reformulating the indicators as necessary based on incoming data. The data requirements for indicators are based on three critical elements: (1) the causal relationships assumed in the RF; (2) the need to express indicators simply and objectively; and (3) the cost of collecting the data. These critical elements influence the design of both micro- and macro-level indicators. Most indicators are more than simple statistics derived from one data point; usually they are constructed by aggregating several variables, which are in turn a combination of several data points.

B4. The Criteria for Selecting Good Indicators

There is no shortage of criteria for developing good indicators (Lewis and Petit 1995; Tunstall 1994; Anderson 1991; Weber 1991). An indicator for NRM or agriculture must be measured consistently to make comparisons over time and space. An indicator ideally should be:

- Directly related to the achievement of the SO based on the RF's development hypotheses.
- Expressed clearly for easy comprehension.
- Practical and measurable over time and space in a time frame appropriate to users' information needs.
- Developed from data that are available or obtainable at an acceptable cost.
- Objective and measured by standardized methods for consistent interpretation.
- Unidimensional.
- Disaggregated by sex and location.

As Tunstall states, "The best indicators are those based on solid scientific understanding of environmental processes and detailed knowledge of traditional and modern uses of land." The problem is that our scientific knowledge about environmental and natural resources issues is incomplete. "There is still considerable effort needed to understand the impacts of human behavior on natural systems, to determine and quantify cause and effect. [Thus,] indicators will need to be continually revised and improved, based on new knowledge and understanding of social and natural phenomena and continuous environmental monitoring."

B5. Using Information from Indicators

The reengineered USAID bureaus, missions, and partners have two essential, key information needs: (1) to monitor changing conditions, including those related to defined targets; and (2) to understand why changes are occurring, including whether the changes are expected and attributable to planned activities. This first information need is to report on progress, which means assessing progress toward an SO using baseline/follow-up information and defined targets. The second information need is to manage for results, which means evaluating change and the factors that influence it.

A practical proposition is to have missions choose indicators to meet these two information needs. This is more practical than identifying numerous indicators to assess a wide range of information needs such as impact, results, performance, progress, process, and targeting. If the SO and intermediate results in a strategic plan are measurable and show impact, then good

indicators of the SO will show impact. Another practical consideration may be identifying proxy indicators if the preferred indicators cannot be measured.

It is easier to identify indicators that reflect change in selected critical factors than to identify indicators that show why changes are occurring. Explaining the "why" of change must be done using research methods to scientifically test an RF's development hypotheses, which generally is not practical to do. However, the R2 requires both types of explanations and therefore necessitates identifying both types of indicators. Missions thus must identify both types of indicators although they are not required to report on all indicators below the SO and intermediate results levels to Bureaus.

The indicators used to report on an SO and intermediate results also should be appropriate to report on progress. These indicators may provide some understanding of why change has occurred but they will not provide a sufficient understanding of the cause and effect relationships in a RF. Missions probably will need to identify and report on indicators beyond the SO and the intermediate results in the RF in order to understand these causal relationships.

B6. Conclusions

- Missions must identify practical indicators that represent the key assumptions, conditions, and results of their strategic plan. A set of practical indicators must be designed to produce information about these key factors in order to focus on reporting on progress and managing for results.

- Indicators for reporting on progress are easier to identify than indicators for explaining why change is occurring or not (i.e., testing development hypotheses). The SO and RP teams' understanding of the factors that influence change will improve over time, which will enable them to refine both the development hypotheses and the indicators that they have chosen to reflect those hypotheses.

C. The Core Dataset

The Core Dataset represents data that is collected by SO field activities based on a consensus about (1) standard definitions for concepts, technical terms, and variables; (2) standardized data collection methods; and (3) standardized data management methods (database software and structure). The specific contents of a Core Dataset are based on the needs of the SO and RP managers to produce information about their RF/RP(s) performance indicators.

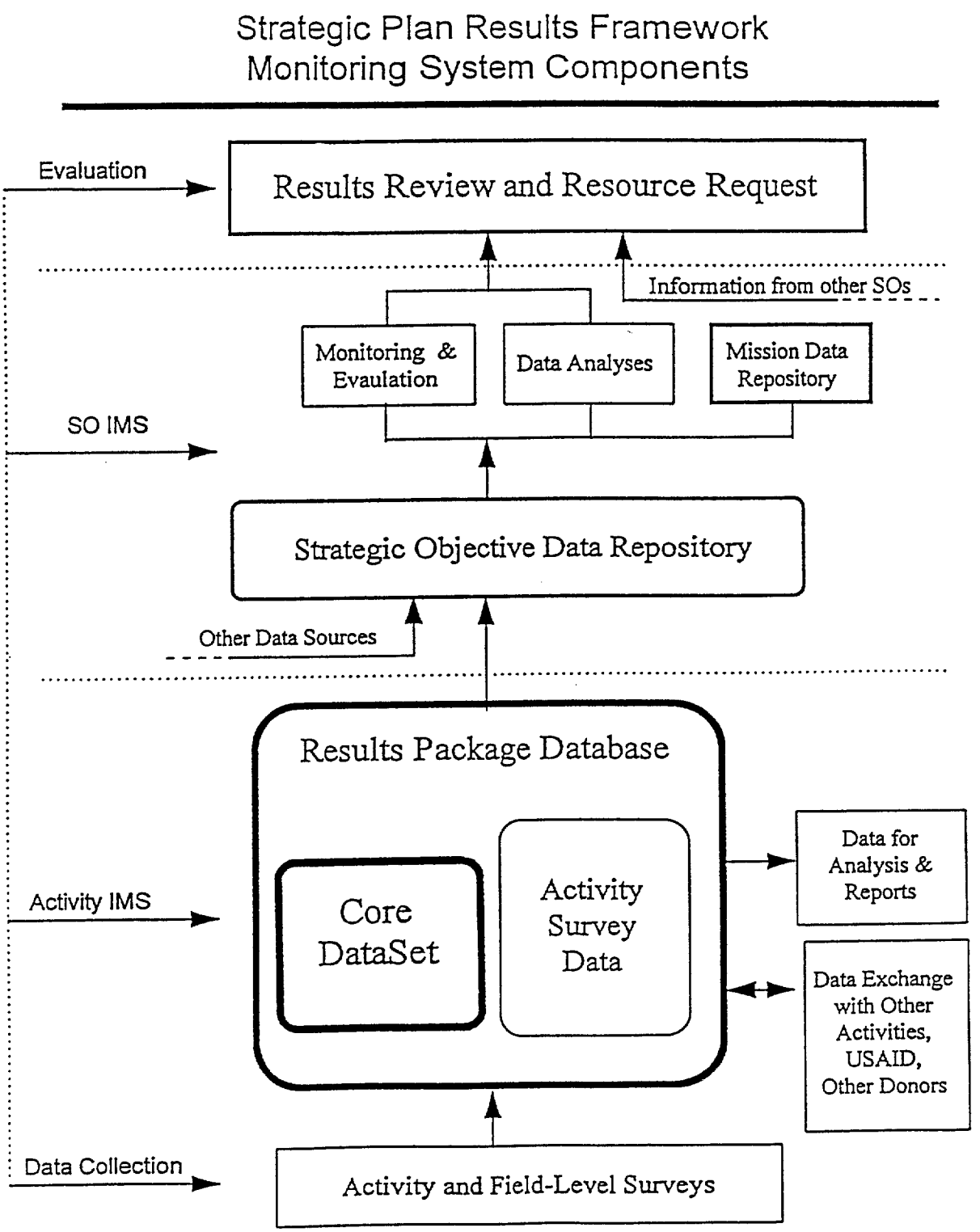
The primary purpose of the Core Dataset is to provide information about the adoption of NRM practices and other results achieved by the SOT in the USAID intervention zones. The Core Dataset provides information about the characteristics of farmers before and after the implementation of an activity's program. This dataset is designed to include data on factors that influence the adoption or non-adoption of NRM practices. The Core Dataset includes information about household characteristics and the use of NRM technology, by both men and women, as well as the reasons that practices have been adopted or not. A standardized Core Dataset can

provide information to compare activities in different regions and, when collected over time, can show changes in NRM behavior.

Program-level information that SO and RP teams need for PM&E is contained in the Core Dataset, which contains two types of performance indicators: socioeconomic and biophysical. Data collected on these performance indicators (or variables) enable SO and RP teams to report on progress and manage for results. Socioeconomic variables are operationalized as a set of questions in a questionnaire. Biophysical variables are operationalized as direct biophysical measurements. In order to aggregate data to the program level, all the SO and RP activities must collect information for the Core Dataset periodically, generally annually. The activities must use standardized questionnaires and methods for this data collection. Each activity also may use different methods to collect the additional data that is unique to their own reporting and management purposes. Thus, to develop the Core Dataset, SO and RP activities require:

- A standardized questionnaire, with standardized definitions and codes.
- Standardized biophysical measurement methods.
- Standardized sampling strategies.
- A standardized field methodology (administering the questionnaire and taking biophysical measures at the same time each year).
- A standardized relational database.
- Similar analytical methods.
- Standardized reporting formats.

The figure on the following page shows the components of a monitoring system that provides information from a core database. The information comes from the activities' field data. Each results package team should have a relational database that includes, at a minimum, the Core Dataset and any survey data (quantitative and/or qualitative) that the RP team feels is essential for its reporting requirements.


Strategic Plan Results Framework
Monitoring System Components
Evaluation
Results Review and Resource Request
Information from other SOs
Monitoring & Evaulation
Data Analyses
Mission Data Repository
SO IMS
Strategic Objective Data Repository
Other Data Sources
Results Package Database
Core DataSet
Activity Survey Data
Activity IMS
Data for Analysis & Reports
Data Exchange with Other Activities, USAID, Other Donors
Data Collection
Activity and Field-Level Surveys

D. The Activity Dataset

The Activity Dataset is designed to show where and how SOT resources are being used by an RP activity. The main purpose of this dataset is to provide a uniform set of data that can be used to develop an overall picture of the contributions of an activity in achieving results under the RP. Annual reports may contain this information in some form but they might not provide it in a format that allows for easy comparison among activities. Given the increasing managerial responsibilities of the SOTs, their capacity to compare and analyze data from field activities can be increased by adopting uniform methods of collecting and managing data.

The Activity Dataset may include information such as where the activity is working, the types of training programs that have been conducted, how many people have received training, and follow-up information on the results of the training. The latter would include people who are using the training information and why, and people who are not using the information and why not. These data are not the result of a survey based on a random sample, but are obtained from the activity's records. An activity frequently collects data on field visits as well as from more formal training activities. These data are updated on a regular basis for their internal records and can be summarized uniformly for SO and RP managers' use. In addition, if the information is presented uniformly, it will facilitate the SOT's ability to provide an overall illustration of the implementation of the SO's RF. The box in section G2. below shows the information categories that are in an activity dataset.

E. Sampling Techniques

Sampling techniques are practical means of collecting data from only some people/places in order to understand the larger picture. Sampling is necessary because it is impractical to collect information from each person or place of interest. There are two main types of sampling techniques: nonprobability or non-random sampling and probability or random sampling. Each type has its particular advantages and limitations. The end-use of the information from the sample determines which type of sampling technique to use.

A population must be divided into "sampling units" in order to select a sample. A "sample frame" is the complete set of sampling units from which a sample is selected. A sample frame may be a list (also called "a list frame") of items such as regions, villages, fields, or people. A sample frame also may be area-based, meaning that it consists of units of land. These two types of sample frames are discussed below.

E1. Non-Random Samples

Non-random sampling essentially means that <u>the sample is chosen purposively</u>, to some degree, and therefore may be a biased representation of reality. If the researcher does not know that his sample and therefore his information is biased, he/she will reach inaccurate conclusions about the larger picture. Obviously this is undesirable. However, a non-random sample may be the result of a purposive bias such as the need for convenience: choosing to survey only villages that are near paved roads due to constraints of time. The greater danger is that non-random samples are likely to have <u>unknown</u> biases and therefore not reflect the larger picture accurately.

For example, if you interview only the farmers that the village chief purposively chooses for you to interview, you probably will have a sample biased toward the wealthier farmers in the village. Thus, one major limitation of non-random sampling is that the information cannot be generalized to the larger population.

Non-random sampling lacks objective criteria to determine if the sample is unbiased, which means that it lacks criteria to determine if it is, in fact, an accurate representation of the larger population. If the sample is biased then the data are not precise and any statistical inferences or extrapolations are questionable. For example, it is impossible to determine the degree of a "significant difference" if the data are from a non-random sample. Data from a non-random sample cannot be extrapolated to the larger population. In technical terms, non-random sampling is said to lack external and statistical validity. Another major limitation of non-random sampling is that data from non-random samples cannot be used for sophisticated statistical analyses.

However, non-random sampling does have some advantages. It is convenient, quick, and generally less expensive than random sampling. Non-random sampling may be preferable in informal studies in which it is more important to gain people's confidence (by working with the people who are interested in working with you, which biases your sample due to "self-selection") than to have a better sample (limiting your work to people chosen randomly, who might not be interested in working with you). The table below summarizes commonly used non-random sampling techniques. Note that all of these techniques are purposive ways to choose samples.

Non-Random Sampling Techniques	
Type of Sample	**Selection Strategy**
Convenience sampling[1]	Units in the sample (people, places, or objects such as fields) are selected based on their accessibility or availability (including volunteering) for the study.
Most likely or most dissimilar units	Units are selected to represent similar conditions or, alternatively, very different conditions as judged by the researcher.
"Typical" sample	Units are selected because they are "typical" of the population (rather than extreme), in the researcher's judgement.
Critical units (key informants)[2]	Units are selected because the researcher feels that they have important information or characteristics that must be documented.
Opportunistic sample	Units are selected as possible, when the opportunity arises. *This is often, and very inappropriately, called a random sample.*
Snowball sampling	People selected purposively for a sample identify other people to include in the sample.
Quota sample	The sampling universe (people, places, or objects such as fields) is divided into strata. A nonrandom sample is selected in each stratum so that the sample has the same proportions in each strata as does the universe.

Sources: Adapted from Henry (1990) and Cochran (1977).
[1] As in a Participatory Rural Appraisal.
[2] As in a Rapid Rural Appraisal.

E2. Probability Sampling

The advantages of random sampling are the opposite of the limitations of non-random sampling. A random sample is one in which each sampling unit has the same chance of being selected. Random sampling uses statistical tests (objective criteria) to evaluate the bias of the sample, determine the precision of the sample results, and generalize the results from the sample to the larger population. Knowing the biases and precision of the data is important because these factors influence decisions about which types of statistical analyses to do and which statistical interpretations to make about the data. Random sampling is necessary to produce data that can be generalized from the sample to the larger population, which is one primary purpose of collecting

data, and data that can be analyzed to show statistically significant relationships, which is another primary purpose of collecting data.

The major disadvantage of random sampling is the expense of planning and selecting the sample. Accurate lists are necessary to select a random sample and compiling them may require months of work. For example, researchers in Niger spent four months recensusing villages to compile accurate lists of households in order to draw a random sample for a health survey. Then they spent two more months designing the random sample. The investment was worthwhile, however, because it allowed them to generalize the survey results to the entire population of Niger.

The table below summarizes the major random sampling techniques that a PM&E plan would use. "Sample units" are people, places, or objects such as fields. The lists that we refer to are numbered lists (generally the names of people or places), so that randomly selecting a number on the list is the way to create a random sample. Note that "random" selection does not mean haphazard selection; random selection means that each unit on the numbered list has the same chance of being chosen. This means that there is no bias in the selection process for a random sample. Tables of random numbers or computer programs that generate lists of random numbers are used to select random samples.

Random Sampling Techniques	
Type of sample	**Selection Strategy**
Simple random sample	Sample units are selected from a list. Each unit has an equal probability of being selected, which eliminates biases.
Systematic random sample	A starting-point on a list is chosen randomly (such as from a table of random numbers) and the units on a list frame are selected at equal intervals (such as every 3rd or 25th or 100th unit).
Stratified random sample	Units on the list are assigned to mutually exclusive strata. Then a simple or systematic random sample is selected from each stratum. *The strata may be geographical units.*
Cluster sample	Each unit of the population to be studied is assigned to a cluster (meaning a group). Then a number of clusters are selected randomly. The sample consists of all of the units in the selected clusters. Clusters may be geographical areas.
Multistage random sample[1]	Clusters are selected as in cluster sampling above, but not all the units in a cluster are retained in the sample. Instead, units are randomly selected from the chosen clusters.
Area frame sample[2]	The geographical area to be surveyed (a country or a smaller area) is divided into land units that are similar, in terms of key characteristics (such as vegetation cover), but of different sizes. These are the primary sampling units. Then these primary sampling units are subdivided into secondary sampling units of the same size. Sampling units (such as farms) are selected from these secondary sampling units. *Area sampling is a type of cluster sampling; the key difference is the geographical-area-based frame for sample selection.*

Sources: Adapted from Henry (1990); Cochran (1977); AAIC (1994)

[1] Multistage, stratified sampling combines stratified and cluster sampling (see the Mali case study in Annex C). Clusters are selected in each stratum (the primary stratum), and then sampling units are chosen from each selected cluster.

[2] An area sample frame is used in combination with a list frame, which is a technique known as multiple frame sampling. For example, large farms may be listed separately in a separate stratum (Wigton 1995, personal communication; Cochrane 1990). The Forestry Service of the United States Department of Agriculture has suggested using a Multiple Resource Inventory (MRI) and monitoring scheme using a multiple sampling frame (Forestry Service seminar on MRI, Washington, D.C., January 1995).

E3. List Frames and Area Frames

A sample frame may be a list (also called a "list frame") of items such as regions, villages, fields, or people. A sample frame also may be area-based, meaning that it consists of units of land. The latter is called an "area sample frame" and commonly is used to study agricultural variables such as crop and livestock production. The land units generally are defined in terms of key characteristics such as type of land use, vegetation, or soil. A country can be divided up on the basis of its land units in order to select a random sample of these units.

List frames. List frames must be complete and accurate in order to select a sample. Ensuring that lists are completely accurate usually is complicated and ultimately requires investing time and funds for recensusing before data are collected. Lists of items such as villages, households, and fields generally change over time so that recensusing is necessary after a year or more has elapsed. For example, Niger's 1988 national census reported 10,000 rural villages in the country, but DESFIL could not assume that the number was the same in 1995, when we needed an updated list to choose a random sample for USAID/Niger's NRM survey. It is reasonable to expect to invest a few months in recensusing to establish accurate lists for sampling. Recensusing is a standard part of the PM&E process and a standard precursor to selecting a sample for data collection. And, as we discussed above, a sound random sample is imperative in order to collect data for statistical analysis and data that can be generalized to the larger population. Trying to save time and funds by cutting corners with the work necessary for selecting a good sample ultimately limits the utility of the data that are collected, which is a net loss.

DESFIL example:

- The Senegal/KAP survey, the USAID/Niger NRM survey and the INSAH/Mali pilot survey all used list frames of villages and households to select their survey samples. List frames were used because they were less expensive than area sample frames.

Area frames. The major advantage of area sample frames is that they are complete. That is, they represent complete and stable lists of a country's land units, as it is reasonable to expect that the key characteristics of land units will not change in the short term. Area sample frames are expensive to establish ($350,000 to more than $1 million) but can be used for as long as 10 years, which eliminates the recurrent costs of periodic recensusing. Area frames are appropriate for collecting land-based data such as an inventory of natural resources, crop production, soil quality, livestock distribution and production, and land use. They are not commonly used as the basis for collecting socioeconomic data at the village and household levels.

The major limitation of area-based frames is the set-up cost. Maps, satellite images, aerial photographs, and on-the-ground leg-work are required to establish an area sample frame. The set-up process can be long (a year) and expensive. We found that experts with experience, particularly African experience, are quite scarce. Another consideration is collaboration with stakeholders: virtually all development agencies use list frames to select samples for their data collection. Using similar types of samples facilitates sharing data among stakeholders. A mission

that uses a very different sampling strategy, such as an area frame, will be limited in sharing its information and using other agencies' data.

E4. Sample Size

Deciding on the correct sample size is a complex process that is based on existing information and technical expertise. The degrees of accuracy and error in the data that the information-user will accept are key factors in calculating sample size. The statistical analyses that the information user needs to meet reporting requirements are another important factor in determining sample size. Selecting the proper type and size of a sample therefore is directly linked to how the data from the sample will be used — in other words, the sample size is linked to the information user's needs. An expert must determine the proper type and size of a sample because a sound sample is essential for producing useful data. Consulting an expert makes the process of data collection efficient because the sample will be the correct size — neither larger nor smaller than necessary.

DESFIL example:

- A small sample was selected for the INSAH/Mali pilot survey due to budget constraints. The sample consisted of two elements at each main level: two villages per zone, two households per village, and two women and two men per household. The DESFIL economist suggested this sampling strategy because it gave a minimum level of variance to the data and fitted the budget for the pilot survey.

E5. Conclusions

- A random sample is necessary if data from the sample will be generalized to the larger population and analyzed to explore the statistical relationships between variables.
- An area sample frame combined with list frames — which is a multiple sampling frame — is the preferred sampling strategy for PM&E over large geographical areas.
- List frames are the preferred sampling strategy for PM&E over small geographical areas.
- Using existing information helps to determine sample size and improves the accuracy of random samples.
- Non-random sampling techniques produce data that cannot be generalized to the larger population or analyzed to explore the statistical relationships between variables. However, data from non-random samples is useful to develop and assess hypotheses, and for preliminary tests of indicators.

F. Collecting Data for Performance Monitoring and Evaluation

It is important to keep in mind the overall purpose of PM&E: to document change over time. This ideally means tracking progress toward an SO by documenting change in the SO's performance indicators. PM&E thus requires good quality information that, as defined in the Introduction, is representative, valid, useful to outsiders, timely, and in budget. The information also must be comparable across time and geographical space, and easy to aggregate from the field-activity level up to the program level. Therefore, the information must be standardized. There are many methods for collecting data that are standardized, representative, valid, and meet the other requirements for being "good quality information." The purpose of this sub-section is to review these data collection methods, and note their different advantages and limitations for PM&E.

F1. Standardizing Data Collection

The essentials for collecting standardized data that can be compared over time and space are a Core Dataset and standardized data collection methods. A Core Dataset (see the USAID/Senegal case study in Annex A) is the set of standardized variables that an NRM program monitors to meet its reporting needs. This set of variables is the heart of a program's information needs: its key variables and indicators. Field activities need to provide standardized information about these variables to the program, and to use it for their own PM&E. They also may need to collect additional information for their own particular purposes. The Core Dataset may be only part of an activity's dataset; it contains the essential set of indicator for PM&E, but activities may add additional indicators to meet their own individual information needs. For example, an NRM program may require information from activities about the standardized variable "men's and women's cash crops" and, in addition, an activity may need information about the variable "total value of modern inputs used on men's and women's cash crops." A good Core Dataset represents the essential information needs that an NRM program and its activities have in common, so that the information is useful for PM&E at both the activity and program levels.

Collecting data from activities that can be aggregated to the program level also requires using standardized methods. This means that all the activities must use the same sampling strategy and data collection instruments (questionnaires, topical guides, biophysical measures), and collect the data at the same time of the year. The latter is important to control the effect of seasonal variation in data. Using standardized methods for data collection should be useful for activities' as well as programs' PM&E. The basic objective of using standardized data collection methods in combination with the standardized variables of the Core Dataset is to get the essential part of the PM&E done at both the program and activity levels.

F2. Pre-Testing Data Collection Methods

Data collection methods are general recipes that produce certain products. Like all recipes, they must be tested by the user and adapted to his or her particular setting and purposes. Methods are not "canned" commodities; they must be tested and adapted to local ingredients and conditions before they produce good results. This is particularly true of collecting data in foreign

settings, each of which has its own particular effect on "standard" tasks such as defining a "household" or deciding who to interview in a PRA. There is no substitute for on-the-ground testing, in the form of small-scale pre-tests, to adapt data collection methods to: (1) a specific mission's PM&E needs and (2) a specific country's social and environmental settings. The experts and technicians who implement data collection activities for a particular PM&E program are introducing "USAID reality" to "rural reality," which always has unforseen consequences. These consequences predictably include the need to pre-test a method, and then to regroup and adapt it to the local setting. It is much more efficient to meet these unforseen consequences and adapt to them in a small-scale pre-test, whose major objective is testing and producing provisional results, than to encounter problems in a large-scale "real" data collection activity that the mission expects to produce useable information on a specified date.

DESFIL's work with USAID/Niger clearly shows the value of investing several months in pre-testing a structured survey (see Annex B for the "Lessons Learned" from the USAID/Niger survey). The Niger Pre-Test Survey was designed to test each phase of a national-level NRM survey the mission planned to do the following year, including testing the technical and logistical capacity of the Nigerien government agencies that would be the mission's major partners in the national survey. One major lesson learned from our pre-test survey in Niger was that when the "AID reality" of the mission's NRM indicators met Niger's "rural reality," we found that many indicators were inappropriate or impractical to measure. The other lessons learned include the fact that enumerators need field-training in NRM technology, that unstandardized NRM terms create problems in recording and analyzing data, and that negotiating the content of an NRM questionnaire with partners takes months. As a result of its NRM survey pre-test, USAID/Niger has the empirical basis for revising its indicators and revising the methods that will be used to conduct its national-level survey.

Data collection that is called "informal," such as PRAs and focus groups, also should be pre-tested on a small scale before it is implemented at the activity or PM&E level. Working with an area sample frame instead of lists for drawing random samples requires pre-testing. Organizing technicians to take biophysical measures requires pre-testing, or practice. Country-specific conditions — beginning with a program's specific information needs, indicators, and Strategic Objectives — have a strong effect on how data collection is designed and implemented. Discussing methods in the office is not a substitute for on-the-ground practice. Only on-the-ground pre-testing will show activities or programs the adaptations that are necessary to make data collection methods work in a specific setting.

F3. Data Collection Methods: the Major Options

The major options for collecting data that an NRM PM&E system would use are summarized in a five-page table at the end of this sub-section. A PM&E program should consist of a combination of some of these methods, to balance the types of information needed for monitoring and evaluation. Some methods are particularly appropriate for the initial work in PM&E, such as identifying and testing NRM indicators and variables before they are finalized. For example, interviewing "key informants" (people knowledgeable about specific topics) or focus groups are useful methods for acquainting activity personnel with new locations or research topics. These methods, and rapid surveys such as PRAs and RRAs, also are useful for producing

the information that is the basis for more structured data collection, such as formal surveys, community case studies, and topical case studies. The purpose of the tables at the end of sub-section F is to summarize the different uses and limitations of the different data collection methods that a PM&E program can combine to meet its particular needs. There are no "silver bullets" to monitor and evaluate NRM program results; there is no one method that will provide all the information and understanding that an NRM program needs to assess its RF, document progress, and do program planning. Combining complementary types of information — quantitative and qualitative information that is obtained rapidly as well as that which takes months to produce; specific as well as general information — is the key to being able to tell the story about change in NRM and how to promote it.

F3a. Key Informant Interviews and Focus Groups

These are formal terms used for the common process of talking to one person (a key informant) or several people (a focus group) about a specific topic(s). The respondents may be rural producers, civil servants, or whoever is knowledgeable about the topics of interest to the researcher. These methods of obtaining information also help outsiders to get oriented to new settings or topics, as well as introducing outsiders and their work to the locals. The researcher may use a flexible list of topics or questions to structure the interviews loosely, or he/she may use a set list to produce more standardized information. The major objective of key informant and focus group interviews is to produce qualitative information on specific topics. These types of interviews and the information they produce "get the researchers' feet on the ground" by acquainting them with local people and systems. The resulting information and the outsiders' increased knowledge then can be used to organize more formal data collection activities.

The advantage of key informant and focus group interviews is that they can produce copious information in a short time. The major limitation on this information usually is that it is not from a representative sample and therefore cannot be generalized. People who are willing to be "key informants" (i.e., spend time with outsiders or speak a non-local language) often are not the "average Joe" and therefore may not provide "average" (or representative) information about the rest of the group. The people in focus groups generally are self-selected, as are those in the group who speak up, so that their information may not be representative either. This factor is a strong limitation on how the information can be used — which is mainly for increasing outsiders' knowledge and orienting further research.

F3b. Informal or Unstructured Surveys

Surveys such as Rapid or Participatory Rural Appraisals can produce a range of information in a few weeks or months. These surveys are called "informal" because they generally do not use formal sampling techniques or structured data collection instruments, and because they produce mainly qualitative, descriptive information. An activity or program often uses informal surveys to explore and document the status quo in a new area, so the method can generate the information for an initial "diagnosis" of local conditions. These surveys also can contribute information to monitor and evaluate program results. Informal survey teams generally are multidisciplinary and aim to produce well-rounded information, which is useful for programmatic planning. The fact

that informal surveys also orient outsiders to local conditions and increase their knowledge is another valuable benefit of the method.

Informal surveys can be made more or less "formal," to some extent. They can be done using representative samples and semi-structured instruments. This takes more time to organize, but makes their information more representative and consistent, which ultimately makes it more useful. How the information will be used determines how to organize an informal survey because deciding how to collect information ultimately means deciding about the ratio of the resources invested to the type (utility) of the information obtained. This ratio is a trade off that must be decided by the information-user's needs. Informal surveys are the choice for investing less time and funds and producing information that usually cannot be generalized beyond the sample.

Qualitative information (written analysis) has the advantages of being interesting to read and easy to understand. Qualitative information from informal surveys can provide real-life illustrations of a program's results or customers' needs. It can provide one basis for formulating hypotheses about what affects people's adoption of NRM technology (or any other innovation). The major limitation on qualitative information from informal surveys is that it cannot be converted to numbers and analyzed statistically. Whether or not it can be generalized depends on the sampling strategy used to collect it. Qualitative information can be used to make written descriptions and explanations of a program's NRM variables, but it cannot be used to test or show statistical associations among them. If the latter are not necessary, then qualitative information from well-designed informal surveys based on representative samples is useful PM&E information. Statistical analysis generally is accepted as a cleaner and stronger way to show associations between variables than is written analysis, but neither is a silver bullet for PM&E — the two are complementary.

It is necessary to clarify the meaning of the much used and misused term <u>participatory</u>, which often is linked with informal data collection methods. <u>Participatory research</u> can be defined as research that is based on the active participation of the community, and returning the research to the community for its verification, critique, and use (Rojas 1994). Most PM&E work (data collection, reports) is not "participatory" because it is done primarily by and for USAID purposes and personnel. "Although some writers make it sound as though there is a separate 'participatory' research method, this is misleading. The idea of participation is more an overall guiding philosophy of how to proceed, than a selection of specific methods. So when people talk about participatory research, participatory monitoring and participatory evaluation, on the whole they are not discussing a self-contained set of methodologies, but a situation whereby the methods being used have included an element of strong involvement and consultation on the part of the subjects of the research. Not all methods or groups are equally amenable to participation. For example, some of the technical methods . . . can only be carried out and interpreted after a lengthy training . . ."(Pratt and Loizos 1992).

"A sense of the extent of [consumers'] participation can be had by reviewing the number of stages at which local people are involved in the research process. Does participation occur at all stages of the research (design, collection of data, interpretation, discussion and presentation) or only at certain points in the process? And if it does not occur at all stages, is the local community really disadvantaged by this? How busy are they? Do they really want to be involved at every

phase of research, given that they may have crops to weed, children to feed, fuel and water to find, and dozens of other daily tasks? Perhaps their participation should be strategic, rather than total? About the big issues, rather than the nuts-and-bolts?"(Pratt and Loizos 1992).

F3c. Formal or Structured Surveys

Formal surveys are based on formal sampling strategies to determine representative samples and use structured questionnaires to collect the same set of data from each respondent. They generally are done with large samples, to produce datasets for secondary statistical analysis. The principal determinants of sample size for surveys are the characteristics of the target population, the variables to be surveyed, the types of statistical analyses to be done, and the degree of statistical accuracy (statistical confidence and error levels) that the user requires. The underlying principal for collecting data from a large sample is that, in terms of statistical probability, large numbers of responses decrease the probability of biases in representing reality. Therefore, a statistician should calculate the sample size required for a survey, based on the user's information needs. Arbitrarily deciding to survey "a big sample" without consulting a statistician is inefficient because a sample that is unnecessarily large creates unnecessary work, and one that is too small compromises the utility of the data.

A structured questionnaire (or other data collection instrument) is the heart of a formal survey. It consists of a uniform set of questions (or measurements) addressed to each respondent (or items to be measured, such as a field). Structured questionnaires used with large samples should be "pre-coded" in order to facilitate recording, computerizing, and analyzing the survey data (see Annex B for an example of the Niger pre-coded NRM survey questionnaire). A structured questionnaire can be used to collect qualitative data (peoples' verbatim responses) as well as turning their responses into codes. The problem is that verbiage is very time-consuming to tabulate and analyze, and large samples make doing so impossible. Designing a structured questionnaire that is easy for the interviewer to use, does not bias responses, and facilitates efficient data entry is work for an expert. And the process requires considerable time. There are many stages in this work, from transforming the program's information needs into useable questions, to systematically field-testing and revising the questionnaire, to training the interviewers to use it correctly. As with calculating sample sizes, it is best to hire an expert.

Formal surveys are done mainly to produce large datasets for statistical analysis. Statistical analysis has explanatory power because it can quantify variables and quantify the strength of the associations among them. This quantitative interpretation of reality generally is accepted as accurate (if the survey methodology is sound!) and useful. Statistical analysis can be used to test the hypotheses in a RF, characterize populations of interest, and show trends and changes in a program's variables and indicators. Formal surveys that produce "statistically valid data" thus are important tools for PM&E.

The major limitations of formal surveys are that they are expensive and yet are not the silver bullet for PM&E. The fact that generally they are large-scale data collection activities makes them expensive in terms of time and funds. It would take at least one and a half years to design, implement, and write up the results of a formal survey of 1,000 households. Most formal surveys take one to two years to complete, so they are a medium-term data collection method.

The information from formal surveys provides a quantitative description of NRM variables and indicators, and their relationships. But quantitative description alone — whether simple percentages or sophisticated correlation coefficients — does not tell the whole story of how and why people adopt innovations such as NRM technology. It provides some understanding and inevitably raises some questions. Understanding the "whys" of human behavior — understanding what lies in the statistical distance between related variables — also requires qualitative data and analysis, to fill in the quantitative interpretation of reality. The combination of quantitative and qualitative information, which are produced by different methods, tells a better story of how and why development occurs than does either one alone.

F3d. Baselines and Follow-Up Studies

A performance baseline is "the value of an indicator at the beginning of, or prior to a performance period" (ADS, Workshop on Reengineering). A baseline is the first measurement of a program's indicators and variables, the basis for measuring progress toward results. Prior studies and secondary data can be used to provide baseline information as the basis for evaluating performance. Collecting and using secondary data should be part of any PM&E program, to take advantage of existing data and avoid reduplicating effort. If secondary data are lacking or unsatisfactory, a program's baseline is established the first time that data are collected to measure the indicators. Formal surveys generally are used to collect the data for the baseline measures of program indicators. The annual requirement of R2 reports ensures that missions will establish their baselines early in their programs.

A program's (or activity's) indicators must be measured periodically after the baseline study has been done, to monitor and evaluate program results. The measurements of program indicators that are done after a baseline are called "follow-up studies." Follow-up studies must use the same methods and collect the same data as the baseline study, as discussed in the section above about "Standardizing Data Collection." This produces standardized datasets from different years that can be compared directly to assess changes over time in the indicators. However, we emphasize that generally it is necessary to use a combination of different types of data, that have been collected using different methods, to better understand change. Managing for change certainly will require doing standardized baseline and follow-up studies. It also is likely to require using methods other than baseline and follow-up surveys to collect other types of data.

F3e. Community and Topical Case Studies

A variety of data collection methods can be used to do community and topical case studies. Case studies are discussed here because they are useful approaches for producing information for PM&E, although they are not methods, as such, for data collection. A community case study usually is a formal, year-long data collection exercise. At least one year is required to collect data from all the seasons. Community case studies generally focus on a set of related research topics (NRM, agricultural production, and the allocation of household resources; or household income, food security, and health status). They generally are "formal" because they use formal sampling strategies and structured data collection instruments. They can produce both quantitative and qualitative information. A topical case study generally is focused, short-term research. The objective usually is to provide information about a specific topic within a few weeks or months.

Case studies generally collect both quantitative and qualitative information, and therefore are useful for producing focused, in-depth information about the research topics.

Case studies can be made "more formal" or "less formal," based on the user's information needs. A case study can be a written description of a community or a topic, based entirely on informal interviews and without any quantitative data, that is completed in a few months. Or, a case study can describe a community or topic primarily with statistical analyses and secondarily with written analyses, based on formal sampling and data collection techniques. For example, collecting data about the topic of women's roles in NRM, for example could be done rapidly and informally (without a representative sample and using focus groups), if that type of qualitative data fit a program's information needs. Or, a formal topical study could be done using a representative sample and structured interviews to produce quantifiable, generalizable data. As we have emphasized above, the users' information needs are the starting point to determine how data should be collected.

A PM&E program can use the focused data from case studies to better understand the trends and questions derived from the more general data produced by formal and informal surveys. Topical case studies are a type of "spot check" that produce data about topics or questions that require more focused explanation than that provided by survey data. The focused data from case studies supplements and illuminates the data from surveys. These data can explain more of the "whys" of human behavior because they provide a closer look at the relationships between variables. Thus formal, long-term community studies can produce excellent data for evaluating program results, but they are expensive to do.

The major limitations of community case studies are their expense and the limited generalizability of their information. A researcher chooses a community that is representative of a certain region or "type" for a case study, which means that the data cannot be generalized to communities of other types or in other regions. Community case studies thus typically produce in-depth information that has limited geographical application. This limitation can be overcome by doing a number of community case studies, which is expensive. The contrast between data from case studies and data from surveys can be paraphrased with the metaphor about medical specialists and general practitioners: a specialist (community study) knows everything about one thing, and a generalist (a survey) knows a little about everything.

The limitations on topical case studies depend on the methods used to do them. Formal topical case studies that are done using a representative sample and well-designed, structured data collection instruments can produce consistent, generalizable data. The process will take several months. Informal topical case studies can produce useful data more rapidly, but their findings are of limited utility because they cannot be generalized. The user's information needs determine which type of case study to do.

F4. Subjective and Objective Data

It is important to recognize the difference between subjective and objective data. All of the data collection methods discussed above produce subjective or self-reported data that the researcher generally does not verify. Interviewing people — singly or in groups, with a flexible

topical guide or a structured questionnaire — produces subjective, unverified data. If a farmer tells the researcher that he has a quarter-hectare woodlot with 100 trees in it, that is his subjective perception (or what he chooses to report). An objective measurement of the woodlot — measuring the area and counting the trees in it — provides objective data about it, which probably differs from the farmer's self-report. Objective data are observable and produced by concrete measures; they are not influenced by emotions, surmise, or personal bias. Objective data usually are reported in or can be converted into standard measures: hectares, kilograms, numbers.

Self-reported data from surveys obviously is influenced by the respondents' emotions and personal biases. This is a problem with the data from interviews and surveys, both formal and informal, because verifying it generally is not part of the method. Self-reported information thus must be taken with a grain of salt, especially information based on memory or about sensitive topics. Objective information from objective measures should be used whenever possible to verify self-reported information. Asking farmers the total hectareage of their fields and which NRM techniques they use in them generally does not produce data as accurate as measuring the fields and surveying them.

Biophysical measures are one set of objective data that NRM programs can use to complement self-reported data. All of a program's variables that can be measured or counted should be. This can be done with a sub-sample of the survey population, to produce a smaller set of objective data. Biophysical measures may be particularly appropriate to evaluate long-term program results: before and after measures of soil quality or tree variety and density are more accurate measures of impact than farmers' subjective reports about them.

F5. Aerial Videography

Aerial videography is one option for producing objective data about NRM. Aerial surveys can document change over time in some aspects of how people manage their natural resources. There are many technical pros and cons regarding this method for collecting data related to NRM. A pilot study in Niger indicated that aerial videography would be a feasible method for collecting objective data that show change over time in the national area where NRM practices are used (Adelski and DeCosse 1995). The cost for an adequate sample in Niger was estimated to be at least one-quarter of a million dollars and perhaps significantly higher. The advantage would be an objective dataset produced more efficiently than hiring technicians to conduct an on-the-ground survey of the entire national area. The Niger pilot study indicated that approximately 40% of the Africa Bureau's NRM indicators can be identified with aerial videography (ibid.). It is important to note that, as with any data collection method, aerial videography must be used in conjunction with other methods (satellite image analysis, GIS, GPS, and on-the-ground measurements).

F6. Anthropometric Measurements

Anthropometric measurements are standardized measurements of height, weight, and upper-arm circumference that are used to assess nutritional status. The measurement method is quite easy to learn and to do, so that the process can be integrated into formal or informal surveys.

Anthropometric measurements are one set of objective data that can be used to monitor or evaluate household well-being, in terms of economics (food production and security) and health (nutritional status). These measurements are logically linked to NRM programs because improvements in NRM should improve household food production and/or income, which in poor populations should be reflected in improved nutritional status.

Anthropometric data are useful because they are objective. The data are rapidly collected and provide a more accurate reflection of household economic status than subjective data about variables such as income or expenditures.

F7. Reviewing the Literature

Reviewing the literature to collect data from "secondary sources" is a useful and often neglected method of data collection. Development agencies produce numerous reports that can be reviewed for background and orientation information. Supplementary or contextual data that a PM&E program can use or build on may be available in the existing literature. A literature review should be the first step in a PM&E program, because it provides the context for USAID's research activities. Information from a literature review also should be the starting point for organizing USAID's research to build on previous experience with sampling strategies, data collection instruments, and methods that have been used successfully in the country. Building collaboration between partners and sharing information should begin with reviewing partners' previous work and building on it.

F8. An Integrated PM&E Program

As we have emphasized, no one data collection method or type of data is the silver bullet for PM&E. The two major objectives of PM&E — short-term monitoring and long-term evaluation — make an integrated data collection program necessary. The different strengths and limitations of different types of data also mean that combining different data collection methods is necessary to tell the story of change. The program's information needs will determine which types of data, and therefore which methods, are necessary for its PM&E plan. The table below is provided only as a general example.

An Integrated Plan for PM&E: Data Collection Methods

PM&E Objective	Data Collection Methods to Use
1. Collect background information, contextual data, and describe the status quo.	Literature review, collect secondary data, informal interviews (key informants and focus groups), and informal surveys (PRAs, RRAs).
2. Identify and define provisional indicators and variables for PM&E.	Literature review, focus group interviews, and informal surveys.
3. Diagnostic assessments of local systems and people's perceived needs.	Focus groups, informal surveys, and informal topical case studies.
4. Ground-truth provisional indicators and key variables, and adapt data collection methods to the local setting.	Small-scale pre-tests of formal surveys.
5. Collect baseline and follow-up data on indicators and key variables for PM&E.	Large-scale formal surveys, biophysical measures, anthropometric measurements, aerial photography.
6. Collect complementary data, explore the survey findings, and collect data for monitoring.	Topical and community case studies, small-scale formal surveys, anthropometric measurements, focus groups, and key informant interviews.
7. Collect data for evaluation of program impact.	Large-scale formal surveys, biophysical measures, anthropometric measurements, aerial photography.

Summary of the Major Data Collection Methods

Method	Characteristics	Uses	Limitations
Key Informant Interviews	Discussion with a person who has knowledge of a specific topic or topics. Purposively selected individuals; not representative sampling. Produces qualitative data. Low cost.	Orient activity personnel to new locations or topics. Qualitative data, rapid collection. Preparation for organizing other types of data collection in a community or region. Preliminary identification of key topics for research; help identify indicators.	Information cannot be generalized. Limited explanatory power.
Focus Group Interviews	Discussion with a group of people focused on a specific topic or topics. Purposively or self-selected people; not representative sampling. Produces mainly qualitative data. Low cost.	Orient activity personnel to new locations or topics. Qualitative data, rapid collection. Preparation for organizing other types of data collection in a community or region. Preliminary identification of key topics for research; help identify indicators.	Information cannot be generalized. Limited explanatory power.

Method	Characteristics	Uses	Limitations
Community Case Studies	Structured data collection from a representative sample of a community during 1+ years. Long-term research (1+ years). Appropriate to collect data on indicators. Can be done as unstructured (informal) research. Medium to high cost.	Produces individual-, household-, or community-level data. Can have topical focus/foci. Produces seasonal and annual data. Produces quantitative and/or qualitative data. Data for quantitative analysis. Can be used to evaluate program impact. Can be participatory. Can be long-term.	Information cannot be generalized to other geographical regions or different types of communities. Medium to high cost in time and funds. Require trained personnel.
Topical Case Studies	Focused research on specific topics (e.g., women's roles in NRM, pastoralist NRM techniques). Can be done as formal or informal research. Generally short-term; completed in a few weeks or a few months. Medium cost.	Produces individual-, household-, or community-level data. Produces quantitative and/or qualitative data. Data for quantitative analysis. Can be participatory. Generally completed in several weeks or months.	Medium cost. Require trained personnel.

Method	Characteristics	Uses	Limitations
Informal or Unstructured Surveys: PRAs, RRAs	Generally use informal methods (non-random sampling strategies and unstructured interview instruments). Can be made more formal by using formal sampling strategies and more standardized data collection instruments. Produce general, qualitative data. Completed in a few weeks or months. Medium cost.	Rapid, can survey a community in one day. Can be used to orient and train activity personnel. Produce mainly general, qualitative data for written analysis. Produce qualitative data to complement and illustrate quantitative data. Can focus on specific topics (NRM, food security). Can identify groups or topics for further research. Can be participatory.	Information cannot be generalized to other villages or regions. Mainly qualitative information only.

Method	Characteristics	Uses	Limitations
Formal or Structured Surveys	Use formal sampling strategies and structured data collection instruments. Produce quantitative data for statistical analysis. Generally produce little or no qualitative data. Appropriate to collect data on indicators. Large-scale formal surveys generally take 1+ years to complete. Medium to high cost in time and funds.	Generally require significant time, funds, and personnel. Require formal sample design and training of survey personnel. Produce quantitative data for statistical analysis. Data can be generalized, based on the sampling strategy.	High cost in time and funds. Generally produce subjective, unverified information.

Method	Characteristics	Uses	Limitations
Anthropometric Measurements	Universal physical measurements to assess nutritional status. Can be used as an indicator of household or economic well-being. Cost-effective production of standardized, quantitative data. The method is universal and easily taught. Can be integrated into informal or formal surveys. Low to medium cost.	Produce standardized, quantitative data for comparing nutritional status across regions and countries. Require formal samples and trained personnel. One quantitative, objective indicator of economic status. Data can be generalized, based on the sampling strategy.	Only one indicator of economic status or household well-being.
Literature Review	Use of existing documents or data that has been collected by other agencies.	Resources to use in planning data collection activities. Can provide supplementary or integral data for PM&E.	Can be difficult to synthesize due to different data collection methods and reporting formats.
Aerial Photography	Aerial photos of villages, fields, or regions. Low to medium cost.	Can be used to help design survey samples. Can identify areas or regions for research, based on the condition of the natural resource base. Objective data to document change over time.	Requires equipment and trained personnel.

G. Data Management

Implementing an effective information management system (IMS) at the SO level to manage performance data requires:

- Identifying the variables that represent the data needed to report on the performance indicators chosen to show RP and SO results.
- Introducing a database system to store and retrieve data about the variables and indicators in an easy-to-use form.
- Assisting SO and RP teams to convert existing data to build an IMS database.
- Assisting activities to set up database systems that facilitate providing standardized data to the SO team on a regular basis.

When the SO and RP teams have chosen their performance indicators, the variables needed to generate data about those indicators can be specified. Then the database can be structured to efficiently organize those data. The different SOs in a mission may share some of these indicators and variables, but each SO also will have its own set. The number of indicators and variables that the SOs share will depend on the mission's specific goals and objectives, the number of its RFs, and the number of its RPs.

The data management component of an IMS requires standard computer hardware and software, and training for the SO/RP staff that will use the system. The specific data requirements of each SO are important to consider in terms of these three factors. The database for each SO must be customized to meet the SO's particular information needs, **and to maintain standardization of the variables that the different SOs share.**

Most field activities, SO teams, and other mission units currently have useful data in their libraries from a variety of sources. However, these data generally are not in the same format nor in forms that are easy to use. This lack of standardization limits aggregating or comparing data from different sources, and ultimately limits the use of the information. Much of these existing data can be converted into the standardized format of the mission's IMS so that they form the foundation of an NRM relational database. Converting existing data to a standardized format thus increases the mission's information-base.

Most field activities will need assistance to set up their information management systems. The personnel in each activity will have different levels of computer skills. They will need to learn the requirements of the SO and the RF and what those mean in terms of managing data. Because standardization is necessary for aggregating and comparing data, the personnel also must learn about standardizing data collection, coding, and entry into the database.

G1. Components of a Database Management System

Components of a Database Management System

- Relational Database
- The Data Dictionary
- Queries and Reports

Relational Databases: A relational database consists of numerous data tables, each containing information about a specific topic. For example, one table may contain data about household demography, such as the number of family members, their ages, and their major economic activities. Another data table may contain data about household crops — the types grown, yield, and changes in yield during the past few years. A third table may contain data about the NRM practices used by households.

The data tables are structured so that they can be used individually or linked, using a common variable or field such as a village identification number. For example, if an information-user is interested in the household-level use of NRM practices, he or she looks at the "NRM practices" table. If the user wants to relate that NRM data to household demographic data, to explore the demographic characteristics of NRM users, he or she uses a common field such as the village identification number, which is in both tables, to link the "NRM practices" table to the "household demography" table.

Information from the Core Dataset, the different field activities, or any other source can be organized into a relational database. Standardizing the data in a relational database will allow the SO team to compare and analyze data from different sources over time.

Data Dictionary: A data dictionary provides information about all the data tables and the data in the relational database. The information in the data dictionary includes the name of the variables in each table, the standardized format for each variable in the database, and the values for each variable.

Queries and Reports: The ability to easily extract data in different forms is one advantage of an IMS. This is necessary to facilitate disseminating information and the lessons learned from field activities to all the stakeholders. Database users may want data in the form of printed reports, in the form of data files to export to statistical programs, or as new files to transfer to other users. A user may want to select variables from one table, link several tables to extract specific variables, or extract any combination of variables from the data tables. A relational database also allows users to extract specific data, such as data about the use of a particular NRM practice or information from a particular geographical region. The results of these specific queries can be used to produce reports or to extract data to other data tables for statistical analysis. Specific queries can be set up at the activity or RP levels and pre-programmed to provide data files that are needed by the SO and the RP, to ensure that the activities produce consistent information.

DESFIL example:

- In Senegal, training was necessary to ensure optimal use of the SO team's Information Management System. Training to improve computer skills became important when the staff began using the relational database to research specific issues, and wanted to make specific queries of the data to meet their information needs.

G2. Managing the Core and Activity Datasets

The SO and RP database managers will use their Core Datasets to analyze the results of their programs. These analyses will provide information about the results being achieved by USAID and its partners. However, the data about results will not provide the SO and RP managers with information about the specific use of USAID resources at specific locations.

The Activity Database will allow these managers to monitor the use of USAID resources by their partners and field activities. The activity data can be used to monitor information such as: where the field activities are working, the development problems being addressed, the types of interventions being promoted, the results/impacts being achieved, and what resources have been obligated to these activities.

The data from the separate core and activity databases will not be combined for statistical analyses. Instead, the two types of data will be used by the SO and RP teams to "tell the story" about where USAID resources are being used and to explain the results that are being achieved.

Data Tables in the Activity Database

1. Locator Data (where field activities are working)
2. Partner Information (activities' partners)
3. Data on Problems Addressed
4. Data on Enabling Conditions
5. Data on Interventions
6. Training and Education
7. Data on Results Achieved
8. Data on Impacts
9. Data on SO Obligations

H. Data Analysis

Development workers need a general conceptual understanding of what data analysis is and the major techniques that are used. This section focuses on that conceptual background. Understanding the mechanics of statistical analysis is less important, so our discussion of that topic is limited. An ancient colleague articulated an important principle of data analysis that remains true today: a little knowledge is a dangerous thing (Anonymous). A second colleague provides the context for discussing the topic: "The word 'analysis' has two meanings. On the one hand, it means making complicated things understandable by reducing them to their component parts. This is *descriptive analysis*. On the other hand, it means making complicated things understandable by showing how their component

parts fit together according to some rules. This is *theory*. Both types of analysis are accomplished by systematically looking for patterns in recorded observations and formulating ideas that account for those patterns . . . The canons of science that govern data analysis and the development of explanations apply equally to qualitative and quantitative data" (Bernard 1988).

H1. Qualitative and Quantitative Analysis

Analysis is the process of developing ideas about how things work and then collecting information to test those ideas. The written and/or numerical information collected generally leads to reformulating the ideas, which leads to testing them further, so that the analytical process is iterative and in principle does not end. There are two major types of data analysis: qualitative and quantitative. Qualitative analysis uses words (prose) for developing and testing ideas. It uses prose to describe and explain data in order to reach conclusions, formulate hypotheses, and plan further work. Defining research topics and planning how to study them — topics such as RF hypotheses or enabling conditions for the adoption of NRM practices — always begin with qualitative analysis. We certainly may use numbers and statistics within our qualitative analyses of new situations or research topics, but it is important to remember that PM&E work begins (in planning) and ends (in dissemination) with qualitative analysis.

Quantitative analysis uses numbers to develop and test ideas. It uses numbers to describe and explain conditions and to show change. Quantitative analysis also can be used to formulate hypotheses, reach conclusions, and plan further work. There are different levels of quantitative analysis, from "descriptive statistics" (percentages, average, modes, and medians) to complex (or "secondary") statistical analyses. The latter includes numerous sophisticated statistical techniques (t-tests, linear regression, cost-benefit analysis) that are used to quantify the strength of the relationships between variables, make predictions about how variables will change, and to test hypotheses, among other purposes. We emphasize that the information-user's needs determine which types and combinations of quantitative analyses to do.

The objectives of PM&E require both qualitative and quantitative analysis. Qualitative analysis is sufficient to report on progress by describing which changes have occurred, and how. But managing for results requires some understanding of why change has occurred, which means understanding the cause and effect relationships between the variables in the RF. Quantitative analysis is useful for providing insight into these relationships. Although qualitative analysis often is regarded as less powerful and important than "hard" quantitative analysis, the two are in fact complementary and equally important in the analytical process of understanding change over time. As we stated in the preceding section, no one method alone can do the job of PM&E, and the same is true for data analysis: there is no one analytical method, no one silver bullet, that will do the entire job. The use of logic, expertise, and sound judgement is required for both qualitative and quantitative analysis.

H2. Correlation and Causation

Correlation means that two variables are related. Two other common terms for related variables are "association" and "covariation." Correlated variables may vary in the same or in opposite directions. Correlation is a **necessary** but not a sufficient condition for claiming a causal relationship between two variables. Showing causal relationships — which means showing that

one variable (the independent variable) affects another variable (the dependent variable)—requires using the experimental method and secondary statistical analyses. In the scientific tradition, five conditions must be met in order to claim that one variable causes another:

1. Measurements of the variables must be valid (you must be sure that your measurements do in fact measure what you think they measure).

2. The two variables must be correlated (statistically).

3. The statistical correlation must not be spurious (statistically). A spurious correlation can occur when the association between the variables is caused by another variable.

4. The presumed causal variable always must precede the other variable in time.

5. You must have a theory about how one variable causes the other. "Theories consist of good ideas about how things work" (Bernard 1988).

We point out that "ideas about causation are qualitative. They are based on insight, derived from either qualitative or quantitative observations, and are initially expressed in words. Testing causal statements — finding out how much they explain rather than whether they seem to be plausible explanations — requires quantitative observations. But explanation itself is a qualitative act" (Bernard 1988).

Demonstrating causal relationships requires using "the experimental method." This rarely is possible in international development work with human populations. The experimental method consists of randomly assigning people to two groups, measuring them on several variables that you expect will change due to your intervention, introducing the intervention (the presumed causal variable), and then measuring the same variables again to determine any changes. This is the "scientific method" for demonstrating causality. Obviously it is not a practical method that PM&E programs can use to showing causality.

PM&E managers can take a more pragmatic approach to explaining cause and effect. Managers can investigate the causal relationships that they assume exist, using sound methods of data collection and analysis, and use the statistical analyses to suggest that causal relationships exist. However, without using the experimental method, we point out that statistical analyses do not establish or demonstrate causal relationships. It is ironic that development agencies, whose objectives are to affect critical aspects of human behavior, cannot use the method that would demonstrate the causal effects of their interventions, but that is the case. The best option is to use sound methods and recognize that the "causal relationships" our data suggest are useful as unproven, working hypotheses for planning and understanding change.

Congress and USAID require an indication of causal links between programmatic actions and impact with some reasonable degree of confidence before committing resources. In environmental policy making, "before administrators can legislate, they must have established that the thing to be regulated is or can be the cause of the actual or potential cause of harm" (Fienberg, 1989). Because natural resources management is so complex and resources earmarked

to analyze it so limited, PM&E programs often look for trends in association rather than pinpoint statistical precision.

H3. Data Analysis Techniques

The overall purpose of data analysis is to use statistical tests to make quantitative descriptions and tests of a program's working hypotheses. Data analysis should be as simple or complex as the end-user's information needs. Complex statistical analyses are useful when the information they provide is necessary and will be used; they are not intrinsically more useful than descriptive statistics. Reviewing the data and following your hunches about analysis are just as valid an approach as being driven by theory. The bottom line is that "there is no substitute for thinking hard about your data" (Bernard 1988). Note also that your sources of ideas about data analysis do not affect the utility of your ideas: "You can get ideas from a prior theory or from browsing through data tables. The important thing is whether you can test your ideas and create plausible explanations for your findings . . . Stumbling onto a significant relationship between some variables does nothing to invalidate the relationship . . . No matter what the purposes of your research, or how you design it, the two principal rules of data analysis are: (1) if you have an idea, test it. (2) You can't test it if you don't have data on it" (Bernard 1988).

We emphasize that "statistical significance does not mean the same thing as theoretical or practical significance . . . with a very large sample of subjects one can always find *some* statistically significant differences between populations . . . statistical computations cannot, therefore, tell us all we wish to know about our data. The calculations assist us in making certain decisions and statements about these data, but . . . we should step back from statistics and exercise "common sense." Independently of statistics, we must make our decisions about the magnitude of contribution, or the usefulness as information, of particular research findings. Usefulness must be assessed in terms of how well the particular data help to fill gaps in the network of [hypotheses and how] research findings can be evaluated in terms of the possibilities of making correct, practical predictions of human behavior related to social problems" (Pelto 1970).

A range of techniques is available to analyze natural resource data. Techniques applied in other fields now are being adapted to the analysis of natural resources. These techniques include multivariate analyses such as logistic regression analysis (Fiebig and Ouedraogo 1994), cost-benefit analysis (Pagiola 1993), and the Policy Analysis Matrix (Pagiola 1991).

Univariate Statistics. Univariate statistics are used to describe one variable; they are not used to analyze the relationship among several variables. The commonly used univariate statistics are percentages, mean, mode, median, standard deviation, and the t-test. A standard deviation shows the distribution of individual values around the group's average value. It shows how the values in a population are distributed: for example, the classic "bell curve" distribution. The t-test tests the difference between the means (averages) of two groups. This test asks the simple question, "Do two sample means . . . differ enough to make me believe that there are real differences between the two populations?" (Bernard 1988).

Multivariate Analysis. Multivariate analysis is used to identify and describe the relationships among variables, and to test the significance of those relationships (ibid.). The sophisticated techniques of statistical analysis that we also call "secondary statistical analysis" are in the category of multivariate analysis. However, the overall **purpose** of using these sophisticated techniques can be stated quite simply: "There are four things we want to know about a statistical relationship between two variables: (1) How big is it? How much better could we predict the score of a dependent variable [an effect] in our sample if we knew the score of some independent variable [the cause]? (2) Is the covariation [correlation] a matter of chance, or does it exist in the overall population to which we want to generalize? (3) What is its direction? Is [the correlation] positive or negative? (4) What is its shape? Is it linear or non-linear?" (ibid.).

The Chi-square test and multiple regression analyses are commonly used multivariate statistical techniques. Chi-square is used to determine whether or not there is a relationship among variables. It also shows the probability that a relationship is due to chance. This test helps the researcher avoid "inferring that a relationship exists when it really doesn't, or inferring that a relationship doesn't exist when it really does" (ibid.). Multiple regression analyses are used to sort out the independent (causal) variable among the potential determinants of a dependent (effect) variable. The type of data available for analysis determines which regression techniques should be used.

DESFIL example:

- DESFIL used logistic regression to analyze USAID/Senegal's KAP data, to explore the variables related to the use or non-use of NRM practices. The purpose of the analysis was illustrative: DESFIL used it to suggest which variables potentially were associated with the use of NRM practices.

The Policy Analysis Matrix. The Policy Analysis Matrix is an improved format for budgetary data initially suggested by Monke and Pearson (1989) to analyze government policy distortions in agriculture. Policy Analysis Matrix uses data generated by a variety of sources and sampling techniques, so the results are site-specific.

Cost-benefit analysis: Cost-benefit analysis originally was developed to analyze water resource development. Over time, however, cost-benefit analysis also has been used to analyze project-level data from agricultural projects. This analysis is designed to assess the effects of agricultural technology packages as well as the supporting extension services and policy environment created by the project. Cost-benefit analysis now is being applied to natural resource management problems such as soil conservation at the farm level (Pagiola 1991). The analysis requires both biophysical data (yield losses and soil degradation) and economic data (costs and prices). It also requires data that are collected over time to capture the time-dimension of variables such as soil erosion. The analyses are site-specific but they often are aggregated to higher levels to guide project designs.

Information for PM&E usually will be generated by a limited number of data collection activities, due to budget constraints. For example, quantitative analyses such as cost-benefit

analysis may be limited to a few cases. Thus, despite the site-specificity of this analysis, the researcher often must "borrow" a missing characteristic from another, similar cost-benefit analysis to complete his work (Gittinger 1982). Statistical inferences made from analyses that use borrowed data are improved if the methods used in each case are well known. This is a strong reason for collecting information with standardized statistical methodologies such as the multiple resource inventory.

Key Data Analysis Methods and Their Uses for PM&E

Analytical Methods	Primary Use in Monitoring and Evaluation
Univariate (descriptive) statistics: • Describe one variable • Percents, mean, mode, median, standard deviation	Reporting on progress. These descriptive statistics often are used with qualitative analysis. They are the prerequisites for more complex quantitative analyses.
Graphical analysis: • GIS • Videography	Reporting on progress and managing for results. The data can be extrapolated and used to assess the relationships among variables if they are from random samples.
Qualitative analysis	Reporting on progress and programming. Qualitative analysis is used to formulate hypotheses and theories about causation, and to describe which changes occurred and how.
Multivariate analysis: • Chi-square • Regression analyses • Analysis of variance	Managing for results; suggest which variables may cause change. These techniques are used to identify and describe the relationships among variables. The results can be generalized if the data are from random samples.
Budget analysis: • Cost-benefit analysis • Domestic resource cost (DRC) • Policy analysis matrix (PAM)	Managing for results. These analyses produce site-specific information. The data generally cannot be generalized to other sites because they are produced by a variety of sources and sampling techniques.

I. Reporting and Disseminating Information

Performance monitoring and evaluation are first and foremost internal management functions: they provide information about the effectiveness of the actions to achieve SO and RP results and are an essential basis for SO and RP teams' informed decision making. The SO and RP teams are responsible for monitoring results that represent agreed-upon objectives with the next management level, and for planning any additional conditions or results needed to manage SO and RP activities. The SO and RP teams also are responsible for planning and implementing evaluations to test the RF hypotheses or to address the issues illuminated by the PM&E

information. This monitoring and evaluation enables SO and RP teams to assess the validity of the development hypotheses underlying their programmatic strategy and tactics, and to recommend changes in resource levels or expected results.

The use of standardized indicators should be encouraged for similar programs. This is particularly true for SOs and key intermediate results, which should be directly relevant to broader AID/W goals. The use of standardized indicators will facilitate AID/W's efforts to show external constituencies, including Congress, that USAID is producing measurable improvement in sustainable development. This section will discuss the role of reporting on results in the reengineered USAID.

I1. Reporting on Results

Reengineering has created several reporting levels with different emphases on reporting on progress and managing for results. Field activities are obligated funds which they use to report on their progress toward achieving the results identified by results packages. Results package teams report to the SO team about their progress and management for results. The SO team then reports to the mission regarding their RPs' progress toward achieving the key and intermediate results in the RF. The mission must aggregate the information from the SO team(s) to prepare their annual R4 for AID/W. These different reporting levels in the reengineered USAID that affect the dissemination of information are discussed in this section.

The paramount reason for designing and implementing an IMS is to produce reliable information about results. Reporting results is a USAID imperative, but it depends upon the commitment and actions of AID/W's partners. USAID's partners implement the field activities and collect much of the data for the IMS, so standardized reporting will be essential to produce useful information for the SO teams.

Managing Information

An information management system will help leaders make better decisions about policies and institutions, help farmers choose among NRM practices, and promote sound management overall.

I1a. Reporting at the Field-Activity Level

The field activities collect and analyze data on the SO performance indicators, and then provide that information to the SO team. The activities should report on the numerical changes in the performance indicators as well as providing information to help their partners understand the reasons behind these changes, both expected and unexpected. Reporting on changes in the indicators <u>and</u> explaining why those changes have occurred is complete reporting.

Reporting on Progress

The objective is to understand the meaning behind change, not just getting the numbers. Reporting only on the numerical changes in performance indicators is insufficient. Managing for results requires insight into the reasons underlying those changes.

Field activities will use their information systems to report on:

- The activity's objectives.
- The actual results of the activity.
- The unexpected results of the activity.
- The reasons for both types of results.
- The activity's strategic plans, based on the above information.

DESFIL example:

- In Botswana, DESFIL developed the format for NRM activity reports that shows key and intermediate results achieved over the life-of-activity for each of the program objectives. The activity reports show the chronological order of results that have empowered communities to develop the institutional capacity to manage their natural resources. The key and intermediate results are shown with quantitative and qualitative data. Results that will change over time are shown in shaded boxes with the qualitative statements in bullets that "tell the story of change."

I1b. Results Package Teams

Targets and performance indicators for measuring and reporting progress toward the RP results are built into the description of the RP. The RP teams must report on these topics so that the SO team can assess the validity of the assumed causal relationships between its strategies and its expected results. RP reports should provide the SO teams with information to assess their activity assumptions, their technical approach, and changes in external conditions that require reorienting their intervention. The RP reports must provide the basis for management decisions that the RP makes to manage for results effectively.

I1c. Preparing the R4 Annual Report

All the SOs in a mission will contribute information to prepare the mission's annual R4 report. The mission must develop a standardized reporting format so that the SOs present their information in the same format, to facilitate this task. The quality and quantity of the information available for the R4 will influence the mission's resources request. The major purpose of establishing an effective IMS is to ensure that the SOs have the proper quality and quantity of information for contributing to the R4, so that the mission can effectively"tell the story of change in sustainable development."

I2. Disseminating Information

Sharing information benefits all the stakeholders involved in NRM. USAID mission programs, host-country government agencies, NGOs/PVOs, and resource users must share information about NRM and NRM interventions. An NRM IMS can use different types of media to disseminate its information to stakeholders. The choice in media depends on the stakeholder who will receive the information.

Traditional printed documents are appropriate for many participants in the NRM area, but not for most resource users in developing countries, who generally are illiterate. Seminars, workshops, and conferences are preferable for sharing information with a range of participants. These means of dissemination allow different types of stakeholders to participate in the information-sharing process. Many NGOs currently are promoting farmer-to-farmer visits as an effective way to disseminate information at the village level.

The Internet is becoming an increasingly important system for disseminating information. USAID and its partners are working to facilitate the exchange of information between the developed and developing countries by linking them via the Internet. Hypertext and other electronic media will facilitate disseminating information about the lessons learned about sustainable development in agriculture and managing natural resources.

REFERENCES CITED

Adelski, Elizabeth and Philip DeCosse. 1995. *A Monitoring and Evaluation Plan for USAID/Niger's Strategic Objective Three*. Washington, D.C.: Chemonics International Inc.

Adelski, Elizabeth and John Lichte. 1996. *Rural Household's Knowledge and Use of Natural Resource Management Practices: A Pilot Survey in the Tillaberi, Tahoua, and Maradi Departments of Niger*. Washington, D.C.: Chemonics International Inc.

Agricultural Assessments International Corporation. 1992. *Area Sampling Frame Survey in Albania. Summary Report*. Upper Marlboro, Maryland: Agricultural Assessments International Corporation.

Anderson, Victor. 1991. *Alternative Economic Indicators*. London: Routledge Press.

Banta, Gordon R. 1982. *Asian Cropping Systems Research: Microeconomic Evaluation Procedures*. Ottawa: International Development Research Center.

Bernard, H. R. 1988. *Research Methods in Cultural Anthropology*. California: Sage Publications.

Besley, T, and A. Case. 1994. *Modeling Technology Adapting in Developing Countries: New Developments in Development*. American Economist Association Papers and Proceedings. Vol. 83, No. 2: 396-402.

Birkes, David and Yardolah Dodge. 1993. *Alternative Methods of Regression Analysis*. New York: John Wiley and Sons.

Casley, Dennis J. and Krishna Kumar. 1990. *Project Monitoring and Evaluation in Agriculture*. A World Bank Publication. Baltimore: The Johns Hopkins University Press.

Cochran, William G. 1977. *Sampling Techniques, Third Edition*. New York: John Wiley and Sons.

Crow, Edwin L., Frances A. Davis, and Margaret W. Maxfield. 1960. *Statistics Manual*. Mineola: Dover Publications, Inc.

Curry, J. J. 1994. *Framework for Applied Social Research, Monitoring, and Evaluation of Wildlife and Natural Resource Management for the Department of Wildlife and National Parks, Botswana*. Washington, D.C.: Chemonics International Inc.

Department of Statistics and National Accounts, Government of Niger. 1992. *The Demographic and Health Survey*. Arlington, Virginia: Macro International Inc.

Eros Data Center. 1995. *USAID/Senegal's Strategic Objective #2 Data Repository Manager (REPOMAN)*. Sioux Falls, South Dakota: U.S.G.S.

Fiebig, W. W., and I. S. Ouedraogo. 1994. *A Natural Resources Information Management System: DESFIL's Contribution*. A DESFIL discussion paper submitted to USAID. Washington, D.C.: Chemonics International Inc.

Fiebig, W. W., and I. S. Ouedraogo. 1995. *Monitoring and Evaluation Systems Using a Relational NRM Database*. A DESFIL discussion paper submitted to USAID. Washington, D.C.: Chemonics International Inc.

Fienberg, Stephen E. 1989. *The Evolving Role of Statistical Assessments as Evidence in the Courts*. New York: Springer-Verlag.

Gittinger, J. P. 1982. *Economic Analysis of Agricultural Projects*. A World Bank Publication. Washington, D.C.: Economic Development Institute, World Bank.

Gohagan, John Kenneth. 1980. *Quantitative Analysis for Public Policy*. New York: McGraw-Hill Book Company.

Hair, Joseph, Ralph Anderson, L.T. Ronald, and William C. Black. 1992. *Multivariate Data Analysis (Third Edition)*. New York: MacMillan Publishers.

Hassan M. Hassan and Charles Hutchinson (eds). 1992. *Natural and Environmental Information for Decisionmaking*. A World Bank Publication. Washington, D.C.: The World Bank.

Henry, Gary T. 1990. *Practical Sampling. Applied Social Research Methods Series, Vol 21*. Newburry Park: Sage Publications.

Johnston, George and Hilary Lorraine. 1994. *The Green Book* (Three Volumes). The Regional Environmental and Natural Resources Management (RENARM) and Development Strategies for Fragile Lands (DESFIL) projects. Washington, D.C.: Chemonics International Inc.

Kite, R. 1994. *ZTAB Program*. Washington, D.C.: USAID.

Kite, R., M. Keita, and L. Thiam. 1993. *The USAID/ANRO Knowledge, Attitudes and Practices Survey Report*. Dakar, Senegal: USAID/Senegal.

McGahuey, M. 1993. *USAID Africa Bureau NRM Analytical Framework*. Personal communication.

Monke, Eric and Scot Pearson. 1989. *The Policy Analysis Matrix for Agricultural Development.* Ithaca: Cornell University Press.

Norusis, M. J. 1993. *SPSS for Windows. Advanced statistics release 6.0.* Chicago, Illinois: SPSS.

Pagiola, Stefano. 1991. *Use of Cost-Benefit Analysis and the Policy Analysis Matrix to Examine Environmental and Natural Resource Problems.* Agricultural Policy Analysis Project, Phase II Collaborative Research Report No. 336. Bethesda, Maryland: Abt Associates Inc.

Painter, M. 1995. *An Approach to Monitoring and Evaluating Community Based Natural Resource Management Activities.* Botswana Natural Resources Management Project. Washington, D.C.: Chemonics International Inc.

Pelto, P.J. 1970. *Anthropological Research: the Structure of Inquiry.* New York: Harper and Row.

Pratt, B. and P. Loizos. 1992. *Choosing Research Methods, Data Collection for Development Workers*, Development Guidelines No. 7. Oxford, England: OXFAM.

PVO-NGO/NRMS Project. 1996. *Combatting Desertification Worldwide.* Geneva, Switzerland: Interim Secretariat for the Convention to Combat Desertification.

Rojas, M. 1994. *A Guide to the Process of Participatory Research.* DESFIL Reports No. 3. Washington, D.C.: Chemonics International Inc.

SECID and Virginia Tech. 1996. *CBNRM Monitoring and Information System.* Summary Assistance Report No. 6. Blacksburg, VA.

Seyer, Philip. 1991. *Understanding Hypertext: Concepts and Applications.* Blue Ridge Summit: Windcrest/McGraw-Hill.

Shneiderman, Ben and Greg Kearsley. 1989. *Hypertext Hands-on! An Introduction to a New Way of Organizing and Accessing Information.* Reading: Adison-Wesley Publishing Company.

Tunstall, Daniel B. 1994. "Developing and Using Indicators of Sustainable Development in Africa: An Overview," in *Proceedings of the NESDA Workshop on Indicators of Sustainable Development in Africa.* Banjul, The Gambia, May 16-18, 1994. (NESDA: Network for Environment and Sustainable Development in Africa; Reseau pour l'Environnement et le Developpement Durable en Afrique).

Weber, Fred R. 1991. *NRM Indicator Catalogue for Use with NRM Framework.* Washington, D.C.: USAID.

ANNEX A
USAID/SENEGAL:
An Information Management System for Strategic Planning and Reporting on an Agriculture and Natural Resources Strategic Objective
by William Fiebig and Michael Selhorst

A. Background

DESFIL, working in collaboration with AFR/SD/PSGE/NRM, was requested to assist USAID/Senegal in the conceptualization and implementation of an information management system (IMS). The IMS provides the mechanism for the collection, management, analysis, and dissemination of information on mission-funded NRM activities in Senegal.

In support of the USAID/Senegal's SO#2 - **Increased crop productivity through improved natural resources management in zones of reliable rainfall** - DESFIL assisted in the design and implementation of SO#2 information management system (IMS). Performance monitoring and evaluation (PM&E) of results needed to achieve this objective is an ongoing responsibility of the strategic objective (SO) team and results package (RP) teams. The RP is used as the basic unit for data collection since the targets and performance indicators are built into the RP. Monitoring also includes significant feedback from USAID customers and partners. In addition to providing information on progress in implementing an intervention or achieving an objective, PM&E is used to:

- Continually test the validity of assumptions.
- Determine if the technical approach is workable.
- Determine if the external circumstances have changed to the degree that the intervention needs to be changed.
- Ensure that the continuing causal relationships cited in the strategic objective are still valid.

Performance monitoring is relevant to management review, accountability, and improvement. It focuses almost exclusively on tracking progress in achieving planned results and analyzing the difference between expected and unexpected results.

DESFIL has contributed to the development of an information management system using an array of informational tools, including a relational database, that helps USAID/Senegal effectively meet their goals, while minimizing, in the medium- and long-run, their management burden. These goals include: (1) establishing a more effective tracking and monitoring system, and (2) analysis to improve programming effectiveness.

This field support to USAID/Senegal has helped to design and implement a process to develop a prototype IMS consisting of a category of information management tools:

- A needs assessment strategy.
- Methodologies to select sampling frames.
- Data collection tools (survey instruments, PRA).
- Relational, dynamic, and multidimensional relational database.

- Navigational (menu) and query programs that allows staff to access data and conduct analyses to provide information to answer key NRM questions.
- Information dissemination systems.

An objective is to assist SOT#2, their field activities and other partners discuss the implications of re-engineering on their existing use of field data. Field activities and their partners are essential as data sources to provide the information needed to report on progress and manage for results.

B. Work Provided by DESFIL

B1. Information Needs Assessment

DESFIL developed a strategy to determine what information would be generated for the SOT#2 under their results framework (RF). In-depth interviews were conducted with all existing field activities in 1995. The following questions were posed to the field activities:

- What is/are the principle objective(s) of the activity?
- What information is needed to report on results?
- How are these data collected?
- How are these data organized and managed?
- What analyses are currently done with these data?
- What is done with the information that they have now?
- What hardware and software is available for information management?
- What staff is available for information management?
- What are the capabilities and training needs of the information management staff?
- What concerns exist relative to collecting, managing, analyzing, and sharing the kind of data needed by the SOT#2?
- What are the principle constraints to participating in the IMS?

B2. Results Framework/Result Packages

Based on an analysis of the types of information being generated by the SO#2 field activities, these categories of field data were placed under the appropriate key and intermediate results in the SO#2 RF. This identified the results where existing field activities could report on and the results which were not part of the current focus of field activities.

In August, 1995, the SOT#2 organized a conference where USAID partners - GOS ministries, Extension, other donors, and NGOs - where assembled to discuss a draft RF and came to a consensus of key and intermediate results needed to be achieved in order to achieve SO#2. The level of engagement, innovativeness and quality of the discussions were notable. But more importantly, there was a consensus that building the framework was an important part of an evolving and participatory process to build, field test, and update the SO#2 development hypothesis.

A follow-up workshop was held in March, 1996, to finalize the RF and to discuss, refine and ratify the RPs which would be implemented to report on and manage for the key and intermediate results in the RF. The approved RPs consisted of the associated intermediate results, enabling conditions, and performance indicators.

B3. Core Dataset

Following the needs assessment and RF/RP workshop in June-August, 1995, a SOT#2 and partner working group was established under the leadership of the ANR Core to define a common framework to: (1) define a core dataset (Figure 1) to be included in the SO#2 data repository of field data needed to report on performance indicators (i.e., the variables required to measure performance indicators), and; (2) define and establish data collection and reporting methods (e.g. the field-level survey instrument for the core dataset was designed and field-tested; periodicity for data collection was established; data file formats were developed for transfer/exchange and sharing of analysis results among all players/partners). The survey instrument designed and field tested by DESFIL was then made available for all field activities to pre-test in their specific zones of intervention to take into account local specificities.

C. Informational Tools

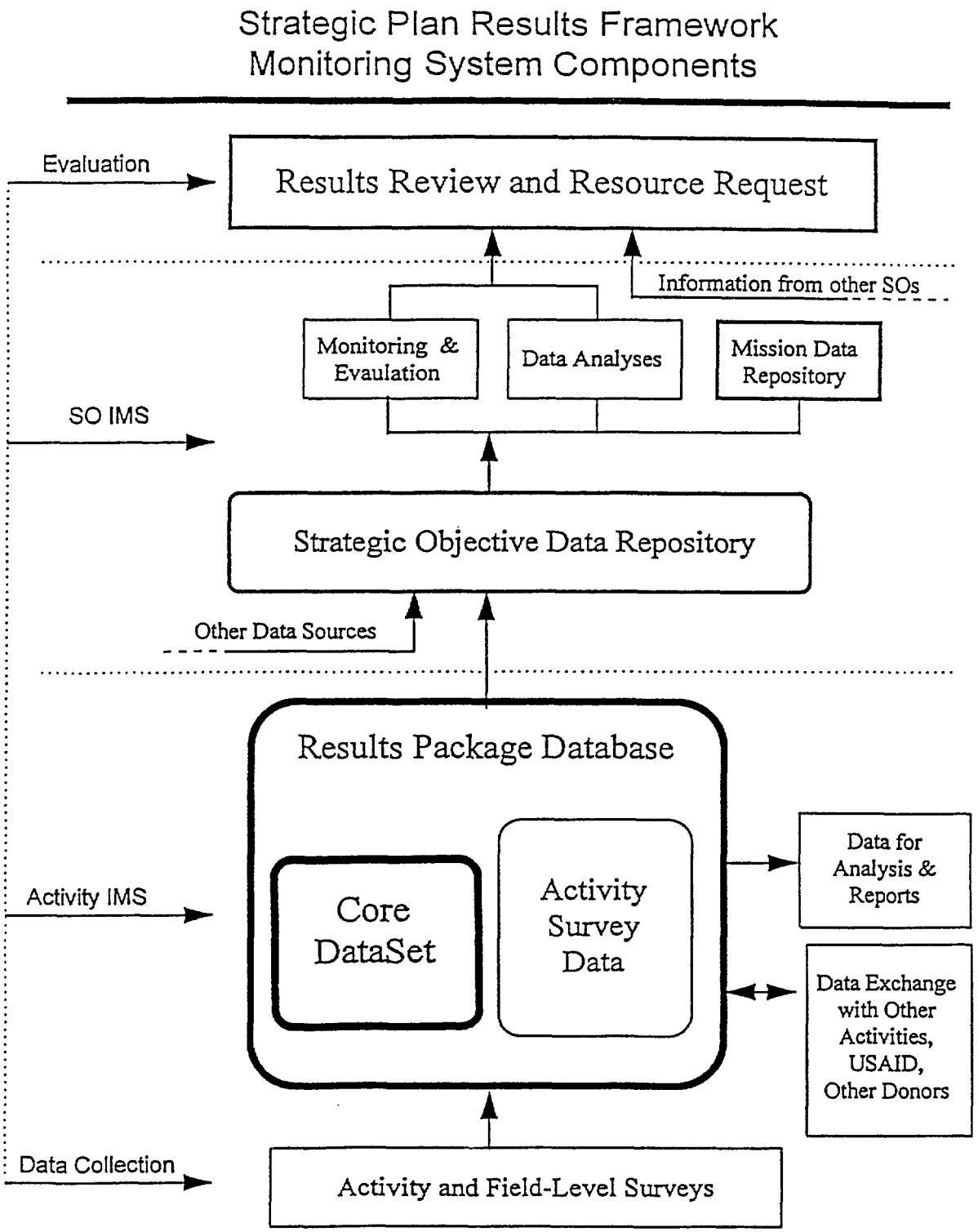
The SOT#2 and their field activities have been discussing the types informational tools which might be considered and their options based on the informational needs to report on results. The following is a discussion of various aspects of each tool and some examples of how various field activities have used them.

C1. Sampling

The choice of selecting a sample depends on several factors, among which are the following: the nature of the problem, cost and time factors, and the desired reliability (and precision) of results. Taking all these factors into consideration, the ANR Office decided that the 1992 Knowledge, Attitudes, and Practices (KAP) survey should use the sampling method employed by the Senegalese Department of Statistics for the World Bank-funded Priority Survey (Kite et al., 1993). By doing so, the ANR Office was seeking comparability between the two surveys. Variables in the KAP database include data on:

- Characteristics of the rural population.
- Resources controlled and used by the rural population.
- Natural resources management practices.
- Land and tree ownership and use.
- Markets and marketing problems.
- Revenue and expenditures.

Figure 1.



12 Apr 96: IMS_DBMD.PPT

65

A multi-stage sampling which involved two stages was used as follows:

Stage 1. The target population in the five regions (Fatick, Kaolack, Tambacounda, Kolda, and Ziguinchor) covered by the Mission's CPSP was divided into census districts as defined by the 1988 general census. This yielded 2,361 census districts. Of these, 106 were selected with probability to be included in the sample proportional to the number of households in the District. Each of those 106 Census Districts was assigned an enumerator.

Sampling Frame and the Distribution and Size of the Rural Household Sample

REGIONS	Total Number of Rural Census Districts	Number of Census Districts Selected	Number of Households Selected
Fatick	439	22	330
Kaolack	741	31	465
Tambacounda	364	18	267
Kolda	547	21	315
Ziguinchor	270	11	155
TOTAL	2,361	103	1,532

Stage 2. Fifteen households were randomly selected from each of the 106 Districts. Selection was made from the list of households established for each of the selected Census Districts. A total of 1,590 households were selected for the interviews. Due to some difficulties which were experienced in the field during the survey, there were 1,532 households actually included in the survey activity.

In the CBNRM/Senegal Program's Monitoring System (SECID/Virginia Tech, 1996), data gathering will be operating at two levels: the national and the local. The national level will be stratified for data collection purposes into the six major Eco-Geographical Zones of the Office for Water and Forests (*Direction des Eaux et Forêts)*. The sum of a particular parameter estimated at the level of each of these zones may provide reliable national population estimate for that parameter. Whether it does or not depends on the sampling method applied at the zonal level. The NRM KAP study was designed to provide such a capacity. All subsequent broadly based, quantitative, village and household-level surveys should follow the procedures established for that study.

C2. Sampling Considerations of Special Studies

Some special studies designed to provide in-depth understanding of particular themes that the CBNRM Program wishes to address may not provide population estimates for either the national or the zonal population. To the extent that these studies involve quantitative data on specific populations, careful specification of the sampling framework will be necessary to allow for reliable comparisons. Valid comparisons of a qualitative nature may also be legitimate without assuring statistical reliability. These latter must rely upon the good judgement of the researcher and strong theoretical grounding.

The local level will be represented by the specific rural communities [*Communauté Rurales* (CR)] in which the CBNRM program is active. Some indicators at this level will be the actual population parameters (such as, total population, number of villages, number of micro-activities, number of participants in micro-activities, etc.). These are statistics which can be easily gathered for the population as a whole. Other indicators will need to be estimated from samples. Such is

the case for data on the NRM perceptions and practices of individual men and women as measured in the household survey of the baseline for each CR.

The direct collection of population parameters and sample data within the CRs should be organized according to the groups of villages [*Zone Terroirs (ZT)*] composing the CR. This facilitates the use of this information in NRM planning and implementation, reinforcing the role of the village representatives. Sampling should be proportional to the population of the respective CR.

Total sample size of households may vary between 120 and 200 (i.e., 240-400 individual interviews), depending on the level which best reflects the distribution of population proportions within the CR. This will provide a representative sampling where each member of the population has an equal chance of being selected.

The CBNRM Sampling Method at the Local Level

1. Arrange the villages lists of households according to the size of population within each *Zone Terroir* (ZT).
2. Determine the total population for each ZT.
3. Establish a minimum sample size of not less than 30 for the smallest ZT (40 should be standard; 60, if there are only two ZTs), then calculate sample size for the other ZTs proportional to their populations (for example, if ZT1 = 240, ZT2 = 300, and ZT3 = 330, then n1 = 40, n2 = 50, and n3 = 55, for a total sample size of 145 households).
4. Systematically select every j-th house hold from lists of households in each ZT starting from a randomly selected household on the list (where j = ZT/n).
5. Interview both the household head and the leading wife in each selected household.

C3. Data Collection

Data collection by SOT#2 field activities will be done at two levels. First, the CBNRM program will design and implement the KAP survey questionnaire, using the sampling methodology described above, beginning in 1996. The CBNRM KAP questionnaire will be based on the structure of the ANR 1992 KAP survey questionnaire adapted to the informational needs of the CBNRM program.

CBNRM Data at the Household-Level

1. Household characteristics and assets
2. Principle and secondary activities
3. Food and/or cash crops grown
4. NRM practices used
5. Sources of knowledge about NRM
6. Reasons for using/not using NRM practices

Secondly, the SOT#2 field activities have field tested the questionnaire that DESFIL developed for the SO#2 core database. The questionnaire will provide data on the variables which will allow SOT#2 to monitor progress of field activity efforts to achieve results under the SO#2 RF. This core questionnaire will most likely be refined over time as variables are identified which are needed to complement the original core set of variables identified by DESFIL. The questionnaire may also be revised as the SO#2 performance indicators monitored by the SO#2 RPs are field tested.

C4. Data Storage and Management

The 1992 KAP survey administered a questionnaire of 64 questions, many of which had multiple components, which after data transformation led to some 800 variables in a huge (over 8

megabytes) flat database. DESFIL, using two software programs developed by Rod Kite (1993, 1994), transformed the flat KAP database into a relational database comprised of a number of data tables for further analysis. This required extracting variables from the flat database according to specific categories using the Kite extraction program and saving them in data tables in the database (.dbf) format. These tables then can be imported into any spreadsheet software or relational database management software, such as FoxPro or Paradox.

The SO#2 core database consists of a number of data tables with a core set of variables which will be developed by all field activities being managed by SO#2 RP teams. The field activities will use the core questionnaire to collect data on the core variables and will enter and manage these data using various database management programs. At a specified time, all RP activities will export these data tables in their core database to .dbf format and provide the diskettes to the SO#2 database manager for entry into the SO#2 data repository which was developed for USAID/Senegal by the EROS Data Center (1995). These compiled data will then be shared by the SOT#2 with their partners - the GOS, NGOs, and contractors.

The SOT#2 RPs, as organizational and management tools, themselves need not be monitored and reviewed using these core data. What will be monitored and reviewed are the results included in the SOT#2's core database, and, at least presumably within the respective RP teams, implementation progress of the activities included in the RPs. Reports on results will be assembled annually for the Results Review (the first R2) process. The use of the core dataset will focus on the results being achieved in the field, not on individual activities being used to achieve those results. The SOT#2 and RP managers will also need to use these data to keep themselves informed about the implementation progress. At a minimum, such monitoring will act as an early warning sign that results may not be achieved in a specific area. The core database will also include data from special research studies and evaluations which will help determine why certain results (expected and/or unexpected) are occuring.

The core database will allow the SOT#2 to monitor progress of their two RPs, one of which focuses on research to develop demand-driven NRM technologies (RP#1) and the other to strengthen extension/outreach organizations (RP#2). For example, a performance indicator for the intermediate result -- *rural population has increased access to improved NRM practices* -- is the percentage increase of farmers reporting their knowledge and use of improved NRM practices. The core dataset will allow the SOT to determine where their activites are conducting training sessions, the number of men and women being trained, following the numbers of users/nonusers after training, determining differences in crop yields and degradation rates over time, and to identify incentives (enabling conditions) and/or constraints (policy implications) relative to the use/nonuse of these NRM practices.

Another important source of data available to the SOT# 2 are the field activity databases (see box on page A-8) which DESFIL has designed based on the informational needs identified by the NGOs who work with USAID/Senegal. The database contains data on the work that each NGO is doing within their activity on a day-to-day basis. These data help the NGOs to meet other reporting requirements that they may have for their monthly reports to their home offices, for quarterly reports to USAID, etc.

These data are not meant for statistical analysis, as the nature of the data mainly descriptive, allowing the NGOs to describe where they are working, with whom, where training

has been done and for which purpose(s), which problems are being addressed and describing the types of interventions that they are making. The descriptive nature of these data also allow the NGOs to track the results of their programs and to report on their impacts within their zone(s) of intervention.

One of the most important uses of these data will be to provide the qualitative information which will describe or help explain unexpected results which occur in the field. The SO#2's RPs will have access to these data on a to-be-determined basis and can link the activities results and impacts to the funding provided through the RP.

Data Tables in the SO#2 Activity Database		
1.	Locator Data	LOCATOR.DB
2.	Partner Information	PARTNER.DB
3.	Data on Problems Addressed	PROBLEM.DB
4.	Data on Enabling Conditions	COND.DB
5.	Data on Interventions	INTERVEN.DB
6.	Training and Education	TRAINING.DB
7.	Data on Results Achieved	RESULT.DB
8.	Data on Impacts	IMPACT.DB
9.	Data on SO#2 Obligations	OBLIGAT.DB

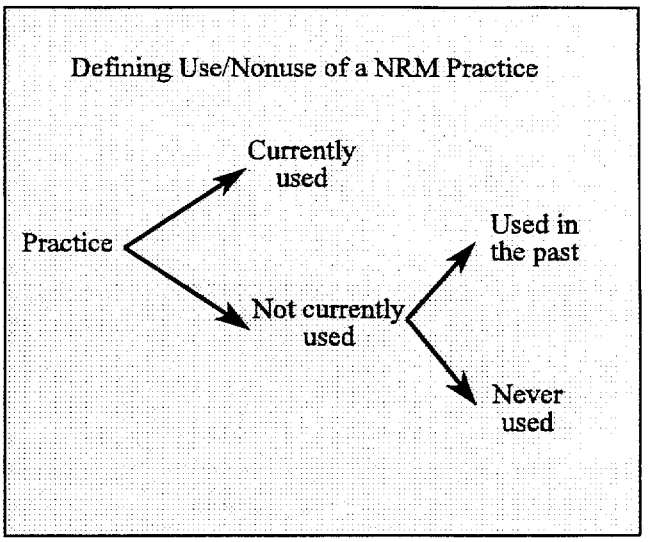
C5. Data Analysis

Kite, Keita, and Thiam (1993) have reported results of the 1992 KAP survey, establishing key baseline data. They analyzed characteristics of the rural population by gender; primary activities of household family members; resources controlled and used by rural households; natural resource management; marketed and marketing with revenues and expenditures. The KAP data is rich and its random nature allows valid and interesting statistical manipulation. Additional analyses can take advantage of the richness and random nature of the KAP data, when combined with the core database, to answer basic NRM questions, such as:

- For each agroecological zone, what is the inventory of land-use management practicces currently being used at the community and/or household level?
- For each practice or set of practices, what are the impacts on the rates of degradation of soil, vegetation, wildlife and water?
- For each practice or set of practices, how do expected yields compare with actual yields and how do yields of those using the practice(s) compare with yields of nonusers? Do increased yields justify additional costs associated with the use of the practice(s)?
- What are the enabling conditions associated with the adoption of those practices?
- What are the programmatic options for establishing each enabling condition? What are the estimated costs to the host-country government of establishing the conditions using various program options? What are the implications of doing nothing?

DESFIL conducted an analysis of the 1992 KAP data after restructing the data into a relational database (Fiebig and Ouedraogo, 1995). Much of the analysis was done by use or nonuse of NRM practices. Who is a user or nonuser of a NRM practice is a simple question only

on the surface. The 1992 KAP survey asked about the last time households used a NRM practice. Quite a few households have never used several of the practices identified. For those who had, responses ranged from 1962 to 1992, the survey year. Based on these responses, households may be divided in two categories as users and nonusers. There are different ways of defining a user/nonuser (see box).



Depending on the purpose on hand, the definition of user/nonuser may be more or less restrictive. For practices that imply a short-term investment, such as composting and fertilizer use, restrictive definitions seem appropriate. A user can be defined as one currently using the practice. A nonuser, on the other hand, would be either as one not currently using or one that has never used it. For practices that imply a longer-term investment, such as dam building or tree planting, a less restrictive definition of user may be acceptable. For example, a user could be defined as one that is either currently using the practice or has used it in the (recent) past. There may not be need to plant field trees every year, so that households that have planted field trees in 1992 but did so in recent past (1990 or 1991) may still be considered "users" of this practice. Here, "using field trees" can be interpreted not only as planting, but also including care and maintenance of the trees. Note that 1992 KAP survey did not ask how long households have used the practice. Therefore, it is not known whether those households who have used a practice were long-time or first-time users.

The box above also shows that this seemingly simple user/nonuser dichotomy may actually mask valuable information. Some households have used a practice in the past, but chose not to, or could not do so presently. Past users of short-term investment practices may be viewed as "quitters." There are households that used a practice and then "abandoned" it. An important issue in this survey is the lack of data to explain why they quit using the practice(s). This identifies a critical variable(s) needed in the relational database to be able to answer the question: *why are past users no longer using NRM practices?*

As a way of standardization, this analysis was based on the following definitions: we defined a user of a NRM practice as that household currently using the practice(s) in 1992. A nonuser was defined as a household that has never used it or was no longer using the NRM practice(s).

The array of NRM practices identified by the 1992 KAP survey were analyzed using a commonly used typology which groups practices as agroforestry, soil & water conservation, and soil fertility enhancement practices. Data on the use/nonuse of these NRM practices were disaggregated and analyzed by gender. A regional breakdown on the use/nonuse of practices was also conducted. Profiles of users and nonusers were developed and disaggregated by gender. The profiles included personal characteristics, household assets, and type of activities. Manageable

70

determinates such as market constraints, land tenure issues, and the impacts of extension and/or activity activities on the use/nonuse of NRM practices were also examined.

C6. Dissemination

It has been agreed the SO#2 field activities would use participatory evaluations with community partners to determine the results and impacts from their activities.

Reporting the results achieved by NGOs and other SO#2 partners to the SOT#2 is one of the most important and most interesting parts of the PM&E system. All too often evaluation results are reported only by staff, researchers and experts; people at the community level usually take little part in deciding what the results are, how they will be reported, and most importantly how they should be used. Many written evaluation reports are full of complicated statistics and difficult words. They are not intended to be understood by those outside of ministries, departments, organisations, funding agencies, universities, etc.

In the PM&E system, program staff and community participants go through all the stages of planning and carrying out the monitoring and evaluation of SO#2 activities. They are then ready to participate in the preparation of a report on their analysis and interpretation of results from what they have found. They are also better able to see program strengths and weaknesses, and to decide which plans need to be made for future actions.

In an evaluation, results will be presented in various forms. For example, such presentations may be brief reports prepared by different individuals and groups, unstructured survey and some questionnaire results, and numerical results that will need to be turned into simple percentages.

PM&E results are expected to show:

- The program objectives and which problems are being addressed.
- Which enabling conditions are being established to ensure successful adoption.
- Which interventions are undertaken.
- What actually happens.
- The expected and unexpected results.
- The expected and unexpected impacts.

Exactly who does what in reporting the results will depend on the purpose and methods used in each PM&E activity. With some training some participants at the community level can also analyze and report on PM&E results numerically. However, it is essential that they understand the meaning behind such results and that the presentation does not become merely an execise in adding up numbers.

D. Lessons Learned

- As the core database system evolved, USAID's partners played an increasing role as they adhered to the mission's approach of management for results. Overcoming the "activity"perception - doing what their contract and LOP workplans say they are supposed to do - and orienting to reporting on progress and managing for results was difficult. The process started slowly, but with continuing involvement of all players, progress has been accelerating over the last year, thus indicating committment of all partners (USAID/Senegal, GOS, NGOs, PVOs, other donors, and the rural population).

71

- A number of issues came up during the process which were not anticipated in the beginning but had to be addressed. Examples are the lack of standard sets of definitions for various terms and/or concepts, utilization of the electronic-mail in transfer/exchange of data/information files and analysis reports, and access to the local LAN by partners.

- Collecting PM&E data has its associated costs. The SOT must realize that if the types of data needed to report on progress and manage for results is to be provided on a timely basis, then financial and human resources must be budgeted accordingly. It is still not clear who will take the lead to implement the PM&E system, and how the costs of the system will be met.

ANNEX B
USAID/NIGER:
Designing and Implementing a Natural Resource Management Pre-Test Survey
by Elizabeth Adelski

A. Background: Pre-Test Survey Objectives and Context

In 1995 the Natural Resource Management and Agriculture Unit of USAID/Niger contracted DESFIL to design and conduct a Pre-Test Survey (PTS) focused on rural peoples' knowledge and use of NRM technology. The PTS's primary objective was to serve as a pilot exercise for the mission's large, national-level baseline NRM survey scheduled for 1996. The PTS therefore was designed and implemented to pre-test *each phase* of the 1996 National Baseline survey, beginning with the sample and questionnaire design and concluding with the data entry and analysis. This included pre-testing collaboration with the Government of Niger (GON) to conduct a survey of NRM technology. The PTS's secondary objective was to produce pre-baseline, working information about rural peoples' knowledge and use of NRM technology. This information was to provide a preliminary view of the status of the SOT's NRM indicators for the mission to use in its 1996 R4 report. The entire PTS, including analyzing the survey data and producing the final report, was completed in seven months at a cost of approximately $200,000.

Based on the PTS's primary objective, USAID/Niger required four specific, major products from the PTS:

- An extensively field-tested NRM survey questionnaire.
- Information on the distribution of NRM techniques to help design an appropriate sampling strategy for the 1996 survey.
- An evaluation of the technical and support capacity of the GON institutions that would be the mission's principal collaborators for both the 1995 and the 1996 surveys (mainly the Department of Statistics and National Accounts, and the National NRM Program Unit).
- Technical recommendations for the entire process of designing and implementing the 1996 national-level NRM baseline survey.

The context for the PTS was USAID/Niger's need for national-level information to evaluate the results of its policy reform activity (the Agricultural Sector Development Grant, Phase II) and to link the mission's NRM program with the Government of Niger's national NRM program. In 1995, donors invested approximately half a million dollars in NRM in Niger, but monitoring and evaluation activities and information about NRM at the national level did not exist. Individual donors were collecting a range of region- and farmer-level NRM data, but the data could not be aggregated to the national level due to different M&E objectives and the use of different methods. Thus USAID/Niger, as well as the GON and all donors, had limited knowledge about the types and distribution of NRM technology nationwide. *This lack of national-level information was critical.* The PTS was designed as the first step in addressing this critical information gap,

- 73

by testing the methodology for the mission's national survey of NRM technology in 1996. *The PTS also was a major step toward coordinating research with the GON's national NRM program and making national-level information about NRM available in Niger.* Information from USAID/Niger's PTS and the 1996 survey would help the mission assess the results of policy reform and contribute to the GON's overall knowledge of the impact of NRM projects. Both surveys would collaborate with the GON's national NRM program, so that the work and the data would forge links between the NRM programs of USAID/Niger and the GON.

B. Focusing on Information Needs: The NRM Indicators

The starting point for designing an M&E activity is identifying the types of information that it must generate, and how they will be used to meet reporting requirements. USAID/Niger's NRM SO provided the broad basis for understanding the SO team's general information needs. That SO is: "the sustained widespread adoption of management practices improving the conservation and productive use of Niger's forests, fields, waters and pastures." Thus, to evaluate the impact of the NRM program, the NRM SO team needed to monitor changes in the types of NRM techniques that rural men and women adopt and/or use. DESFIL focused the PTS and its data collection instruments on this information need and on the SO team's specific information needs in the form of its six NRM indicators (see box below). The indicators were converted into the core questions on the survey questionnaires. Two indicators from another SO for rural development also were included in the survey questionnaires because they are linked to the NRM strategic objective. The PTS also collected some information about the rural population's socioeconomic characteristics to explore factors that may affect people's knowledge and use of NRM technology.

The PTS showed that some of these indicators were impractical to operationalize and to measure. It also showed that the target figures for some indicators already were met or exceeded. Revising the indicators to make them more appropriate and measurable thus was a major recommendation of the PTS. The problems with the NRM indicators and the recommended revisions are discussed in Section D: Lessons Learned.

USAID/Niger's Six NRM Indicators

Percentage of male and female household heads that:

- Report using one or more new NRM technologies.
- Have heard about the Rural Code.
- Can identify at least one new NRM method.
- Can describe at least one NRM practice used in another village.
- Have access to market and climatic reporting services.
- Report having access to credit.

C. Pre-Test Survey Methodology: Sample and Questionnaire Design, Training, and Data Analysis

C1. Designing the Survey Sample and Questionnaires

The survey sample. Because the PTS was specifically designed as a pilot study to be completed in a short time and the survey data were of secondary importance, the actual field work (interviewing) arbitrarily was limited to one month. This time frame was one factor that affected the size of the survey sample. The fact that the types and distribution of the NRM techniques used by rural Nigeriens are not well documented in Niger, particularly at the regional and national levels, was the other factor that made choosing an appropriate sampling strategy problematic. Without good information about who and where the NRM users and nonusers were in Niger, we had to make some assumptions about how to design a sample that would adequately

represent these populations. *We assumed that rural people's knowledge and use of NRM technology were relatively rare (rather than common) variables and that they would most likely be associated with operational, village-level NRM projects.* To ensure that the limited PTS sample would include NRM users, we defined two strata: (1) villages that currently were working with NRM projects and, (2) villages that were not.

We also assumed that people's knowledge/use of NRM technology would be different in different areas of Niger. Therefore, we chose three different geographical areas and agricultural systems for the sample. (The time limit of one month for field work limited us to three of Niger's nine major agricultural systems). We chose the three areas for two reasons: (1) to field-test the questionnaire in different social and environmental contexts; and (2) to produce data that would provide some insight into the differential distribution of NRM technology. The sample also included one agropastoralist village (Peulh or Touareg ethnic groups) in each area, for these same reasons. We relied on our Nigerian colleagues to recommend areas that were agriculturally different and logistically possible to survey within a month; the final choice was made by consensus with the SO#3 team. The NRM projects in each area were chosen based on our colleagues' recommendations and the consensus of the SO#3 team.

Criteria for the PTS Sample

The PTS survey sample was designed to:

- Ensure that NRM users, who were assumed to be a relatively rare variable, were included in the sample.
- Include variation in resource bases and agricultural production systems.
- Be a size that could be surveyed within the one month allocated for fieldwork.

The final PTS sample consisted of 18 villages, six villages in each of the three geographical areas. Three villages in each area were working with NRM projects and three were not, so that the final sample consisted of nine project villages and nine nonproject villages. The survey team generally surveyed one village per day and was able to interview six to nine households and one village group each day. The unit of sampling and analysis for the PTS was the household. (We defined *household* as the group of people who worked their collective fields together and ate from the same granaries.) Random samples of households were chosen from the village chiefs' lists of tax-paying households; when these lists were not available, the village chief was asked to identify representative households to be interviewed. (Our technical recommendations regarding sampling are at the end of this case study). **A total of 135 households was surveyed**. Both male and female household heads were interviewed so the survey produced 135 men's questionnaires, 135 women's questionnaires, and 18 village questionnaires.

Designing the survey questionnaires. We focused on the SO team's information needs, in the form of its indicators (see box on preceding page), to design the survey questionnaires. Each indicator was operationalized (transformed) into several questions to obtain the necessary information. For example, field testing showed us that several questions were necessary to measure the indicator, "the percentage of male and female household heads aware of the Rural Code." We found that some people knew about the Rural Code by that name but that more people knew about it in terms of its major themes, such as the need for peaceful relationships between farmers and herders or the settlement of land tenure conflicts. Similarly, documenting the NRM techniques that people were using required asking them questions about several topics, including their management of crops, trees, livestock, and water.

75

Three questionnaires were designed for the PTS: one to interview men, another to interview women, and another to interview village groups (the men's questionnaire is at the end of this annex). All three were structured questionnaires (set questions that the interviewers asked uniformly) and precoded (all the responses were recorded using numerical codes). The men's and women's questionnaires contained identical questions on the NRM indicators so that the survey produced separate datasets for each sex, and also so that these two datasets could be combined to obtain household-level data. The men's and women's questionnaires focused on the individual management of private resources (households' fields, trees, and pastures). The village questionnaire focused on community infrastructure, and communal resources (water, pasture, trees) and their management. The village information was collected to assess the association between village-level factors (such as access to markets, credit, and technical assistance for agriculture and NRM) and individual or group NRM behavior in the data analysis.

Each Indicator Is Transformed into Multiple Questions on a Questionnaire

Generally, several questions are required to obtain the information on one indicator, as the Niger questionnaires show (see questionnaire at the end of this annex). This is an important reason for prioritizing information needs and making them the core of a questionnaire: it focuses the researcher on his/her research priorities and delimits the essential scope of the questionnaire. If a survey questionnaire (or other data collection instrument) cannot accommodate all of an SO's information needs, then the SO team must review those needs and decide what combination of

Using standardized codes to record data. In addition to the questionnaires, a precoded list of NRM techniques was used for interviewing (see the list of terms at the end of this annex). The list, in French and in Niger's two major national languages (Hausa and Zarma), was divided into four categories of NRM techniques (for fields, trees, water, and pasture). Each technique was given a numerical code. The interviewers used the coded NRM list to record *all* the responses about NRM techniques, so that the data about NRM techniques from all three questionnaires could be compared directly and aggregated easily. For example, during data analysis, we were able to tabulate the NRM techniques that:

- *men* used with trees.
- *women* used with trees.
- *households* used with trees (this data was produced by aggregating the information from the men's and women's lists).
- *villages* used with trees.

Using standardized, numerical codes to record people's responses on different questionnaires (or other data collection instruments) is useful and efficient for both recording and analyzing data. We also had standardized, numerical codes to record information such as sources of knowledge of NRM techniques, crops cultivated last season, type of fields cultivated, and sources of cash credit (see the questionnaire). This allowed us to compare, for example, men's and women's sources of credit, and then aggregate them to the household level, as well as to directly compare the sources of credit in different villages. One important reason for using standardized codes, particularly for long-term PM&E that includes periodic follow-up studies, is that the code lists are easily expanded over time to include new information and still allow direct comparison with older information. Using standardized codes is efficient because it:

- Speeds the job of the interviewers, who soon learn the codes for the common responses.
- Allows the easy separation and aggregation of different datasets for analysis.

- Allows adding additional codes to the standardized list of responses, which permits the researcher to simultaneously expand them and maintain direct comparison over time.

Field-testing the survey questionnaires. The process of drafting the survey questionnaires, field-testing them, revising them, and negotiating their form and content with the SOT took about two months. Each of these step was repeated several times until the questionnaires were finalized. The questionnaires were field-tested in 14 different villages and five different agricultural systems, to ensure they would be usable in different areas. A week of field-training the eight-member survey team resulted in additional revisions in the "final" questionnaires. The month of surveying 135 households showed us that further revisions were necessary to produce "final draft" questionnaires for the 1996 survey. The questionnaires would need to be revised because we recommended revising the NRM indicators, which in turn meant that they would need to be revised, which would require additional field-testing.

This iterative process is standard and necessary to produce sound questionnaires (or other data collection instruments). Time for this process must be built into an M&E program, as USAID/Niger did. It is an essential, up-front investment necessary for producing sound data and a form of "market research" that *must precede* investing time and money in the next steps of the M&E process. A striking example of the need to pre-test survey instruments is the Demographic and Health Survey (DHS). The DHS, which uses field methods and questionnaires that took approximately 25 years and $30 million to develop, is conducted regularly throughout the underdeveloped world. Its methods and questionnaires set a standard of quality for surveys. In 1992, the DHS invested six months in designing, pre-testing, and finalizing its "standard" questionnaire for use in Niger: three months to design and translate it, two months to pre-test it, and one month to finalize it (Macro International 1992). The investment obviously is necessary and valuable.

The potential costs of *not* investing in solid "ground-truthing" of data collection instruments include:

- Time and money lost to clean up data after it is collected.
- Finding that the correct data have not been collected, or that the data collected are not in the correct form.
- Collecting extraneous data.
- Revising the data collection instruments afterward, which creates problems comparing the first dataset with subsequent datasets.
- Needing to repeat all or part of the data collection process.

C2. Training the Survey Staff

Training the field staff. In most developing countries, hiring both women and men to interview rural people is necessary because same-sex interviews are socially appropriate. In Niger this certainly was the case. That women field staff are necessary and appropriate may seem obvious, but we emphasize this because women in developing countries generally are not hired to work with NRM projects. The major reason is that they usually lack technical expertise in NRM, which overall remains a male field. The other reasons commonly given locally include inaccuracies and biases: women cannot learn about NRM, they cannot endure the rigors of field work, they cannot be absent from home during long periods, traveling with and finding lodging for a mixed-sex group are difficult, and men are available to do the job. Many years of experience conducting surveys have shown us that women are reliable field staff and that mixed-

11

sex survey teams work well. Women are likely to require training in NRM but so are men, due to the program-specific requirements of any data collection exercise. The Niger PTS showed that, due mainly to the complications of unstandardized NRM terminology, both men and women interviewers required classroom training and field training to elicit accurate information from respondents.

Based on the Niger PTS, we recommended hiring men and women who have experience with survey work as field staff. As in Niger, there often is a cadre of enumerators in developing countries that has experience working with the United Nations and other agencies that conduct surveys and use structured, precoded questionnaires. These men and women will need both classroom and field training in an SO team's specific questions and methods related to NRM. We found that at least three weeks of classroom training and three weeks of field training are necessary. *Solid training for enumerators is another up-front investment necessary for maximizing good data collection and minimizing problems and delays during the survey.*

Investing time and money up front in training the field staff has the same benefits listed above as ground-truthing the survey questionnaires. That is, it gives people the knowledge and the practice that they need to do a good job. Also, as we found in Niger, the team's practice interviews in the field and its recommendations helped us to improve the questionnaire and the precoded NRM list. The Niger survey team received about one month of training, two weeks in the classroom and two weeks in the field; after the survey, we concluded that both men and women needed additional field training focused on NRM technology. The DHS invested in two months of training for its survey in Niger: one month of training the survey staff and one month of training the data entry staff. "Saving" time and money by investing less in training is likely to be costly later in the survey process, when mistakes made in the field will require investment in cleaning up the data, repeating part of the data collection, or discarding some data.

Training the computer staff. Solid training for the data entry staff also is a key part of organizing a survey or any data collection exercise that includes computerizing data. The data entry staff should attend the classroom training with the field staff, so that they learn about the survey objectives and process, and also become thoroughly familiar with the questionnaires with which they will work. This knowledge is the first step in quality control of the data entry process and helps to decrease input errors. As in Niger, usually there is a cadre of computer technicians in developing countries and training them has two major benefits: their computer expertise improves and, given their practical experience with donors and surveys, they also can contribute to improving the data entry process.

The data entry staff also requires separate training that focuses on their particular tasks. The staff in Niger requested a training session and also requested us to be present during the first few days of the data entry, to answer questions and to check their work. As they pointed out, this was necessary to get them well started and to reduce the errors that inevitably are made in the beginning of the data entry process. As discussed in section E. below, we found that supervising the data entry staff, including the supervisors, was necessary for good quality control.

C3. Data Entry and Analysis

Data entry. The data entry process is a major component of conducting a survey and is as important as the data collection process. The data entry in Niger was done simultaneously with the field interviews, so that the databases were complete shortly after the field work was finished.

We did this by sending all the completed questionnaires back to the data entry team at the end of each week of field work. This makes the data available for analysis as soon as possible.

Supervising the data entry process is a full-time job requiring a full-time supervisor with experience. The field supervisor cannot do this job, even if he/she is not traveling full time with the survey teams. In our experience, trying to decrease costs or personnel by having one person do both jobs creates serious problems. Supervising field staff and supervising data entry staff are two separate jobs, and finding one person with sufficient expertise in both areas is unlikely. Inaccurate data entry obviously costs time to correct and can produce inaccurate information for the mission. We found a few major errors in the Niger databases even though only 288 questionnaires were computerized, and we worked with the data entry supervisor to check and correct the data before the analysis. In comparison, the DHS in Niger spent four months conducting its field interviews and six months completing the data entry, twice as long as was planned.

Data analysis. Data analysis mainly is determined by the types of information that the SO team needs, as specified in its indicators. USAID/Niger's NRM indicators required only calculating percentages from the survey data. However, as we recommended, the mission also decided to do additional, secondary statistical analysis to explore the potential correlations between key variables in the databases, such as the influence of gender on people's knowledge and use of NRM technology. The databases had the potential for this type of analysis which would provide useful information for programmatic planning.

Based on our work in Niger, we recommend one practical step in the data analysis process: the SO team should design the data output tables before the survey begins. The data output tables (tables with the column and row headings but without data) show how the SO team wants its data analyzed and presented. Drafting the output tables is a very practical way to decide how to organize data because it is a concrete exercise that shows the alternatives. A group discussion of how to organize data is abstract and reaching consensus about abstractions, particularly about numerous abstract variables, usually is difficult.

Draft output tables are a concrete reference for answering questions such as:

- Which variables should be grouped together in a table? Does the SO team want "men's land ownership" and "women's land ownership" in one table or in separate tables?

- Should all the variables be analyzed at the same level for all the tables, or does that depend on the variable? For example, the SO team might want "cash expenditures on modern agricultural inputs last year" shown in tables to compare the levels of men's, women's, and households' expenditures. Or, it might want that variable shown only at the household level but comparing "project villages" and "nonproject villages."

- Which percentages should be calculated? The variable "crops cultivated by men last season" is a good example of this question. This variable can be presented in a table that shows "*the percent of men* who grew sorghum" (and the percent of men that grew all the other crops last season). Or, it can be calculated and shown as "sorghum as *the percent of all men's crops* grown last season." The SO team should decide beforehand how to analyze and present the data, based on how the information will be used, to avoid doing the calculations more than once.

Drafting the output tables before the data are available has several advantages. It gives the SO team a concrete basis for understanding what data the survey questionnaires will produce and what can be done with them. The draft tables also will indicate data that are missing or extraneous, so that the questionnaires can be revised before the survey. And perhaps most important, it gives the SO team control of the process of data analysis instead of leaving key decisions to the survey personnel. In Niger we did not allocate time to drafting the output tables and consequently several had to be redone. This is a time-consuming duplication of effort even with small databases.

D. Lessons Learned from the USAID/Niger NRM Pre-Test Survey

D1. NRM Indicators Require Ground-Truthing

The Niger survey clearly showed that NRM indicators must be systematically field-tested before they are finalized. Identifying NRM indicators, based on discussions with partners and existing information, is only one part of the process of finalizing them. The other part of the process is systematic ground-truthing using solid methods. The reasons for this are clear. The Niger SO team had limited information about people's NRM behavior, which was one reason they commissioned the PTS. The team drafted what looked like reasonable indicators based on this limited information. The PTS data clearly showed that at least half of the indicators were not measurable and that several target figures were surprisingly incorrect. After the Niger survey, we concluded that:

- The results framework and its development hypotheses are not a sufficient basis for drafting usable NRM indicators.
- Existing information, including data from partners, is not a sufficient basis for drafting usable NRM indicators.
- Systematic ground-truthing is necessary to identify relevant, measurable NRM indicators.

The problems that we found with Niger's NRM indicators were due to a combination of factors. Some indicators were impractical to transform into variables and questions, and to measure. The lack of definitions for some key terms (the phrase *new* or *modern NRM techniques* ended up creating real problems) and the unstandardized NRM terminology used in Niger compounded the difficulty of recording NRM information in the field and analyzing it. We will focus here on explaining why indicators must be field-tested, and on related factors such as the need to standardize NRM terminology.

Following is the complete list of the NRM indicators that USAID/Niger originally identified, our recommended revisions, and our reasons for the revisions.

1. Original indicator: *Percent of male and female household heads reporting the use of one or more new NRM technologies.*

- **Revised indicator:** Percent of male and female household heads reporting the use of NRM techniques in one or more priority NRM categories (our "priority NRM categories" are listed below).

80

- **Reasons for the revision:** The apparently innocent word *new* (or its synonyms *modern* and *improved*) created a very real problem with this indicator. We concluded that the SO team would have to make its own, arbitrary list of *new* or *improved* NRM techniques, OR that it should drop the term. Here are the reasons for our conclusion:

The PTS and its data did not provide the basis for defining *new* NRM techniques and, in fact, we found that the concept of *new* techniques was problematic rather than useful. "Newness" depends on factors such as the NRM traditions in a region, the historical sequence of projects and extension efforts in an area during the past decades, and the ages and perspectives of the survey respondents. Very few techniques can be defined exclusively as "new" or "traditional." Older respondents tended to classify the techniques introduced in the colonial era and afterward as "new." Many of the "new" techniques being promoted by projects are based on similar traditional practices so that producers justifiably may subjectively classify them as either *new* or *traditional*. Some PTS respondents classified using rock dikes, protecting natural regeneration, and leaving tree stumps with at least one dominant stem as traditional techniques. They reported that some villagers, under some conditions, had used these techniques before the colonial era. Younger respondents reported that animal traction is a traditional technique because it has been practiced as long as they can remember.

Unstandardized NRM terminology compounds the problems of defining NRM techniques and "new" techniques in Niger. A plethora of terms exist for NRM techniques, so that different projects may promote very similar techniques and give them different names. This proliferates the number of *NRM techniques* and *new* techniques that exist in Niger. Techniques may be mislabeled as *new* due to project- or area-specific names. All these factors complicate data analysis, as they create problems with definitively identifying techniques and lumping the same ones with different names under one name.

The PTS data show that if "new" NRM techniques are defined broadly to include those promoted in recent decades by government extension services—such as animal traction, modern inputs, livestock corridors, and dikes or dams to control water—then most people already know about them. The data also show that if "new" techniques are defined more narrowly as those introduced by recent NRM projects (e.g., using project-specific terms for them), then people probably will know about them only where these NRM projects have been or are working.

We recommended that the SOT eliminate the term *new* and classify NRM techniques into categories to resolve these problems of definition and unstandardized terminology. **We believe that, in tracking change in NRM technology over time, it is less important to focus on whether techniques are *new* or *traditional* than it is to focus on their positive impacts on sustainable production and the natural resource base.** Thus, categories of NRM techniques and "priority" NRM techniques could be derived from the PTS survey and in consultation with the SO team's partners. Identifying these categories and "priority categories" should be done by convening a multidisciplinary group of NRM professionals in Niger and reaching a consensus. This participatory process would produce a list of NRM categories acceptable to all the NRM actors and support collaboration among them.

We also recommended that the SOT define *categories of techniques* based on their purposes (such as to control soil erosion, improve water retention/infiltration, produce trees). Using categories of techniques to classify and analyze the survey data will: (1) solve the problem of defining techniques as "new" or "traditional;" (2) solve the unstandardized terminology problem,

which will eliminate the potential problem of counting the same technique more than once; (3) give the SO team a more convenient dataset to work with (the list of categories will be shorter than the list of individual techniques); and (4) contribute toward standardizing NRM research in Niger by giving agencies a common frame of reference for collecting and comparing data. Draft lists of priority NRM categories are presented in the boxes on the following pages.

2. Original indicator: *Percent of male and female household heads aware of the Rural Code.*

- **Revised indicator:** Percent of male and female household heads aware of the Rural Code and/or its major themes.

- **Reasons for the revision:** During pre-tests of the survey questionnaires, we found that most people had heard about the Rural Code's major themes, even if they did not know about it by the term *Rural Code*. The survey data showed that about half of all household heads knew about the Rural Code by that name but about 75 percent knew about it in terms of its three major themes (rapport between farmers and pastoralists, land tenure rights, the resolution of land tenure conflicts). USAID/Niger's target figure for this indicator was "80 percent of the people know about new land laws by 2000." The survey data raised the question, will USAID/Niger accept people's knowledge of the Rural Code's themes as knowledge of the Rural Code itself? If so, its target figure should be revised. Ground-truthing this indicator with the PTS provided the information that the mission needed to make the indicator accurate.

3. Original indicator: *Percent of male and female household heads able to identify at least one new NRM method.*

- **Revised indicator:** Percent of male and female household heads that can name one or more NRM techniques in the SOT's first three categories of priority techniques. (See below for the categories of NRM techniques) .

- **Reasons for the revision:** The objective of the original indicator was to assess people's *knowledge* of NRM technology, even if they were not using it. So, we operationalized the indicator into the question: what NRM techniques do you know about, even if you do not use them? We had practical problems with the question and the indicator. We asked people this question in terms of managing their four major natural resources (fields, trees, pasture, water). We found the following problems with asking people about techniques that they did not use: (1) the question was abstract, which made it more difficult for people to answer than concrete questions about which techniques they actually were using; (2) respondents may have interpreted the question as an implied criticism; and (3) respondents apparently found the question tedious and repetitive, after answering similar questions about the techniques that they actually were using in their fields.

Also, the survey data showed that the level of knowledge of NRM techniques already was quite broad among rural men and women. We concluded that the large majority of people (75 percent or more) *already know about* techniques such as animal traction, modern inputs, irrigation, planting/maintaining different species of trees in and around fields and villages, livestock corridors, dikes or dams to hold and control water, and cement wells. We found that

many people in non-project villages *already know about* the NRM technology promoted in project villages, but in most cases they are waiting until the government or a project extends the material assistance or direct incentives to adopt it.

Categories of NRM Techniques Used by Individuals (for men's and women's individual questionnaires)

1. Rows cultivated or oriented perpendicular to the slope.
2. Contour- or location-specific rock dikes, earthen dikes, or bunds to control soil and water erosion.
3. Contour- or location-specific strips of grass or trees to control soil and water erosion.
4. Bunds or trenches to stop excess water from entering fields.
5. Micro-basins to enhance water retention and infiltration (such as demi-lunes).
6. Techniques to control erosion in ravines and gullies: rock dikes to control water flow or protect banks; planting grass or trees to protect the sides of ravines.
7. Dune stabilization (physical or biological barriers, protection from livestock, spreading manure on the dunes).
8. Mulching (use of grass, stalks, or branches to cover soil and enhance water infiltration).
9. Use of animal traction equipment to prepare land.
10. Use of traditional soil improvement techniques (bury weeds and plant on the mounds the following year).
11. Manual, gravity, or pump irrigation to increase crop productivity.
12. Manure contracts with herders or staking livestock on fallow land to increase crop productivity.
13. Planting trees or bushes in fields.
14. Leaving numerous stumps with one or more dominant stems when clearing fields.
15. Restricting livestock access to certain portions of family land to allow tree seedlings to grow.
16. Protecting tree or bush seedlings found growing in fields and fallow land.
17. Planting trees, bushes, or *Euphorbia* around or along fields as live fencing or windbreak.
18. Encouraging Gao trees (*Acacia albida*) to grow in fields, but eliminating stumps and seedlings of most other species.
19. Harvesting trees and bushes growing in fields for fruit, forage, fuelwood, and poles.
20. Planting multipurpose trees in or around the concession.
21. Maintaining orchard, woodlot, or individual trees to sell fruit or other tree products.
22. Restricting the cutting of trees growing on family land to family members.
23. Planting, protecting, pruning, or otherwise maintaining individual trees or groups of trees on communal land.
24. Using the same piece of family land each year as pasture or an area to stake livestock during the cropping season.
25. Restricting access to family pasture land to family livestock.
26. Protecting pasture land and fields from bush fires.
27. Improving long-term pasture or pastured fallow land by seeding grasses or applying fertilizer.
28. Sending livestock on transhumance.
29. Consigning livestock to herders for the entire year to graze outside the village.
30. Transplanting or collecting pasture grass to feed to livestock.
31. Collecting and storing crop residues or bush grass to feed livestock in the dry season.

Categories of NRM Technologies Used by Villages to Manage Communal Resources (for village-level questionnaires)

1. A territory management plan for the village or a plan to develop one.
2. Treatment of portions of village territory with contour bunds or dikes to protect micro-watershed.
3. Treatment of portion of village territory with grass strips or trees to reduce soil and water erosion.
4. Treatment of portion of village territory with *zais*, demi-lunes, or other micro-basins.
5. Dune stabilization (physical or biological barriers, protection from livestock, spreading manure on the dunes).
6. Techniques to control erosion in ravines and gullies: rock dikes to control water flow or protect banks; planting grasses or trees to protect the sides of ravines.
7. Village or collective irrigation system.
8. Planting a village woodlot.
9. Planting windbreaks traversing village territory.
10. Village agreement that restricts cutting trees and bushes on all or a portion of village territory to increase wood resources.
11. Village agreement limiting sale of poles and fuelwood.
12. Village nursery to support tree and grass planting programs.
13. Maintaining trees (planting, protecting, pruning, or otherwise) on communal land (village forest, woodland, bush).
14. Excluding livestock from a portion of village territory to promote regeneration of grass and trees.
15. Village agreement to prohibit bush fires to protect grass and trees.
16. Village agreement to restrict use of a specific portion of the village territory only for pasture.
17. Village agreement that restricts cultivation of village bush land to maintain communal pasture.
18. Improving communal pasture by seeding or applying fertilizer.
19. Village agreement that restricts cultivation of inter-village bush land to maintain communal pasture.
20. Establishing livestock corridor(s) across village territory to facilitate livestock access to water and pasture resources.
21. Traditional open wells.
22. Cement open wells.
23. Tube wells.
24. Village water system with neighborhood faucets.
25. Village maintenance of wells, water depth, and area around wells to preserve water quantity and quality.
26. Village organized to make regular contributions to a fund to maintain pumps and well infrastructure.
27. Periodically deepening or otherwise maintaining natural water reservoirs (*mares*).
28. Human-made water retention structures (dams or large solid dikes).

The mission's target for this indicator is "25 percent of producers able to name one new NRM method by 2000." The survey data clearly show that this target is inappropriate: in 1995, most people already can name one *new* NRM method. The SO team could not know this before the PTS was done. This clearly shows the need for ground-truthing indicators.

4. Original indicator: *Percent of male and female household heads able to describe at least one NRM practice used in another village.*

- **Revised indicator:** Percent of male and female household heads who report "another village" as the source of their knowledge about NRM technology.

- **Reasons for the revision:** The objective of this indicator was to assess the diffusion of NRM information. We converted this indicator into the question, "Where did you learn about the NRM techniques that you use?" The added advantage of this broader question was that the survey produced a list of people's sources of knowledge of NRM technology (not only about "another village"). Our list included many different sources: tradition, another village, government technical agents, missionaries, fellow

84

villagers, spouses, and the radio. Having more complete information allowed us to compare the importance of "another village" as a source of information against all the other sources. Using the revised indicator we recommended will provide the information that the mission needs.

Once again, we found that the practical problem with the original indicator was that it was difficult to measure. In terms of survey methodology, the indicator implied that: (1) qualitative data from a discussion ("describe" an NRM technique) would be collected during survey interviews, which generally does not fit in the format of a structured survey; and (2) the SO team would collect information about the NRM practices that are used in the villages throughout Niger to verify the survey responses. There would be no way of evaluating the accuracy of the survey responses if these data were not collected. Collecting the information about all the techniques used in all the villages in Niger and verifying the survey responses would entail much work.

The survey data showed that many people, including those in nonproject villages, already could describe the NRM practices used in neighboring villages. People without cement or tube wells usually could describe these technologies, which a project had provided in a neighboring village. Many villagers were able to describe the pump mechanism on their wells and explain the different mechanism on the pump in a neighboring village. Most people already knew something about the NRM techniques used in neighboring areas (such as fertilizer, natural regeneration, protection of areas from livestock and fire to encourage regrowth, the practice of leaving some trees when clearing fields for cultivation, livestock corridors, and the use of rock or earthen dikes to control water), even if they did not use them.

4. Original indicator: *Percent of male and female household heads with access to market and climatic reporting services.*

- **Revised indicator:** Percent of male and female household heads who have heard market and climate information during the past two weeks.

- **Reasons for the revision:** Operationalizing the phrase *with access to* is the problem with this indicator. Considering the phrase in practical terms is important to produce an indicator that effectively states what it means. How do we define *with access to*? If news about market prices and the climate is on the radio, as it is in Niger, almost everybody in Niger has "access" to the news. Theoretically, whoever has a radio, can talk to somebody who does, or can find a public one to listen to has "access" to the news. Our survey and previous surveys in Niger show that about one-third of the rural population has radios. If *owning* a radio gives people access to radio news, then the question is, how many people own radios? What the SO team really wanted to know was how many people had *heard* this news.

We operationalized the indicator as several questions. We asked people if they owned a radio, if they had heard about market prices during the past two weeks (this is the period of time in which people have accurate recall; asking about longer time periods generally produces poor information). We asked if they listened to news about the climate and if so, what subjects had they heard about (e.g., rainfall, locusts, regional droughts). The data showed that about 75 percent of our respondents had heard the radio news. The revised indicator is an accurate statement of what the SO team wanted to know *and* what the data measured.

5. Original indicator: *Percent of male and female household heads reporting access to credit.*

- **Revised indicator:** Percent of male and female household heads who obtained credit in cash for NRM last year.

- **Reasons for the revision:** The flaw in this indicator is similar to the preceding case: it is one step removed from stating the information that will be collected. The SO team actually wanted to know *how many men and women had obtained credit in cash last year,* and had invested the credit in NRM. The team's objective is to monitor change in people's investment in NRM over time. The problem with the original indicator is the phrase "reporting access to credit." If we had operationalized the indicator as written, we would have asked people, "Do you have access to credit in cash or kind?" and recorded yes/no answers. This would not have given the SO team the information that it wanted, because having "access to" credit is somewhat theoretical--it means that a source of credit exists and the respondent believes that he/she qualifies for a loan.

We operationalized this indicator as several questions, including the number of times that people obtained credit, their sources of credit, and how they used it. The village-level questionnaire collected information about the sources of credit in the villages, so the survey provided information about how many men and women actually had *obtained* credit during the past year, from whom, and for what purposes.

Clearly there is the need to define the phrase "obtaining credit for NRM" for this indicator. Some rural producers reported that getting credit to buy food was a form of credit for NRM. Their general explanation was that a person needs energy to work the fields. Some expatriates felt that "buying food" did not qualify as "credit invested in NRM," while others felt that it did. Because buying food was reported as the most common use of cash credit in our survey, the SO team will have to resolve the issue before it can analyze the survey data and report the information about credit invested in NRM. Once again, **the field data make us re-examine our expectations and definitions, and suggest reality-based changes in our data collection methods and the indicators that we will use to assess change over time.**

D2. Methods for NRM Data Collection Require Ground-Truthing

The key terms in this discussion are *reality-based* or *ground-truthing*. The Niger survey shows the need to check "USAID reality," such as drafting NRM indicators, with the "real world reality" in which it will be used. Formally this is called *grounded research*: theories and methods are grounded in the information we have from the world where it will be used, so that they are grounded in reality. Overall, the Niger NRM indicators were usable and the survey generated good data. But our few months of experience working to combine "USAID/Niger reality" with "rural reality" definitely showed us that the former needed some adjustments, to work well in the local rural world *and* to generate the information needed. This is a standard finding because research is an iterative process of theorizing, designing methods to test the theories, collecting real-life data, and revising the methods and theories to do a better job. The PTS is an example of this iterative process and, as a field study, shows the utility of ground-truthing working theories (such as NRM indicators) and methods.

86

We learned some lessons in each stage of designing and implementing the Niger PTS. The need to ground theory in field reality and the issues that arise in defining what seem to be everyday, universal terms are lessons learned that, we believe, can be generalized to all types of data collection activities. Data collection that is called *informal* or *qualitative*, such as participatory rural appraisals (PRAs), focus groups, and rapid rural assessments (RRAs), also should be pre-tested on a small scale before implementation at the project or PM&E level. Working with an area sample frame instead of using lists to draw random samples requires practice, which is another term for pre-testing. Organizing technicians to take biophysical measures requires practice. We are sure that organizing an NRM PRA—which involves training interviewers, designing data collection instruments, and analyzing the information and writing a report—would have its own set of theoretical and practical problems. Pre-testing therefore is appropriate for all the types of data collection activities that comprise an M&E program. And small-scale pre-testing is appropriate because it is an efficient way to learn the lessons of "field reality." The combination of small-scale and pre-testing is the basis for doing effective, large-scale PM&E.

The fact that social and environmental conditions are site-specific makes pre-testing crucial for successful PM&E. Methods and recommendations are somewhat generalizable and also somewhat limited: an NRM survey method that works in rural Niger can be a useful example for a survey in rural Mali, but data collection methods require adaptation to site-specific conditions, including site-specific program requirements. And the adaptation is best done with small-scale pre-tests. We all stand on the shoulders of giants, to paraphrase the great scientist Newton; the objective is to use the learning of others to further your own M&E aims. Site-specific conditions —including a program's specific information needs, indicators, and strategic objectives—have a strong effect on how data collection exercises are designed and implemented. We all begin with canned methods and questionnaire formats, and we all end up adding local ingredients to adapt to a new environment. In other words, it is best to practice a new, local dish on the family, as a small pre-test, before inviting the mission director over for his/her opinion of your cooking. As mentioned earlier, the Demographic and Health Survey, which sets a high standard for data collection and monitoring change over time, has spent 25 years and $30 million pre-testing and refining its methods.

The great advantages of small-scale pre-testing are that:

- It enables the testers to find and resolve problems when they are small-scale.
- The SO team or the mission is not depending on having the information available for its reporting requirements on a specific date.
- It is useful for evaluating the technical and support capacity of the government and private agencies that will collaborate with the mission in its PM&E activities. This is an assessment that definitely is necessary before large-scale activities begin.

Time and funds to pre-test the components of a PM&E plan should be built into the PM&E program. We find this is often overlooked, with the negative results that programs have to spend time finding these resources and re-allocating them before M&E work can start, or skimp on the pre-testing. It is more efficient to examine the components of a PM&E program and allocate resources to pre-test them before the program's budget and schedule are finalized. Trial runs and product testing are built into the private sector's development plans and into scientific research; they should be built into USAID's PM&E programs, as well.

D3. Agriculture as a System of NRM

The field work during the PTS showed us that rural men and women conceptualize agricultural production as one broad system of NRM, and agropastoralism as another. Men and women farmers evidently view agriculture as one major way of managing their diverse natural resources (land, trees, water, the bush), and agropastoralists view agro-livestock production as another. Our investigation of how people manage their "wild" resources such as forests and the bush was limited to keep the survey interviews to an acceptable length. Village groups generally reported that wild resources, by definition, are "wild" and communal property, and therefore are not managed. This is a topic that remains to be investigated, as in fact people do manage the bush to some extent. Thus we found that rural producers conceptualize **agricultural and agropastoral production as subsets of natural resource management**, not the reverse, which is NRM as a subset of agriculture, as we generally do. Our conclusion about rural people's conceptual orientation is a preliminary one, a working hypothesis based on our field work done during the course of designing and conducting the PTS.

The practical point, for designing survey questionnaires and for the Niger SO team's future field research activities, is that it will be more useful to focus on people's agricultural and/or livestock production systems to investigate their knowledge and use of NRM, rather than focusing on their natural resource management and conceptualizing it as a subset of their production systems. We believe that this hypothesis bears consideration in interpreting the data and in designing the SO's future PM&E activities. The PTS questionnaires separated natural resources into four major categories (agricultural fields, trees, water, and pasture land) and the survey questioned people about their use and knowledge of NRM technology in each category. As a result of our field experience, we conclude that this conceptual and practical orientation should be changed. The household questionnaires should be based on people's holistic perspective of "using natural resources for production." The questionnaires should address people's production systems as the focal point for asking them about their management of natural resources.

A related finding is that the PTS data show that rural Nigeriens definitions of NRM techniques do not necessarily match that of the SO team. Producers' operating definition of NRM apparently is strongly linked to household production and consumption needs. For example, both men and women reported filtering water, doing agricultural operations on time, manual labor, and collecting fodder from the bush for their livestock as natural resource management. Their perspective, as stated above, evidently is that these are some of the diverse means of managing their natural resources to meet household consumption and production needs. Such "techniques" were not originally anticipated in our pre-coded survey questionnaires and certainly broadened our original list. It is broadly true that these are techniques for managing natural resources, but whether or not the SO team accepts them as "NRM techniques" will require team consensus.

D4. Women and NRM Programs

Our survey in Niger showed that, despite decades of gender awareness, an effort still is required to include women in NRM programs, as PM&E technicians *and* as respondents. Women with experience in surveys and interviewing generally are found in developing countries but women with experience in NRM generally are rare. Men with experience in NRM/agriculture are not rare in developing countries. Hiring women to work with NRM projects, even as short-term enumerators for data collection, therefore easily is seen as problematic because they require training, which in turn requires time and funds. Country nationals generally prefer to hire men

for data collection, even though women in developing countries are agricultural producers and therefore natural resource managers, and it is socially preferable to have women interviewing women.

We encountered all of these factors in Niger and as a result we recommend hiring and training women for all types of NRM data collection exercises, for three major reasons:

- Men as well as women will require training in the specific methods of conducting a specific data collection activity for a specific NRM PM&E program, to ensure good data collection.
- It will build a cadre of women with experience in NRM that other donors can use.
- It will improve the quality of women's data in NRM PM&E, as it is socially preferable to have women interview women.

In addition, an effort is still required to collect NRM-related data from women and to represent them equitably in PM&E. The women in one village in Niger said that surveys usually focused on men and demanded to be interviewed. The fact that women in developing countries are producers and natural resource managers is sufficient justification for representing them equitably in survey samples and databases. And rich data and information for sound programming came from asking the women about women's NRM. We emphasize that NRM is a *social* process and that we cannot understand how others do it unless we understand *both* major social actors—women and men.

There is another powerful reason for collecting separate and equal data from men and women, which is a basic rule of data analysis: you can collect identical gender-specific data and aggregate it to the household level, but you cannot collect household-level data and then disaggregate it by gender.

E. Technical Recommendations from USAID/Niger's NRM Pre-Test Survey

This section contains the major technical recommendations from the USAID/Niger NRM Pre-Test Survey report by DESFIL. The recommendations address the issues that NRM data collection exercises in other countries are likely to encounter and thus represent the major "lessons learned" in Niger.

E1. Negotiation to Design the Survey Questionnaire

The process of producing the final questionnaire in collaboration with the SO team should be organized for efficiency and team participation. The lack of concrete, written input from all the team members can be a problem for the survey director. We recommend organizing the process into the following steps:

- The SO team reviews and agrees on the *prioritized* list of information needs (data) that the survey (or any data collection exercise) will address. The SO team recognizes that the survey cannot collect all the information that the team needs due to limitations on the length of the interviews and thus the questionnaire. This makes the need for agreeing on the information priorities essential. The information needs that cannot be addressed by

this data collection exercise constitute a specific set of data needs that must be collected using other methods. *(Time: three to four weeks.)*

- The survey director and his/her homologues review the SO team's information needs in terms of the draft questionnaires and revise them as necessary. The draft questionnaires are distributed to the SO team, which makes *written* comments and corrections on them within a period of time specified by the team. *(Time: three weeks.)*

- The survey director and homologues revise the draft questionnaires, based on the SO team's written comments, and then field-tests them. Further revisions are made based on the field-testing, and the field-tested drafts are distributed to the SO team for *written* comments, within a specified time period, followed by a meeting to discuss the drafts. *(Time: This process continues until all the questionnaires are finalized.)*

- The initial field-testing necessary to revise the draft questionnaires and the translations should be done by a small team of experts. This will ensure that problems in the field are due to flaws in the questionnaire design or translations and not to lack of expertise in the interviewers. When the questionnaires are revised and functional, the trained enumerators can field-test them in different agricultural systems, as discussed below. This division of labor for field-testing the draft questionnaires is necessary so that flaws in the questionnaires are not confused with or compounded by inexpert interviewers. *(Time: 12 weeks. This includes the time necessary for field-testing the questionnaires in different agricultural systems and the translations, as discussed below.)*

E2. Field-Test the Draft Questionnaire in Different Agricultural Systems

The draft questionnaires should be field-tested in different geographical areas and production systems. The information from farmers and projects in each site will add to the coded list of NRM practices and to the coded lists of responses on the questionnaires. This field-testing is necessary to ensure the questionnaires are usable region- or country-wide (depending on the survey) and to finalize the coded lists. The different economic and social characteristics of the regions can be expected to require adjustments in draft questionnaires.

This field-testing can be combined with testing the questionnaires' translation into local language(s). When the questionnaires are in final form, the trained enumerators can field-test region- or country-wide. This field practice also will improve efficiency: in Niger, the enumerators improved from doing two interviews per day to three, by the third week of the survey. *(Time: included in the 12 weeks above.)*

E3. Pre-Code the Survey Questionnaire

A coded master list of the NRM techniques that people report using should be compiled during the course of field-testing the questionnaires. In Niger, we also made coded lists of people's "reasons for using NRM techniques," "reasons for *not* using NRM techniques," and "sources of information about NRM technology." These codes will simplify the enumerators' work in the field as well as the data entry and analysis. Adding to these lists through field-testing is a necessary part of finalizing the questionnaires. *(Time: included in the 12 weeks above.)*

E4. Design the System for Data Entry and Analysis

The data entry formats and the output tables for the data analysis should be designed and tested before the survey begins. This will ensure that the data output will be in an appropriate form. This requires that the SO team specify the type and form of data it needs for reporting and in the final survey report. The process will require collaboration between the SO team, the survey director, and the data entry director.

The data generated by field-testing the final questionnaires should be used to test the data entry and analysis system so that it can be finalized before the survey begins. The entire survey process must be tested on a small scale beforehand: data collection, input, quality control, and analysis. This will make it more efficient and decrease errors during the actual data collection. Supervision of the data entry process and a quality-control system also should be set up at this time. Our work in Niger showed that supervision of the data input process is essential. This includes monitoring the databases continuously (quality control) to identify and correct input errors before they accumulate. Supervision is the best way to control these problems. *(Time: eight weeks.)*

E5. Administering the Questionnaire in National Languages

Translating data collection instruments into national language(s) generally raises questions about which language(s) to work in, finding native speakers to do the translations and interviews, and doing accurate translations. We used the Niger Demographic and Health Survey, a survey conducted worldwide, as our model for recommending how to deal with these questions. The DHS survey was translated into the two languages (Hausa and Zarma) that are used by approximately 75 percent of Niger's population. Native Hausa and Zarma speakers who also were fluent in Niger's six other national languages administered the questionnaire in those other languages. We recommended that USAID/Niger use the same procedure for its national NRM survey.

An important part of this process is making a list of all the key terms in the questionnaires (e.g., household, NRM technique, economic activity) and defining them in English, so that the SO team's meanings are clear to the translators. Translating these key terms will require working with native speakers of each national language who also have expertise in NRM. These key terms also are a focal point for training the enumerators. Keeping the definitions as standard as possible in the different languages will help ensure that the enumerators use standard terminology in surveying different ethnic groups.

The enumerators and supervisors will require specific training and practice to learn the survey vocabulary for each ethnic group(s) that they will survey. The DHS survey used the Centre de Formation des Cadres de l'Alphabétisation to train its enumerators in Hausa and Zarma. The survey personnel also will require some training in NRM and NRM techniques. *(Time for translating a questionnaire into one national language: three to four weeks).*

E6. Standardize the Terminology for NRM Technology

Standardized terms for NRM techniques do not exist in Niger, so that projects and people in different regions often use different names for the same techniques. Different projects may promote similar techniques, that are done slightly differently, and give them different names. And many of the modern techniques are based on similar traditional practices. Obviously this

complicates the work of accurately documenting the NRM techniques that people know about and use. It makes field training essential for the survey personnel, so that they can recognize the techniques commonly used by projects or people from verbal descriptions. We believe that these complications are likely to exist in other countries, and they must be addressed to collect accurate data about NRM.

The first part of addressing the problem of unstandardized NRM terminology is mainly desk work. Lists and definitions of the NRM techniques from the NRM projects in a country (or region(s) should be collected early in the process of preparing for the data collection exercise. The objectives are to: (1) list all the techniques being promoted by the NRM projects (or in the areas that will surveyed); (2) identify which techniques are the same but have different names and then put them in categories. For example, "mulching with straw" and "mulching with crop residues" both belong in the category of "mulching." and (3) provide the project-specific information to the enumerators. The enumerators will need lists of the NRM techniques being promoted by each project as background material to enable them to elicit accurate information from the people in different areas. If the survey will be limited to defined regions or NRM projects, only the lists from those areas will be needed. *(Time: 12 weeks.)*

E7. Survey Time and Field Staff

Survey timing. Surveys and other data collection exercises should be done when the rural population is less occupied with its agricultural work, which generally is after the major rainy season's harvest. They should be done when all the members of rural households are likely to be at home—that is, not during seasonal migration periods. And, to produce comparable data, surveys must be done during the same month(s) each time they are done. As we found in Niger, people are always occupied with their work, but there are periods when they have the time to participate in interviews.

Survey field staff. We recommend that the enumerators work in male/female pairs to interview one man and woman per household. In Niger, each enumerator-pair was able to complete two to three interviews per village per day. A Niger field team consisted of three pairs of enumerators plus a team leader and a supervisor. The last two can conduct the group-level village interview in each village, introduce the team to the projects and the villages to be surveyed, and maintain quality control of the completed questionnaires.

These figures from Niger illustrate the organization of a large-scale survey:

- A field team consists of three male and three female enumerators, one supervisor, one team leader, two drivers, and two vehicles.

- The field team can survey six to nine households and one village-level group in one village per day, during three consecutive days. Five field teams working simultaneously will complete a minimum of 30 surveys per day. At this rate, 50 days of field work are necessary to survey 1,500 households. This will produce 3,000 individual questionnaires: 1,500 from men and 1,500 from women. It also will produce one questionnaire from each village surveyed, or approximately 250 village-level questionnaires.

92

- Each team will need 20 additional days in the field to review and correct completed questionnaires (quality control).Based on our work in Niger, we recommend that three days of surveying be followed by one day of work on quality control.

- Approximately 20 days will be needed for traveling and contingencies.

- The field staff will need three days per month of leave in the capital city, to attend to family matters and rest from the intense field work.

(Total time: approximately 14 weeks, or 100 work and leave days, to survey 1,500 households.)

The field staff to survey 1,500 households in 14 weeks therefore will consist of:

15 male enumerators
15 female enumerators
5 supervisors
5 team leaders
10 drivers and 10 four-wheel drive vehicles

E8. Training the Field Staff and the Data Entry Staff

Classroom training. Both men and women should be hired for NRM surveys, because same-sex interviews are socially appropriate in rural areas in most developing countries. The enumerators will require approximately one month of training. This includes classroom training in the survey methodology and objectives, interviewing techniques, and data recording techniques. It also includes field-training in interviewing techniques and completing the questionnaire.

The data entry personnel should attend part of this training to learn about the types of data and the field work methodology with which they are working. The data entry supervisor should collaborate in teaching the enumerators proper data-recording techniques. The Niger survey shows that linking the field staff with the data entry staff is essential; this also was done by the DHS.

Field training in NRM. In general, few women in developing countries have an education or work experience in agriculture or NRM. This creates a problem in finding female enumerators with appropriate backgrounds for NRM surveys. Women technicians who have worked with NRM projects are good candidates if they are available. In Niger we found that it would be necessary to identify women who already have experience in survey work and give them some basic training in the theory and practices of NRM related to the SO team's survey. The training would require approximately three weeks, one week in the classroom and three weeks in the field. We recommend field training for the men as well as the women enumerators, because it will contribute to inter-interviewer reliability (i.e., the different enumerators using the same terms to record the different NRM practices reported). It also will improve their efficiency in conducting interviews and their effectiveness in eliciting accurate responses. *(Time for classroom training: five weeks. Time for field training: three weeks.)*

E9. Quality Control of the Questionnaires and the Data Entry

Before the data entry process started in Niger our colleagues in the Department of Statistics warned us that time and personnel had to be available to thoroughly review and correct the survey questionnaires *before* the data were entered. This is necessary to help control the input errors. Our colleagues reported that insufficient supervision in large surveys generally leads to lack of this quality control and the proliferation of incorrect data in the databases. Thus we recommend that time and personnel to control the questionnaires in the field should be built into surveys.

This quality control should be a three-step process. First, the field supervisors and the enumerators must have time to review and correct the questionnaires in the field. Second, some data entry personnel should be designated to check the questionnaires before they are given to the data entry technicians. And third, each database (men, women, village) must be checked every two weeks, or as the input for a set of villages is completed, to ensure that basic input errors have not occurred (questionnaires misnumbered, skipped, or entered more than once). *(Time: every fourth day of field work and continuous with the 14 weeks of data input.)*

F. The 1992 Niger Demographic and Health Survey: An Example of a National-Level Survey

The Demographic and Health Survey is an excellent example of the time and resources necessary to conduct a very large, national-level survey. The Niger DHS surveyed 5,200 people and took 30 months to complete (Macro International 1992). This is much larger than any NRM program would require, but the organizational process is the same for smaller-scale surveys.

The Niger DHS was conducted by the Ministry of Statistics and National Accounts, in the Ministry of Finances and Planning. The data were collected by the Ministry of Statistics in collaboration with the Ministry of Public Health; the Ministry of Social Development, Population, and the Promotion of Women; and Macro International. USAID, the U.N. Development Program and FNUAP contributed material and financial assistance. One objective of the DHS was to develop Niger's national capacity to conduct national surveys.

Management. The DHS was managed by a national director, a technical director, and an expatriate technical coordinator. Nigerien consultants translated the questionnaire into the country's two major languages and trained the enumerators to administer it in these two languages. The expatriate technical coordinator was responsible for training supervisors and enumerators and coordinating the computer work. He also provided technical assistance in sample design, questionnaire design, personnel training, and data management and analysis. Macro International also provided a sampling expert, two trainers, and two data management people.

The survey personnel. A total of 24 people were trained as team leaders and conducted the pre-test of the DHS questionnaires, including four people from the Ministry of Statistics. They were given 21 days of training. The pre-test was done in one section of the capital city and four rural villages. A technical team selected by the Ministry of Statistics supervised the field work (an epidemiologist from the Ministry of Public Health, a sociologist from the Ministry of Social Development, statisticians and demographers from the Ministry of Statistics, and a consultant demographer).

Sixteen team leaders and controllers were selected from the group that had done the pre-test. In addition, 33 female enumerators were chosen, based on training results and aptitude tests. These women received one month of training in interviewing and data recording techniques and completing the DHS questionnaire. The Training Center for Literacy trained the enumerators to use the questionnaires in Niger's two national languages.

Sample design. The sample was based on the 1988 census, excluding three desert areas that contain less than 1 percent of Niger's population. The 4,479 census zones from the 1988 census served as the sampling base for the DHS. Good maps of the boundaries of each census zone exist.

The target sample was 6,000 women of child-bearing age (15 to 49 years old). The national sample consisted of three strata: the capital city, secondary urban centers, and rural areas. A total of 235 clusters, which constituted the primary sampling units, were drawn from the 4,479 census zones. The clusters were drawn systematically from each strata, with a probability proportional to the size of the census zone. Ministry of Statistics personnel and others who had worked in the 1988 census worked on the task of recensusing each cluster to produce an accurate list of the households in each one. A sample of 10 to 45 households was selected from these new lists. A total of 5,500 households were identified and a total of 5,242 were interviewed. The survey sample consisted of 309 households in Niamey, 529 in secondary urban centers, and 4,404 in rural areas.

Data management. The "Integrated System for Survey Analysis," developed by Macro International, was used to input the data. Six people from the Ministry of Statistics who received the same training as the enumerators and computer training, provided data input. SPSS software was used to analyze the data.

95

The Niger Demographic and Health Survey
Timetable

Task	Number of months
1. The entire survey, from the beginning to the production of the final report.	30
2. Conception of the survey; design and translation of the questionnaire.	3
3. Sample design and definition of the census zones.	2
4. Re-censusing the census zones to produce accurate lists to draw the survey sample.	4
5. Pre-test the survey questionnaire.	2
6. Finalize the questionnaire.	1
7. Prepare the tabulation and analysis plan (the data output tables).	3
8. Train the survey field workers.	1
9. Conduct the survey.	4
10. Train computer personnel to enter the survey data.	1
11. Data entry.	6
12. First draft report.	2
13. Finalize the draft report.	2
14. Preparation of data summary.	1
15. Print report and data summary.	2
16. National seminar on survey results.	1
17. Audit.	1

96

ANNEX B1:
THE NIGER QUESTIONNAIRES

HEAD OF HOUSEHOLD QUESTIONNAIRE
NRM Pre-Test Survey
USAID/NRMA and C/GRN
Niger, 1995

Department_____ . . . . . .

Arrondissement_____ . . . . . .

Canton_____ . . . . . .

Village_____ . . . . . .

Project_____ . . . . . .

Date (day, month, year)_____ . . . . . .

Enumerator_____ . . . . . .

Household No._____ . . . . . .

I. HOUSEHOLD DEMOGRAPHIC COMPOSITION

Name of Household Head:_____

Name of wife (wives):_____

1. How many years in a row have you lived in this village? . . . . . .
   89=entire life

2. What is your ethnic group? . . . . . .

1=Haoussa, 2=Djerma/Songhai, 3=Fulani, 4=Kanouri, 5=Arab, 6=Toubou, 7=Gourmantché, 8=Touareg, 97=other, 98=don't know, 99=no response.

3. Household Composition:

Please give the names of persons who usually reside in your concession and work in your collective fields, beginning with yourself.

Ask the following questions for each member of the household:
a. Sex: Is (NAME) male or female?
b. Age: Is (NAME) 15 years old or older? Put a "1" in the corresponding column.
c. Education level: How many years of formal (French) school has (NAME) completed?
d. Literacy: Does (NAME) read and write any language well?

No.	First Name	a. Sex 1=male 2=female	b. Age: less than 15 years	b. Age: more than 15 years	c, No. years French School	d. Literate in which language
1.	Head of Household					
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						

Literate in: 0=illiterate, 1=Haoussa, 2=Djerma, 3=Fulani, 4=Kanouri, 5=Arabic, 6=Toubou, 7=Gourmantché, 8=Tamashek, 97=other, 98=don't know, 99=no response.

3. Household Composition: (continued).

Please give the names of persons who usually reside in your concession and work in your collective fields, beginning with yourself.

Ask the following questions for each member of the household:
a. Sex: Is (NAME) male or female?
b. Age: Is (NAME) 15 years old or older? Put a "1" in the corresponding column.
c. Education level: How many years of formal (French) school has (NAME) completed?
d. Literacy: Does (NAME) read and write any language well?

No.	First Name	a. Sex 1=male 2=female	b. Age: less than 15 years	b. Age: more than 15 years	c. No. years French school	d. Literate in which language
19.						
20.						
21.						
22.						
24.						
25.						
26.						
27.						
28.						
29.						
30.						
31.						
32.						
33.						
34.						
35.						

Literate in: 0=illiterate, 1=Haoussa, 2=Djerma, 3=Fulani, 4=Kanouri, 5=Arabic, 6=Toubou, 7=Gourmantché, 8=Tamashek, 97=other, 98=don't know, 99=no response.

4. How many members of your household went on seasonal migration (exode) last year? . . . . . .

II. SOURCES OF HOUSEHOLD INCOME

A. Principal Economic Activities

5. What is the principal economic activity of household members?
   a. What is the second most important economic activity?
   b. What is the third most important, fourth, etc.

6. If migration is not mentioned, ask:
   Is migration an important source of household economic support? If yes, place the response in the following table.

Order of Importance	Economic Activity (write)	Code
1. Most important activity		
2. 2nd most important activity		
3. 3rd most important activity		
4. 4th most important activity		
5. 5th most important activity		
6. 6th most important activity		

Codes:

Activity: 1=rainfed agriculture, 2=livestock production, 3=livestock fattening, 4=commerce, 5=migration, 6=money order, 8=paid laborer for project, 9=nursery, 10=fruit orchard, 11=storyteller, 12=marabout, 13=fishing, 14=transport, 15= artisan products, 16=Koranic teacher, 17=day labor, 18=construction (granaries, houses), 19=reparation, 20=permanent salaried employment, 21=sale of wood/charcoal, 22=butcher, 23=vegetable gardening, 24=poultry production, 25=rice production, 26=food sales, 27= artisan services, 28=blacksmith, 29= woodworking, 97=specify, 98=don't know, 99=no response.

B. Sources of Cash Income

7. Last year, what were the household's principal sources of cash income, including income to both men and women?

8. If migration is not mentioned, ask:
   a. Is migration an important source of revenue in your household?
   b. Place the response in the following table, if appropriate.

9. If money sent home (remittances) or brought home by relatives is not mentioned, ask:
   a. Are remittances or money brought home by relatives an important source of cash income for your household?
   b. Place the response in the following table, if appropriate.

No.	Sources of Cash Income (write)	Source, Code
1.		_____
2.		_____
3.		_____
4.		_____
5.		_____
6.		_____
7.		_____

Codes:

Sale of Agricultural Products: 1=millet, 2=small millet, 3=sorghum, 4=fonio, 5=maize, 6=wheat, 7=cowpea (seed), 8=cowpea (hay), 9=cotton, 10=peanut, 11=rice, 12=onion, 13=sesame, 14=okra, 15=hibiscus, 16=souchet, 17=gardening (including cassava, yam, potato), 18=tobacco, 19=gourds, 20= doum palm products, 21=honey, 22=fruit, 23=bambara nut, 24=sale of forage/hay, 97=specify.

Livestock and fish: 25=sale of animals or animal products, 26=livestock fattening, 27=sale of fish, 28=salaried livestock herding, 29=salaried fishing, 97=specify.

Other: 30=work paid by a project, 31=weaving mats, 32=sale of food, 33=sale of wood/charcoal, 34=transformation of agricultural products (peanut oil), 35=commerce, 36=transport, 37=marabout, 38=storytelling, 39=sale of plants, 40=artisan products, 41= Koranic teacher, 42=day labor, 43=construction (granaries, houses), 44=reparation, 45=permanent salaried employment, 46=migration, 47=money order, 48=traditional pharmacology, 49= wood working, 51=artisan services, 52=blacksmith, 53=butcher, 54=pension, 55= rope maker, 56= sale of milk, 97=specify, 98=don't know, 99=no response.

III. GENERAL INFORMATION

1=Yes, 2=No

10. Do you have a functional radio? . . . . . ___

11. Have you listened to radio reports on the price of agricultural products during the last two weeks? . . . . . ___

12. During the rainy season, do you regularly listen to radio reports concerning the weather or the state of crops? . . . . . ___

13. If yes: on what subjects? 1=Yes, 2=No

Rainfall . . . . . ___

Locusts . . . . . ___

The state of maturity of crops . . . . . ___

Regional drought . . . . . ___

14. Have you heard of the Rural Code? . . . . . ___

15. Have you heard discussions of the following topics? 1=Yes, 2=No

Relationships between farmers and herders . . . . . ___

Security for rural people through knowledge of their land tenure rights . . . . . ___

Settlement of land conflicts . . . . . ___

Other, specify:_____

16. How did you hear about these topics? 1=Yes, 2=No

Radio . . . . . ___

Village chief . . . . . ___

Canton chief . . . . . ___

Government agents . . . . . ___

Technical agents . . . . . ___

Television . . . . . ___

Villagers . . . . . ___

Other, specify:_____

17. If from NGO or project agents, from which project or agency?

Project (specify the name)_____

Agency (specify the name)_____ **1=Yes, 2=No**

Don't know . . . . . ___

RIDD FITILA . . . . . ___

Other, specify:_____

IV. HOUSEHOLD AGRICULTURAL RESOURCES

A. Livestock **1=Yes, 2=No**

18. Do you own any cattle, including animals taken care of by a herder? . . . . . ___

19. Do you own any camels? . . . . . ___

20. Do you own any goats? . . . . . ___

21. Do you own any sheep? . . . . . ___

22. Do you own any horses? . . . . . ___

23. Do you own any donkeys? . . . . . ___

24. Do you own any poultry? . . . . . ___

25. How many traction animals do you have?

Traction Animals	Number
Oxen	___ ___ ___
Camels	___ ___ ___
Donkeys	___ ___ ___

B. Land Ownership, Men

26. Do you own land? . . . . . └─┘ **1=Yes, 2=No**
If the answer is NO: Go to question 35.

27. How many fields that belong to you did you cultivate last year? . . . . . └─┴─┘
What are their names? WRITE THE FIELDS' NAMES in the column labeled "Name of field" in the table on the next page.

28. Did you leave any of your fields fallow last year? . . . . . └─┘ **1=Yes, 2=No**

29. If yes, how many fields did you leave fallow?
WRITE THE FIELDS' NAMES in the table. . . . . └─┴─┘

30. Did you rent, loan, give, or allow someone else to sharecrop any of your fields last year? . . . . . └─┘ **1=Yes, 2=No**

31. If yes: how many of your fields did you rent, loan, give, or allow someone else to sharecrop? . . . . . └─┴─┘
What are their names? WRITE THE FIELDS' NAMES in the table.

32. How many fields do you own, in total?
VERIFY based on the preceding information. . . . . └─┴─┘

33. Do you have the right to plant fruit trees in your fields, if you wish? . └─┘ **1=Yes, 2=No**

34. Do you have the right to dig wells in your fields, if you wish? . . . . . └─┘ **1=Yes, 2=No**

35. Last year, did you cultivate any fields that you rented, borrowed, were given, or sharecropped? . . . . . └─┘ **1=Yes, 2=No**

36. If yes, how many rented, borrowed, given, or sharecropped fields did you cultivate? . . . . . └─┴─┘
What are their names?
WRITE the fields' names in the column labeled "Name of field."

37. Ask the following questions for EACH FIELD listed in the table:
a. How did you acquire (NAME of field): inherit, buy, borrow, gift, or...?
b. What type of field is it: dune, lowland, plateau, irrigated perimeter, or...?
c. What crops did you cultivate in the field last year?
d. Who worked (exploited) the field last year?

38. Ask the following questions ONLY for COLLECTIVE fields or MEN'S individual fields:
a. Last year, did you do anything in the field (NAME) to improve soil fertility and improve your harvest?
b. Last year, did you do anything to conserve water or control erosion in the field (NAME)?
Use the List of Codes for NRM Techniques

39. Did you maintain trees in the field? Bushes in the field? Use the LIST of CODES.

40. Did you maintain trees around the field? Bushes around the field? Use the LIST of CODES.

105

41. Last year did you use any of the following in the field (NAME):
   a. Chemical fertilizer?
   b. Improved seed? Use the CODES.
   c. Chemicals to control weeds? (herbicides)
   d. Chemicals to control insects? (pesticides)

No.	Name of Field	a. Acquis.	b. Type	c. Crops					d. Exploit.	NRM Techniques, use the CODES								
1.																		
2.																		
3.																		
4.																		
5.																		
6.																		
7.																		
8.																		
9.																		
10.																		
11.																		
12.																		

Codes:

Acquisition: 1=inheritance, 2=purchase, 3=clearing the field ("right of the axe"), 4=loaned by husband, 5=given by husband, 6=given by a relative, 7=given by a non-relative, 8=loaned by a relative, 9=loaned by a non-parent, 10=allocated by the state, 11=in the concession, 12=women's collective field or garden, 13=rented, 14=sharecropped, 15=inherited by usufruct, 97=other, 98=don't know, 99=no response.

Type of field: 1=dune, 2=plateau, 3=valley, 4=lowland, 5=irrigated perimeter, 6=dallol, 7=depression, 8=hardpan, 9=in the concession, 97=other, 99=no response.

Crops: 1=millet, 2=sorghum, 3=cowpea, 4=maize, 5=peanut, 6=rice, 7=sesame, 8=okra, 9=garden vegetables (including cassava, yam, potato), 10=hibiscus, 11=fonio, 18=bambara nut, 19=cotton, 20=wheat, 21=onion, 22=souchet, 23=fruit orchard, 24=fallow, 25=a portion in fallow, 97=other, 99=no response.

Exploiter: 1=collective (household) field, 2=man's individual field, 3=woman's individual field, 4=women's collective field, 5=worked by someone else, 97=other, 99=no response.

V. MANAGEMENT OF AGRICULTURAL FIELDS

A. NRM Techniques Used in Agricultural Fields

NOTE: List all the NRM techniques that you recorded in the preceding table in the table below.

USE THE LIST OF CODES for NRM TECHNIQUES

42. Ask the following questions for each NRM technique:
    a. How did you learn this technique?
    b. What are your reasons for using it?

No.	Techniques (Write)	Code, Techs.	a. Source of Knowledge	b. Reasons for Using	Code, Reasons
1.			⌊_⌊_⌋		⌊_⌊_⌋ .. ⌊_⌊_⌋
2.			⌊_⌊_⌋		⌊_⌊_⌋ .. ⌊_⌊_⌋
3.			⌊_⌊_⌋		⌊_⌊_⌋ .. ⌊_⌊_⌋
4.			⌊_⌊_⌋		⌊_⌊_⌋ .. ⌊_⌊_⌋
5.			⌊_⌊_⌋		⌊_⌊_⌋ .. ⌊_⌊_⌋
6.			⌊_⌊_⌋		⌊_⌊_⌋ .. ⌊_⌊_⌋
7.			⌊_⌊_⌋		⌊_⌊_⌋ .. ⌊_⌊_⌋
8.			⌊_⌊_⌋		⌊_⌊_⌋ .. ⌊_⌊_⌋
9.			⌊_⌊_⌋		⌊_⌊_⌋ .. ⌊_⌊_⌋
10.			⌊_⌊_⌋		⌊_⌊_⌋ .. ⌊_⌊_⌋

Codes:

Source of knowledge: 1=existing project, 2=past project, 3=tradition, 4=villagers, 5=husband, 6=state technical agents, 7=private sector, 8=another village, 9=study visit, 10=missionaries, 11=personal knowledge, 12=women's group, 13=radio, 97=other, 98=don't know, 99=no response.

Reasons: 1=fertilize soil and increase production, 2=fertilize soil, 3=increase production, 4=protect against insects, 5=precocious varieties/mature rapidly, 6=increase agricultural area, 7=windbreak, 8=diversify sources of manure, 9=against desertification, 10=favor water infiltration, 11=shade, 12=produce wood, 13=delimit field, 14=live fence, 15=soil improvement/recovery, 16=control erosion, 17=required by law, 18=clean the field, 19=control water, 20=protection, 21=fruit production, 22=livestock fodder, 23=save time, 24=water retention, 97=specify, 98=don't know, 99=no response.

B. NRM Techniques Known (Not Used) in Agricultural Fields

43. In addition to the techniques that you cited, do you know other techniques to improve the fertility of your fields and increase your production, even if you do not use them? . . ___ **1=Yes, 2=No**

44. In addition to the techniques that you cited, do you know other techniques to conserve water or control erosion in your fields, even if you do not use them? . . . . . ___ **1=Yes, 2=No**

45. Ask the following questions about each technique listed:
    a. How did you learn this technique?
    b. What are your reasons for not using it?

No.	Techniques Known (Write)	Code, Techs.	a. Source of Knowledge	b. Reasons for Not Using	Code, Reasons
1.			___		___ .. ___
2.			___		___ .. ___
3.			___		___ .. ___
4.			___		___ .. ___
5.			___		___ .. ___
6.			___		___ .. ___
7.			___		___ .. ___
8.			___		___ .. ___
9.			___		___ .. ___
10.			___		___ .. ___

Codes:

Source of knowledge: 1=existing project, 2=past project, 3=tradition, 4=villagers, 5=husband, 6=state technical agents, 7=private sector, 8=another village, 9=study visit, 10=missionaries, 11=personal knowledge, 12=women's group, 13=radio, 97=other, 98=don't know, 99=no response.

Reasons: 1=field is still productive, 2=not necessary, 4=lack means of transportation, 5=requires additional manual labor, 6=lack time, 7=lack cash, 8=input not available, 9=lack land/space, 10=men's work, 11=lack equipment/materials, 12=not well enough understood, 13=lack technical assistance, 14=lack livestock, 15=attracts birds, 16=prohibited/fines, 17=not advantageous, 18=lack water, 19=avoid bush fires, 97=other, 98=don't know, 99=no response.

C. Investments in NRM

NOTE: the normal agricultural activities are excluded: field preparation, planting, reseeding, weeding, and harvest.

46. Last year, did you hire any labor to do the NRM techniques cited in your agricultural fields? . . . . . 1=Yes, 2=No

47. Did you pay the hired labor paid in cash? . . . . . 1=Yes, 2=No

48. If yes, what was the total cash amount in CFA?

49. Did you pay for the hired labor in kind? . . . . . 1=Yes, 2=No

50. Last year, how much did you spend on agricultural inputs?

No.	Inputs	Amount in CFA
1.	Chemical fertilizer	
2.	Improved seed	
3.	Pesticides	
4.	Herbicides	

51. What are the three things that you most need to improve your agricultural production?

No.	Needs (write)	Code
1.		
2.		
3.		

Needs: 1=manure, 2=manual labor on time, 3=good rainfall, 4=fertilizer, 5=striation/cultivation, 6=labor, 7=pesticides, 8=tree planting, 9=improved seeds, 10=animal traction, 11=soil improvement, 12=credit, 13=motor pump, 14=mulching, 15=cart, 16=plow, 17=money, 18=agricultural equipment, 19=fuel, 97=other, 98=don't know, 99=no response.

VI. TREE MANAGEMENT

A. NRM Techniques Used with Trees

52. Does your household do anything to manage the trees that belong to you? . . . . . ___ 1=Yes, 2=No

53. Does your household do anything to manage communal trees or forest resources? ___ 1=Yes, 2=No

54. Please list for us ALL the tree management techniques that you use.
Do you have: A family woodlot or orchard?
Live fences or windbreaks?
Trees or bushes in the concession for some purpose?

55. Ask the following questions about each technique cited:
a. How did you learn this technique?
b. What are your reasons for using it?

No.	Technique (Write)	Code, Techs.	a. Source of Knowledge	b. Reasons for Using	Code, Reasons
1.			___		___ .. ___
2.			___		___ .. ___
3.			___		___ .. ___
4.			___		___ .. ___
5.			___		___ .. ___
6.			___		___ .. ___
7.			___		___ .. ___
8.			___		___ .. ___
9.			___		___ .. ___

Codes:

Source of knowledge: 1=existing project, 2=past project, 3=tradition, 4=villagers, 5=husband, 6=state technical agents, 7=private sector, 8=another village, 9=study visit, 10=missionaries, 11=personal knowledge, 12=women's group, 13=radio, 97=other, 98=don't know, 99=no response.

Reasons: 1=control erosion, 2=improve soil fertility, 3=control water, 4=improve the quality of fruit trees, 5=growth/maintenance, 6=control cutting, 7=windbreak, 8=increase the number of trees, 9=protection, 10=shade, 11=produce wood, 12=prohibited/fines, 13=for the fruit, 14=delimit field, 15=soil/field recovery, 16=reforestation, 17=trekking route, 18=live hedge, 19=against desertification, 20=prevent bush fires, 21=field clearing, 22=livestock feed, 23=save time, 24=improve water infiltration, 25=traditional pharmacology, 26=reduce wood consumption, 27=generate income, 28=restore the environment, 97=specify, 98=don't know, 99=no response.

B. NRM Techniques Known (Not Used) with Trees

56. In addition to the techniques that you cited, do you know other techniques to manage of trees, even if you do not use them? . . . . . ___ **1=Yes, 2=No**

57. Ask the following questions about each technique:
    a. How did you learn about this technique?
    b. What are your reasons for not using it?

No.	Techniques Known (Write)	Code, Techs.	a. Source of Knowledge	b. Reasons for Not Using	Code, Reasons
1.			___		___ .. ___
2.			___		___ .. ___
3.			___		___ .. ___
4.			___		___ .. ___
5.			___		___ .. ___
6.			___		___ .. ___
7.			___		___ .. ___
8.			___		___ .. ___
9.			___		___ .. ___
10.			___		___ .. ___

Codes:

Source of knowledge: 1=existing project, 2=past project, 3=tradition, 4=villagers, 5=husband, 6=gov. technical service agents, 7=private sector, 8=another village, 9=study visit, 10=missionaries, 11=personal knowledge, 12=women's group, 13=radio, 97=other, 98=don't know, 99=no response.

Reasons: 1=lack of water, 2=lack labor, 3=lack time, 4=prohibited/fines, 5=lack land, 6=not necessary, 7=men's work, 8=responsibility of head of household, 9=lack cash, 10=lack equipment/material, 11=lack means of transportation, 12=don't understand, 13=lack of technical assistance, 14=lack nursery, 15=attracts birds, 16=theft, 17=animal damage, 18=no fruit orchard, 19=not advantageous, 20=responsibility of (gov.) technical services, 21=no pay/incentive, 97=other, 98=don't know, 99=no response.

111

VII. PASTURE MANAGEMENT

A. NRM Techniques Used with Pasture

58. Do you use a portion of your land for pasture only? . . . . . ___ 1=Yes, 2=No

59. Do you use communal lands for pasture? . . . . . ___ 1=Yes, 2=No

60. Please list for us ALL the techniques that you use to manage pasture land.
Do you do anything to increase the production of forage on pasture land?
Do you do anything to improve the quality of forage produced on pasture land?

61. Ask the following questions about each technique mentioned:
a. How did you learn this technique?
b. What are your reasons for using it?

No.	Technique (Write)	Code, Techs.	a. Source of Knowledge	b. Reasons for Using	Code, Reasons
1.			___		___ .. ___
2.			___		___ .. ___
3.			___		___ .. ___
4.			___		___ .. ___
5.			___		___ .. ___
6.			___		___ .. ___
7.			___		___ .. ___
8.			___		___ .. ___
9.			___		___ .. ___
10.			___		___ .. ___

Codes:

Source of knowledge: 1=existing project, 2=past project, 3=tradition, 4=villagers, 5=husband, 6=state technical agents, 7=private sector, 8=another village, 9=study visit, 10=missionaries, 11=personal knowledge, 12=women's group, 13=radio, 97=other, 98=don't know, 99=no response.

Reasons: 1=increase the area of pasture land, 2=restore the environment, 3=manage/improve livestock feed, 4=deposit manure in the field, 5=improve livestock growth, 6=improve pasture, 7=protection, 8=avoid animal damage, 9=sale of forage/hay, 97=other, 98=don't know, 99=no response.

B. NRM Techniques Known (Not Used) with Pasture

62. In addition to the techniques that you cited, do you know other techniques to improve the management of pasture, even if you do not use them? . . . . . ___ **1=Yes, 2=No**

63. Ask the following questions about each technique:
    a. How did you learn about this technique?
    b. What are your reasons for not using it?

No.	Techniques Known (Write)	Code, Techs.	a. Source of Knowledge	b. Reasons for Not Using	Code, Reasons
1.			___		___ .. ___
2.			___		___ .. ___
3.			___		___ .. ___
4.			___		___ .. ___
5.			___		___ .. ___
6.			___		___ .. ___
7.			___		___ .. ___
8.			___		___ .. ___
9.			___		___ .. ___
10.			___		___ .. ___

Codes:

Source of knowledge: 1=existing project, 2=past project, 3=tradition, 4=villagers, 5=husband, 6=state technical agents, 7=private sector, 8=another village, 9=study visit, 10=missionaries, 11=personal knowledge, 12=women's group, 13=radio, 97=other, 98=don't know, 99=no response.

Reasons: 1= no livestock, 2=not necessary, 3=lack space/land, 4=lack means of transportation, 5=lack cash, 6=men's work, 7=lack time, 8=lack equipment/material, 9=lack labor, 10=don't understand, 11=lack technical assistance, 12=lack seed, 13=requires lots of water, 14=prohibited/fines, 15=lack of consensus, 16=appropriate species not available, 17=inputs not available, 19=not advantageous, 20=responsibility of (gov.) technical services, 97=other, 98=don't know, 99=no response.

VIII. WATER MANAGEMENT

A. NRM Techniques Used with Water

64. Do you do anything to manage water, for agricultural production, for your livestock, or for your drinking water? . . . . . ___ **1=Yes, 2=No**

65. Please list for us ALL the techniques that you use to manage water.

66. Ask the following questions about each technique mentioned:
    a. How did you learn this technique?
    b. What are your reasons for using it?

No.	Technique (Write)	Code, Techs.	a. Source of Knowledge	b. Reasons for Using	Code, Reasons
1.			___		___ .. ___
2.			___		___ .. ___
3.			___		___ .. ___
4.			___		___ .. ___
5.			___		___ .. ___
6.			___		___ .. ___
7.			___		___ .. ___
8.			___		___ .. ___
9.			___		___ .. ___
10.			___		___ .. ___

Codes:

Source of knowledge: 1=existing project, 2=past project, 3=tradition, 4=villagers, 5=husband, 6=gov. technical service agents, 7=private sector, 8=another village, 9=study visit, 10=missionaries, 11=personal knowledge, 12=women's group, 13=radio, 97=other, 98=don't know, 99=no response.

Reasons: 1=control water, 2=increase water capacity, 3=hygiene, 4=control erosion, 5=clear area, 6=water conservation, 7=improve water infiltration, 8=avoid accidents, 9=reparation, 10=protection, 11=evacuate water, 12=water retention, 97=other, 98=don't know, 99=no response.

B. Management Techniques Known (Not Used) with Water

67. In addition to the techniques that you cited, do you know other techniques to manage water, even if you do not use them? . . . . . ___ 1=Yes, 2=No

68. Ask the following questions about each technique:
    a. How did you learn about this technique?
    b. What are your reasons for not using it?

No.	Techniques Known (Write)	Code, Techs.	a. Source of Knowledge	b. Reasons for Not Using	Code, Reasons
1.			___		___ .. ___
2.			___		___ .. ___
3.			___		___ .. ___
4.			___		___ .. ___
5.			___		___ .. ___
6.			___		___ .. ___
7.			___		___ .. ___
8.			___		___ .. ___
9.			___		___ .. ___
10.			___		___ .. ___

Codes:

Source of knowledge: 1=existing project, 2=past project, 3=tradition, 4=villagers, 5=husband, 6=state technical agents, 7=private sector, 8=another village, 9=study visit, 10=missionaries, 11=personal knowledge, 12=women's group, 13=radio, 97=other, 98=don't know, 99=no response.

Reasons: 1=not necessary, 2=lack equipment/materials, 3=men's work, 4=lack time, 5=lack cash, 6=lack means of transportation, 7=lack land/space, 8=don't understand, 9=lack technical assistance, 10=lack seed, 11=lack labor, 12=field is distant, 13=lack water, 97=other, 98=don't know, 99=no response.

115

IX. ACCESS TO CREDIT

A. Cash Credit

69. Last year, did you obtain any CASH credit? . . . . . ___ 1=Yes, 2=No

70. If yes: how many times during the year? . . . . . ___

71. If yes: ask these questions about each credit in CASH obtained:

a. What was the source of credit?
b. Was it individual or group credit?
c. What did you do with the credit?
d. What was the amount of in CFA?
e. What was the amount you repaid?
f. What was the repayment period (in months)?

No.	a. Source	b. Individual=1 Group=2 Both=3	c. Use of Credit	d. Amount in CFA	e. Reimbursement in CFA	f. Loan Period (months)
1.			..			
2.			..			
3.			..			
4.			..			
5.			..			
6.			..			

Codes:

Source: 1=project, 2=government agency, 3=Caisse Populaire de Crédit, 4=CLUSA, 5=WOCCU, 6=CARE, 7=another NGO, 8= cooperative, 9=individual, 10=private sector agency, 11=bank, 12= merchant, 13=spouse, 14=village group, 97=other, 98=don't know, 99=no response.

Use of credit: 1=livestock production, 2=livestock fattening, 3=modern agricultural inputs, 4=local seed, 5=agricultural production, 6=health, 7=seedling nursery, 8=commerce, 9=food, 10=natural resource management, 12=traditional ceremonies, 13=clothes, 14=travel, 15=family needs, 16=hire manual labor, 17=manure, 18=transportation, 19=agricultural equipment, 20=sell animal products, 21= food vending, 97=other, 98=don't know, 99=no response.

B. Credit in Kind

72. Last year, did you obtain any credit IN KIND for agricultural production or natural resource management? . . . . . 1=Yes, 2=No

73. If yes: how many times during the year? . . . . . .

74. If yes: ask these questions about each credit IN KIND obtained:
a. What was the source of the credit?
b. What type of credit was it?
c. How much did you repay in CFA or what was the value of the goods you returned in CFA?
d. What was the repayment period (in months)?

No.	a. Source	b. Type of Credit	c. Reimbursement or Value in CFA	d. Loan Period (months)
1.		..		
2.		..		
3.		..		
4.		..		
5.		..		
6.		..		

Codes:

Source: 1=project, 2=government agency, 3=Caisse Populaire de Crédit, 4=CLUSA, 5=WOCCU, 6=CARE, 7=another NGO, 8= cooperative, 9=individual, 10=private sector org., 11=bank, 12= merchant, 13=spouse, 14=village group, 97=other, 98=don't know, 99=no response.

Type of credit: 1=modern agricultural inputs (fertilizer, improved seed, pesticides), 2=local seed, 3=food, 4=manure, 5= agricultural equipment, 6=transportation, 7=livestock, 8=basic consumer goods, 9=labor, 10=household goods, 11=commerce, 12=family needs, 13=fuel, 97=other, 98=don't know, 99=no response.

- 117

Code List: Natural Resource Management Techniques
USAID/Niger NRM Pre-Test Survey, 1995

997 = specify, 998 = don't know, 999 = no answer.

CODE	FRANCAIS	HAOUSSA	ZARMA
CHAMPS:			
101	arboriculture fruitière	itace garka	turi nwari
102	arbres dans le champ	itace cikin gona	farira turi
103	arbres au tour du champ	itace iyaka gona	hirobon turi
104	arbustes dans le champ		
105	arbustes au tour du champ		
106	augmenter densité des cultures	kara yawan shipka	boungay bobandi
107	bandes enherbées	kuya ciyawa	subu batayan
108	banquettes	ginin duci	tondi kiniyan
109	brise-vent	dashen tarya iska	haw kossorey
110	buttage des plantes		
111	compost/compostage	rubaben taki ramen taki	birgui foumba
112	cordon de pierre	jeran duci	tondi sassarey
113	couloirs de passage	burtali	alman fonda
114	culture attelée	noman dabobi	yeggi farmi
115	culture pure	shipka iri daya	dumi fallon fari
116	culture associée	shipka garwaye	dumi bobo fari
117	défrichage traditionnel	sasabe galgajia	fari zorouyan
118	défrichage amélioré	sasabe zamani	zamani zorouyan
119	démariage	cira (rege shipka)	haini zobuyan
120	demi-lune agricole	rabin wata na shipka cimaka	handu farsime
121	demi-lune forestière	rabin wata na dashe itace	handu farsime
122	désherbage	cire ciyawa	subu doguyan

CODE	FRANCAIS	HAOUSSA	ZARMA
CHAMPS:			
123	diguette		tondi kiniyan
124	engrais chimique	takin zamani	anassara birgui
125	entretien de Gao	tatali Gao	Gao hanseyan
126	fixation des dunes	tsayda tudu	laabu guro gangiyan
127	fosse fumière	ramen taki	birgui gousssou
128	fumier	takin galgajia	alman birgui
129	foyer amélioré	murhun zamani	zamani feema
130	gabion		
131	haie vive	darni ice	turi kali
132	herbicide	magani kashin ciyawa	subu wiyan safari
133	irrigation	ban ruwa	hangandi
134	irrigation par motopompe	ban ruwa da injin	moter hangadiyan
135	irrigation gravitaire	ban ruwa da gota	gota hangadiyan
136	jachère	futawal gona	fari fulanzam
137	labours	noma	farmi
138	main d'oeuvre	lebra	goy ize
139	micro-barrage	kashin gebe	goruwiyan
140	micro-bassin	dubara tarya ruwa	hari kossorey dabari
141	mini-barrage filtrant		
142	mulching	bugun kara	kwari zoruyan
143	multiplication de semences améliorées	yada iri	dumi wassa
144	paillage	wacin haki	subu sayan
145	parcage (ou gardiennage, ou contrat fumure.)		
146	pare-feu	hanya kashin wuta	dangi wiyan fonda
147	pré-labours	noman huri	labu tounandiyan
148	produits phytosanitaires	magani kashen kuwari	gagami ize safari
149	protection de la régénération naturelle	kulawa da itace sabon tashi	turi ize hagoy

CODE	FRANCAIS	HAOUSSA	ZARMA
CHAMPS:			
150	récupération de terre	raya karkara	laabo hanseyan
151	régénération naturelle	falfaduwa karkara	turigna kanga fatta
152	scarifiage manuel	barje	laabu tunandiyan
153	scarifiage avec animaux	barjen chanou	
154	scarifiage avec machine	barjen injin	
155	semences améliorées	iri mai gowgawa	dumi wassa
156	semer à temps	shipka alkoci	dumari da hiney
157	sous-solage mécanisé	huda da inji	laabu boguyan
158	tests variétaux	gona gwado	haini dumi siyan
159	tranchées Nardi	gurzuwa zomo	
160	U.C.A (unité de culture attelée)	noman dabobi	yeggi farmi
161	zai	tassa	gusu-gusu
162	brûlis		
163	murets		
164	protection biologique des berges		
165	haie mort		
166	planter des arbres		
167	planter des euphorbes		
168			
169			
170			
171			
172			
173			
174			
175			

CODE	FRANCAIS	HAOUSSA	ZARMA
ARBRES:			
201	40 arbres/hectare	yawan itace a eka guda	turi dimma
202	arbres dans le champ	itace cikin gona	farira turi
203	arbres autour du champ	itace iyaka gona	hirobon turi
204	arbustes dans le champ		
205	arbustes autour du champ		
206	bandes arborées		
207	brise vent	dashen tariya iska	hawkossorey
208	clôture	kila/darni	kakka/kali
209	contrôler la coupe des arbres	kula da sara ice	turi wiyan hawzu
210	défrichage traditionnel	sasabe galgajia	fari zorouyan
211	défrichage amélioré	sassabe zamani	zamani zorouyan
212	demi-lune forestière	rabin wata na shipka itace	turi dumayan handu farsime
213	élagage	sassaka	turi kebuyan
214	entretien des arbres		
215	fixation des dunes	tsayda tudu	laabu guro gangiyan
216	foyer amélioré	murhun zamani	zamani feema
217	greffage	awre ice	
218	haie vive	darni ice	turi kalli
219	interdiction de feu de brousse		
220	irrigation	ban ruwa	hangandi
221	irrigation goutte à goutte		
222	labours au tour des arbres	noman gindi itace	turi tiksa farmi
223	mise en défens (gardiennage)		
224	pare-feu	hanya kashin wuta	dangi wiyan fonda
225	pépinière	wurin raya iri	turi ize sajo kali
226	plantation euphorbes	dashe aguwa	kokka singyan
227	planter des arbres pour la récupération de terre	dashen ityace dan raya karkara	turi dumayan laabo tunandisey

CODE	FRANCAIS	HAOUSSA	ZARMA
ARBRES:			
228	planter des arbres	dashen itace	turi dumayan
229	plants fruitiers	itace lambu	turi nwari
230	protection d'arbre	kulawa da ice	turi hawzuyan
231	protection de la régénération naturelle	tatalin arzikin karkara	laabo arzaka hagoy
232	reboisement	kara yawa itace	turi duma dabayan
233	rétention d'eau autour des arbres		
234	entretien de Gao		
235	brûlis		
236	aspersion bouse de vache		
237	murets		
238	protection biologique des berges		
239	banquettes		
240	fumier		
241	cordon de pierre		
242	tranchees perpendicu-laires au pente		
243	haie mort		
244	produits phytosanitaires		
245			
246			
247			
248			
249			
250			

CODE	FRANCAIS	HAOUSSA	ZARMA
PATURAGE:			
301	collecte et stockage de résidus de récolte	tara ciyawa dabobi	subu marguyan
302	couloirs de passage	burtali	alman fonda
303	ensilage ou silo	rubun ciyawa	subu albarkante barma
304	espace réservé pour pâturage (ou aires pastorales)	makiaya	alman kuredo
305	feuille et fruits des arbres comme pâturage		
306	mise en défens		
307	parcage (ou gardiennage, ou contrat fumure.)		
308	plantation euphorbes	dashe aguwa	kokka singyan
309	pare-feu	hanya kashin wuta	dangi wiyan fonda
310	semis direct de fourrage	shipka iri ciyawa	subu dumiize sayan
311	semer à temps	shipka alokoci	dumari da hiney
312	collecte et stockage de foin de brousse	tara ciyawa	subu margay
313	transhumance		
314	brûlis		
315	limiter l'accès		
316	haie mort		
317	alimentation complémentaire de bétail		
318	collecte de bourgou		
319	interdiction de feu de la brousse		
320	jachère amélioré pastorale		
321	repiquage de bourgou		
322	murets		
323	tranchees perpendicu-laires au pente		

CODE	FRANCAIS	HAOUSSA	ZARMA
PATURAGE:			
324	demi-lune		
325	banquettes		
326	portion de champs reserves au paturage		
327	planter des arbres		
328	jachere		
329			
330			
331			
332			
333			
334			
335			

CODE	FRANCAIS	HAOUSSA	ZARMA
L'EAU:			
401	canal d'évacuation		
402	clôture		
403	cordon de pierre	jeran duci	tondi sassarey
404	curage de puits à la main (nettoyage)	yassa rijiya	deyzibo kayan
405	curage de puits avec machine (nettoyage)		
406	demi-lune agricole	rabin wata na shipka cimaka	handu farsime
407	demi-lune forestière	rabin wata na dashe itace	handu farsime
408	diguette		
409	drainage	jan rawa	hari guruyan
410	fonçage de puits traditionnel	ginan rijiya	dey kiniyan
411	irrigation	ban ruwa	hangandi
412	irrigation par motopompe	ban ruwa da inji	moter ga hangandiyan
413	irrigation gravitaire	ban ruwa da gota	gota ga hangandiyan
414	margelle		
415	micro-barrage	kashin gebe	goruwiyan
416	mini-barrage filtrant		
417	planter des arbres	dashen itace	turi dumayan
418	puits en ciment	rijiya	dey
419	récupération de terre	raya karkara	laabo hanseyan
420	réparation de puits	gyaran rijiya	dey hanseyan
421	surcreusage de mare	yassan tapki	bongo hanseyan
422	tour d'irrigation	kalandar ban ruwa	hangandi alwatto
423	entretien, surveillance		
424	filtration de l'eau		
425	lutte contre les jocynthes		
426	forage		
427	tranchés perpendiculaires au pente		

175

CODE	FRANCAIS	HAOUSSA	ZARMA
L'EAU:			
428	murets		
429	barrage		
430	protection biologique des berges		
431	protection mechanique des berges		
432	banquettes		
433	zai (tassa)		
434	micro-bassin		
435	labour		
436	paillage		
437	planter des euphorbes		
438	bandes enherbes		
439	bandes arbores		
440			
441			
442			
443			
444			
445			

ANNEX C
INSAH/MALI:
A Pre-Test Survey of Natural Resources Management
by Ismael Ouedraogo

A. Background

The USAID/Sahel Office-funded PADRES project assists all nine CILSS member states (Burkina Faso, Cape Verde Islands, Chad, The Gambia, Guinea-Bissau, Mauritania, Mali, Niger, and Senegal, through the Institut du Sahel (INSAH) to improve the analytical capability of member states in their pursuit of sustainable development. To support these efforts, DESFIL helped the INSAH-PADRES project design and implement a pilot natural resources survey. The goal of the survey was to strengthen INSAH's capacity to provide guidance to member states on setting up natural resources information systems at the national level.

B. Information Needs

The information system has two primary functions: (1) increase the effectiveness of policy making and program implementation, and (2) more effectively monitor and report on progress. The latter function is consistent with CILSS reporting obligations under Article 16 of the U.N. Desertification Convention (see box).

U.N. Convention on Desertification

One of INSAH's mandates is to help member states develop national environment plans to combat desertification, as called for by the U.N. Convention on Desertification.

Article 16 of the convention recommends "the collection, analysis and exchange of relevant short term and long term data and information to ensure systematic observation of land degradation in affected areas and to understand better and assess the processes and effects of drought and desertification." It also urges countries to "give full weight to the collection, analysis and exchange of socioeconomic data, and their integration with physical and biological data."

C. Indicators and Data Requirements

Developing indicators was not a priority in INSAH's strategy. Instead, INSAH focused on two basic information needs: (1) reporting on the actual situation to tell the story of positive results achieved in NRM in the Sahel, and; (2) identifying and measuring factors that influence the use of NRM practices. INSAH formulated a series of broad questions addressing these needs, for example:

- What practices are used in a specific area?
- What is the adoption rate? What are the characteristics of users and nonusers?
- What are the impacts of these practices on the environment and on people's living conditions?
- What are users'/nonusers' knowledge and perceptions about these practices?
- What are the supporting institutions/measures or conditions underlying the use/nonuse of these practices?

127

INSAH planned to further elaborate these questions into a questionnaire for data collection. Analysis of data collected on these questions was intended to suggest candidate variables and indicators for a core dataset to be used by the CILSS member states along with options to select informational tools.

C1. Choice of Informational Tools

A key contribution of DESFIL was to help INSAH explore their options to choose informational tools necessary to meet the information needs identified above. In this process, DESFIL provided on-the-job training for INSAH staff to facilitate their choices of informational tools for sampling, data collection, data management, analysis, and dissemination.

C1a. Sampling

INSAH chose to use probability sampling for two key reasons: (1) to allow meaningful analysis of relationships among variables, and (2) to derive lessons for many member states that seldom consider probability sampling in NRM. The need to combine socioeconomic and biophysical data (particularly nontimber agroforestry species and products inventory) suggested a multiple sampling frame: an area sampling frame (ASF) combined with a list frame (LF) of households. Time and cost considerations, however, forced INSAH to fall back on a list frame based on the 1988 census data.

Components of INSAH's Stratified, Systematic, Random Sampling Design

Items	Number
DRI (primary strata)	8
Villages: 2 per DRI	16
Households: 2 per village	32
Men-and-women association collective plots: 1 per village	16
Women-only association collective plots: 1 per village	16
Common plots: 2 per household	64
Men individual plots: 2 per household	64
Women individual plots: 2 per household	64

Sampling design was further guided by INSAH's need to analyze NRM at three levels of decisionmaking: village, head of household, and individual member of the household. Furthermore, INSAH wanted to analyze practices at the level of the plot. The sampling design process taught INSAH and its partners this fundamental lesson of the iterative nature of a needs assessment: probing and further clarifying needs and hypotheses that are essential to making a decision on a sampling design.

INSAH decided on a stratified, random sampling methodology. At the first level, two villages were selected in agroecological zones based on village size. At the second level, two compounds were selected based on their size (number of households in the compound). Finally, four individual plots (two managed by women and two managed by men) were selected at random. This sampling technique allows the collection of information at the plot level as well as the household and village levels.

C1b. Data Collection

INSAH chose to use structured interviews to collect the field data. It planned GPS reading of fields, but could not because too few GPS were obtained. Direct measurements on biophysical

parameters, such as crop yields, rates of erosion, and inventories of non-timber forest species, were not performed.

The survey instrument included three sets of questionnaires administered at the village, household, and plot levels. The interviewees at these levels were: the village leader(s), head of household (or sometimes his/her farm manager), and the individual male and female members of households managing their plots of land on which they farm.

INSAH collected both qualitative and quantitative data. In this process, it followed the principle that once qualitative data are appropriately coded, these data can be manipulated and analyzed as quantitative data. For example, perceptions of users/nonusers' reasons for using/not using NRM practices are qualitative data that can be coded for analysis once entered into the database.

Data collection proved to be the weakest link in INSAH's pilot effort. True to its mandate, INSAH financially supported the survey, but let Malian national institutions implement the survey and collect the data. Unfortunately, competing assignments of INSAH's limited key staff, as well as limited resources to retain consultants did not allow closer supervision of this effort. The result was insufficient time for data entry and verification. Also, as discussed below, delayed data entry and a narrow focus on analytical tools slowed down INSAH in data analysis and dissemination.

C1c. Data Repository and Management

For both data repository (storage) and analysis, INSAH chose to use SPSS/PC software, which is commonly used by others at INSAH and by the Malian national research institute that collected the data. SPSS/PC possesses powerful data entry, data management, and analysis modules. SPSS/PC also can easily translate data files into several different formats, including database programs (e.g., dBase, Paradox, Access) and worksheet files (e.g., Lotus, MS Excel, Quattro Pro).

C1d. Data Analysis

An innovative approach of INSAH's analyst was to identify key determinants of NRM practices using multidimensional cluster analysis for a visual and graphical interpretation of the data. The analyst relied on a proprietary software, which unfortunately uses a specific data format not supported by the most common public software such as SPSS/PC or database and spreadsheet programs. Converting the data into the special format consumed a great deal of the INSAH analyst's time. Focusing narrowly on this particular analytical tool (cluster analysis) and this software proved to be an impediment. DESFIL is now providing assistance using SPSS/PC, as originally envisioned, to produce key statistics and regression analysis of the data.

This analysis would inform INSAH of the current adoption of NRM practices in the chosen area. More important, however, it would suggest variables for a core data set for member states to collect as well as options in the range of informational tools.

C1e. Dissemination

The process of designing an NRM information system as well as the preliminary results of the pilot survey were presented at a workshop held April 1-6, 1996 in Bamako, Mali. INSAH's audience included all nine CILSS member states (Burkina Faso, Cape Verde Islands, Chad, The

Gambia, Guinea-Bissau, Mauritania, Mali, Niger, and Senegal). Though other coastal West African countries are not part of CILSS, they are concerned by desertification. The U.N. Desertification Convention has mandated CILSS to coordinate efforts in the region. Other participants included international agencies such as the USAID/Sahel Office, Netherlands, Canada, the World Bank, and the French CIRAD.

D. Lessons Learned

- To help choose the best informational tools, continuous probing of decision-makers is often necessary to clarify and detail needs. In this situation, assessments of needs becomes an iterative process. For example, INSAH's need including investigation at different levels of decision-making because of its underlying hypothesis that NRM decisions occurs at these levels.

- Probability sampling and a formal, structured data collection questionnaire do not preclude collection or use of qualitative data, provided qualitative data can be appropriately codified.

- Ensuring good supervision of the data collection effort is essential to the quality of data and timeliness of data analysis and dissemination.

- There is danger in too narrow a focus on a particular analytical method and software. Many different analytical tools provide informative results, but sophisticated analysis, if possible or called for, must still be accompanied by results that are simple to understand and easy to use. Also, more than one type of commercial software can do the job. The key is to use software that allows translation of data into other programs.

ANNEX D
USAID/BOTSWANA:
Reporting on Results: an Example from USAID/Botswana
by William Fiebig

A. Background

To compare data on results achieved through its regional community-based NRM (CBNRM) program, the Regional Center for Southern Africa (RCSA) contracted DESFIL to analyze the quantitative and qualitative results of the Botswana Natural Resources Management project (NRMP). The project is one of several CBNRM projects funded by USAID in Southern Africa to promote sustainable, conservation-based development on lands that are marginal for crop production and domestic livestock. The analysis of Botswana NRMP's results will serve as an example for the RCSA to use across the region.

The Botswana NRMP has implemented a PM&E system for the Department of Wildlife and Natural Parks (DWNP). The system at DWNP is to provide decision-makers with information gathering and analysis tools that support them in building a wildlife management partnership with local people and district authorities (Painter, 1995). This partnership seeks to offer people both opportunities to earn a living through productive activities that contribute to conservation and sustainable use of wildlife resources, and the authority to take advantage of those opportunities. The three major objectives of the PM&E system are to allow DWNP to understand better how different kinds of human productive activities strengthen or constrain this partnership, suggest ways in which incentives can be created to bring more people into the partnership, and allow DWNP to assess its progress over time.

Because the PM&E system being established is deductive, it does not require excruciatingly detailed data to arrive at a defensible conclusion about the implications and impacts of an activity. It can function well with a modest level of data collection, and be maintained by professionals with intermediate-level methodological and computer skills. The challenge for making the system sustainable is matching a combination of data collection and analysis methods to: (1) the skill level of the DWNP sociology office (which runs the system), and (2) the level of resource support that DWNP is willing to provide for monitoring and evaluation.

B. Services Provided by DESFIL

To assess the PM&E system's adequacy for meeting DWNP's information needs and fitting within its institutional capacity, DESFIL reviewed the following kinds of quantitative and qualitative data collected and analyzed by the Botswana NRMP:

- Data collected by other government agencies (e.g., the Central Statistics Office) and international donors (e.g., the Netherlands Development Organization, or SNV), which provide information on issues relevant to wildlife management that would be difficult for DWNP to cost-effectively gather.

- Qualitative and quantitative data gathered in villages where CBNRM is being implemented, using a combination of rapid assessment and PRA techniques.

131

- Data collected through topical studies focusing on specific problems confronting wildlife management (e.g., the incorporation of special game licenses into community wildlife quotas).

- Survey data (see box) collected by the Botswana NRMP from either a descriptive or probabilistic sample in selected areas at the outset of implementing CBNRM. (This data also will be collected at intervals to be determined during and after implementation yields a broad basis of information to develop lessons learned.)

Botswana DWNP/NRMP Baseline Data

1. Homestead information
2. Land assets
3. Crop production
4. Livestock assets
5. Hunting activities
6. Gathering activities
7. Employment and other income sources
8. Exchange and cooperation
9. Education
10. Inventory of homestead goods

C. Outcome of the Work Provided By DESFIL

Monitoring and evaluating USAID performance is a key management approach that will be used to gauge progress, guide programming and resource allocation decisions, and report on results to USAID stakeholders. The NRMP envision that a participatory approach involving customers, partners, and stakeholders will be used in all phases of program performance monitoring and evaluation. In particular, a customer focus should be reflected in the framing of objectives, choice of performance indicators, and measurement of performance. DESFIL assisted the Botswana NRMP to develop an approach to analyzing SO#3 activity field data that provides information on results at the various levels of the SO#3 results framework, and identified how the information would contribute to the SO team's informational needs to report on and manage for results. A similar exercise will be needed for the RCSA to develop an effective standardized and systematized information management system for other regional CBNRM field data.

D. Accomplishments

▸ Drafted NRMP review of results (R2) document based on objectives and outcomes

The R2 report defines key and intermediate outcomes that the NRMP has achieved over the life of project and presents them in quantitative and qualitative statements. It includes a chronological order of outcomes (results) that have empowered communities to develop institutional capabilities to manage the natural resources now under their control. Results that will change over time are represented by the quantitative and qualitative data in shaded boxes and by qualitative statements that are highlighted by bullets. Producing the report was a rather intensive activity and time consuming, yet the NRMP felt that the result was a document that, for the first time, represented its collective efforts to enable rural communities to decide how they wish to manage the natural resources that they control.

The Botswana NRMP R2 report defines some important outcomes that have helped the project achieve many of its hard-earned results and lessons learned about CBNRM in Botswana.

The report only discusses outcomes and results achieved in a few of the NRMP zones of intervention in Botswana. Successes (and failures) in the Chobe Enclave have contributed to a better understanding of the enabling conditions needed to be in place for CBNRM to happen. The

NRMP is working with the DWNP and many NGO partners throughout Botswana and across Southern Africa. The outcomes discussed in this paper can or will be seen in many more communities due to what the NRMP defines as the "demonstration effect."

▸ **With NRMP team members, drafted NRMP results framework**

To develop its results framework, NRMP evaluated what conditions had been established to achieve results in enabling rural communities to manage their natural resources in a sustainable and economically viable manner. NRMP considered these questions:

- What factors characterized communities that were able to develop an institutional capacity to manage natural resources?
- What were the economic outcomes?
- What were the environmental outcomes?
- What were the sequential series of outcomes that led to CBNRM?
- What were the activities that most effectively produced these outcomes?

Next steps: The NRMP needs to continue to reflect on the draft RF, revise as needed, and then choose appropriate indicators and targets. These should be monitored and reported on to USAID in the R2 on an annual basis.

E. Lessons Learned

Issue 1: The regional CBNRM activities are the main source of data/information needed by the RCSA to report on SO#3. These activities also have their own informational needs. The RCSA should work directly with these partners to standardize their reporting formats for their results framework. Otherwise, reporting on results will be very difficult. The Botswana NRMP has developed a model at the country level for a participatory approach to creating and strengthening community institutions to manage natural resources.

Complementary Roles of Survey and Qualitative Data

The USAID-funded Botswana NRMP's system for performance monitoring and evaluation of its participatory approach to CBNRM in Botswana has regional implications. For purposes of monitoring and evaluation, survey data and qualitative data collected through exercises like PRA and follow-up unstructured interviews can powerfully complement one another. Each highlights weaknesses inherent in the other approach and helps to answer questions the other cannot (see Painter, 1995).

Recommendation: Recognize that, in the process of developing strategic objectives, results frameworks, and result packages, USAID will be managing for and reporting on expected (and in many cases unexpected) results. USAID will need reliable information and this has associated costs. The NRMP models for CBNRM and PM&E should be used as a conceptual basis for the RCSA information management system.

Issue 2: Making use of lessons learned about "best practices."

Recommendation: In an environment of shrinking resources, investing in information management systems is critical to exchange knowledge gained about what works in CBNRM

throughout Southern Africa. If lessons have been learned from field experiences, these must be captured and used in developing programmatic actions. Why recreate the wheel?

Issue 3: Sampling techniques.

Recommendation: Support the collection of survey data that, when the surveys are properly administered, allows data collected for a sample to be systematically related to the entire population the sample represented. The RCSA will need to adopt a data collection methodology and reporting format that will allow regional comparisons of data generated by the CBNRM program.

Issue 4: Data collection methodologies.

Recommendation: The end use of the information determines which data collection methods are appropriate to use and which types of data are necessary to collect. The information-user's objectives thus are key in choosing among data collection methods and types of data. The user's resources (time and money) are another key factor. The objective is to match the information requirement with the appropriate data collection methods.

Issue 5: Standard definitions and fields in the RCSA relational database (RDB) should be based on a core set of variables, which need to be defined based on the RCSA's informational needs to report on and manage for results according to the SO#3 results framework.

Recommendation: People cannot communicate information without a common understanding of terms. Managers of any information system will have to develop standard definitions for the full array of terms found in the results framework. The fields in the database depend upon the various key and intermediate results identified in the results framework. These are the results that will be tracked to see if they were achieved and, if so, if they produced the expected outcomes. Standard definitions provide a common understanding as practices are described during data collection, data management, analysis, and information dissemination. The structure of the RDB will need to be developed by a database management specialist who is well-versed in the need to analyze data from different sources to produce the types of information needed by the RCSA.

Issue 6: Analytical methodologies.

Recommendation: A NRM relational database allows various analytical tools to be used with the core data needed to analyze the relationship between the expected (and unexpected) results and the link between the operating unit's SO programs and field activity outcomes. Because these activities are funded through obligations from the SO team, a common ground must exist between the operating unit's SO program and field activity results. This is somewhat similar to the agricultural information system in the United States. The U.S. Department of Agriculture (USDA) receives the same type of data from each state, but each state collects far more information than USDA requested data, which remains of interest to each state. A similar situation exists for the RCSA, which will need a core set of data from its regional activities to report on results identified in its results framework. The analytical methodologies used to accomplish this task must be carefully chosen.

A key question is how to combine different types of data collected from different sampling techniques. The answer depends on how the information will be used. If the question is about the

identification of practices in a region, without any attempt at being comprehensive, data from different sampling techniques may serve the purpose. However, to compare and contrast situations with any degree of precision, data must come from random samples. For example, to statistically test that the adoption of compost in two regions depends on the availability of household labor or/and other factors, researchers must collect similar information in the two regions from random samples that accurately represent these two regions. The two surveys may not use the same probability random sampling techniques, although the analysis is much more simplified if they do.

The Impact of Botswana NRMP on Democracy and Governance

NRMP is having a major impact on issues central to democracy and governance in Botswana. In many cases these are inseparable from economic and resource management questions. As a result of NRMP's work, authority that used to reside exclusively with the Government of Botswana is today in the hands of rural communities. This outcome is a more vibrant measure of progress in democracy and governance than the number of ballot boxes or political parties, since livelihood management authority empowers women and men to make decisions that affect their daily lives in fundamental ways. Devolution of authority also brings responsibilities that the state had previously embraced, such that participating communities share development planning burdens previously borne by the state. The overall outcome is that more and more Batswana are increasingly investing in activities that produce more secure and prosperous livelihoods and that contribute to a more prosperous civil society.

Issue 7: Reporting on results.

Recommendation: Monitoring and evaluating USAID performance is a key management approach that will be used to gauge progress, guide programming and resource allocation decisions, and report on results to USAID stakeholders. We envision that a participatory approach involving customers, partners, and stakeholders will be used in all phases of program performance monitoring and evaluation. In particular, a customer focus should be reflected in the framing of objectives, choice of performance indicators, and measurement of performance. DESFIL assisted the Botswana NRMP to developed an approach for how the analysis of SO#3 activity field data provides information on results at the various levels of the SO#3 results framework and identified how the information would contribute to the SO team's informational needs to report on progress and manage for results. A similar exercise will be needed for the RCSA to develop an effective standardized and systematized information management system for other regional CBNRM projects' field data.

Note: A copy of the Botswana NRMP R2 report is available from DESFIL upon request.

ANNEX E
List of the Reports Produced by the DESFIL Project

REPORTS

Adelski, E., M. Dilley, L. Simon, and J. Tabor. "Famine Mitigation Intervention Options Manual: Niger." Submitted to USAID/Niger Disaster Preparedness and Mitigation Program, Office of U.S. Foreign Disaster Assistance, Famine Mitigation Activity, Washington, D.C., April 1994.

Adelski, Elizabeth. "Senegalese Women's Households and NRM: A Gender Analysis of USAID/Senegal's 1992 KAP Survey Data." DESFIL, Delivery Order No. 9, January 1995.

Adelski, Elizabeth. "A Monitoring and Evaluation Plan for USAID/Niger's Strategic Objective Three." Submitted to USAID/Niger, May 1995.

Adelski, Elizabeth and John Lichte. "Rural Households' Knowledge and Use of Natural Resource Management Practices: A Pilot Survey in the Tillaberi, Tahoua, and Maradi Departments of Niger." DESFIL, Delivery Order No. 17, submitted to USAID/Niger, March 1996.

Armstrong, Shona. "Gender and Community Resource Management." DESFIL, Fall 1992.

Armstrong, Shona. "The Integration of Gender into Community Resource Management." DESFIL, Fall 1992.

Armstrong, Shona, Kimberly Drea, and Valerie Estes. "Gender and Natural Resources Bibliography." DESFIL, 1992.

Bathrick, David, Howard Daugherty, Roberty Mowbray, and Edgar Briceño. "Forest Resources for a Stable Environment (FORESTA) Mid-Term Evaluation." DESFIL, Delivery Order No. 12, submitted to USAID/Costa Rica, October 1994.

Brown, Albert, Gary Costello, Valerie Estes, and Leslie Texeira. "The National Environmental Protection Fund Project: Proposed Project Design." DESFIL, Delivery Order No. 5, submitted to USAID/Honduras, January 1993.

Catterson, Thomas, Gary Costello, Valerie Estes and George Johnston. "Community Natural Resources Management Project (CNRM)." DESFIL, Delivery Order No. 1, submitted to USAID/Guatemala, March 1993.

DESFIL Project of USAID/G/ENV/ENR (Bruce Ross-Sheriff). "Seeds for Disaster Mitigation and Recovery in the Greater Horn of Africa." Prepared by Chemonics International (Bruce Ross-Sheriff) and USDA Famine Mitigation Activity. DESFIL, Delivery Order No. 14, submitted to USAID/BHR/OFDA/PMPP, June 1996.

136

REPORTS, continued

Estes, Valerie. "Gender and Natural Resources in Honduras: Organizations and References." (Gender Supplement to Social Analysis of the National Environmental Protection Fund). DESFIL, Delivery Order No. 5, May 1993.

Fiebig, William. "The Interface of Technology with Incentives and Policy for Sustainable Agricultural Development in Sub-Saharan Africa." DESFIL, Delivery Order No. 9, January 1995.

Fiebig, William. "Inventory of NRM Practices for Agroforestry, Soil and Water Conservation, and Soil Fertility Enhancement Systems." DESFIL, Delivery Order No. 9, January 1995.

Fiebig, William and Ismael Ouedraogo. "Development of NRM Database Following ARTS/FARA NRM Analytical Framework: A Concept Paper." DESFIL, Delivery Order No. 9, January 1995.

Fiebig, William and Ismael Ouedraogo. "Monitoring & Evaluation Systems Using a Relational NRM Database." DESFIL, Delivery Order No. 9, January 1995.

Fiebig, William and Ismael Ouedraogo. "A Natural Resources Information Management System: DESFIL's Contribution." DESFIL, Delivery Order No. 9, January 1995.

Fiebig, William. "A Literature Review on the Potential for an Increase in Agricultural Productivity in Niger, West Africa." DESFIL, Delivery Order No. 9, September 1995.

Fiebig, William and Charles Yamoah. "A Literature Review of NRM Practices: Case Studies on Agroforestry, Soil and Water Conservation, and Soil Fertility Enhancement." DESFIL, Delivery Order No. 9, September 1995.

Fiebig, William. "A Literature Review on Natural Resource Management in Sub-Saharan Africa." DESFIL, Delivery Order No. 9, July 1996.

Fiebig, William, Ismael Ouedraogo, Bruce Ross-Sheriff, Michael Selhorst, and Elizabeth Adelski. "The Collection and Use of Information for Managing USAID Natural Resources and Agriculture Programs: Lessons Learned from the Development Strategies for Fragile Lands Project." DESFIL Final Report, July 1996.

Forster, Nancy and David Stanfield. "Tenure Regime and Forest Management: Case Studies in Latin America." DESFIL and ACCESS II-Land Tenure Center, University of Wisconsin-Madison, March 1993.

French, Jerome, Greg Booth, John Lichte and Jean-Marc Andriamananatena. "Final Evaluation of the WWF Debt-for-Nature Project." DESFIL, Delivery Order No. 13, Submitted to USAID/Madagascar, June 1995.

Hardner, Jared J. and Richard E. Rice. "Financial Constraints to 'Sustainable' Selective Harvesting of Forest in the Eastern Amazon: Bioeconomic Modeling of a Forest Stand in the State of Para, Brazil." DESFIL, Delivery Order No. 8, presented at the Latin American Forestry Workshop, June 1994.

REPORTS, continued

Hamilton, Ann. "Community-Based Natural Resources Management: An Annotated Bibliography." DESFIL, March 1993.

Johnston, George and Hilary Lorraine. "Forest Management Policy Synthesis: Applications to Central America." DESFIL, Delivery Order No. 8, June 1994.

Johnston, George and Hilary Lorraine. "The Green Book." Volume I: Policy Source Book; Volume II: Methodologies; Volume III: Applications. DESFIL, Delivery Order No. 7 and RENARM, September 1994.

LAC TECH/DESFIL Team. "Sustainable Natural Resources Management in Guatemala: A Concept Paper." Submitted to USAID/Guatemala, March 23, 1991.

Lambert, Virginia and María Silvia Guillén. "Concept Paper: Land Tenure Security Project." DESFIL, Delivery Order No. 15, submitted to USAID/El Salvador, May 1996.

Ouedraogo, Ismael. "DESFIL Natural Resource Policy Taxonomy and Analysis: Application to Selected Francophone African Countries." DESFIL, Delivery Order No. 9, January 1995.

Ouedraogo, Ismael, William Fiebig, and Elizabeth Adelski. "The Design and Implementation of a Natural Resource Information Management System: Process and Tools." DESFIL, Delivery Order No. 9, January 1995.

Razetto, Fernando. "Propiedad Privada en Concesiones Forestales: Un Modelo en la Subregión Andina para la Conservación de los Ecosistemas y el Desarrollo Económico y Social." DESFIL, Delivery Order No. 8, presented at the Latin American Forestry Workshop, June 1994.

Roberts, Bill, Jonathon Landeck, and William Fiebig. "A Participatory Approach to Identifying Intermediate Indicators for NRM M&E Systems." DESFIL, Delivery Order No. 9, January 1995.

Rojas, Mary Hill. "Appraisal Report of the 'Fortalecimiento de la Autogestion Municipal para el Desarrollo Social de Las Comunicades'--Strengthening Self-Sufficiency for Community Development." Submitted to FINNIDA, Governments of Finland and Nicaragua, November 1993.

Rojas, Mary Hill. "Integration of Gender into the 'Programa Forestal Ambiental.'" Submitted to the Swedish International Development Authority and the Government of Nicaragua, March 1994.

Rojas, Mary Hill. "Strengthening Self-Sufficiency for Community Development in the Communities of Chontales." Submitted to WIDAGIR Consultants Ltd, December 1993.

Rojas, Mary Hill. "Women and the Environment: Themes from a Literature Review." DESFIL, presented at the Gender and Environment Network Series, January 1994.

REPORTS, continued.

Stewart, Rigoberto and David Gibson. "Environmental and Economic Development Consequences of Forest and Agricultural Sector Policies in Latin America: A Synthesis of Case Studies from Bolivia, Costa Rica and Ecuador." DESFIL, Delivery Order No. 8, presented at the Latin American Forestry Workshop, June 1994.

Swan, Catherine. "Gender-Related Incentives and Constraints in Adopting and Adapting Land-Use Management Practices in West Africa." DESFIL, Delivery Order No. 9, January 1995.

Walker, Ian, Jenny E. Suazo, Alison Thomas, and Herold Jean-Pois. "El Impacto de las Políticas de Ajuste Estructural sobre el Medio Ambiente en Honduras." DESFIL, Delivery Order No. 8, presented at the Latin American Forestry Workshop, June 1994.

DESFIL Reports

No. 1, July 1994: "Women, Gender, and Biodiversity," Mary Hill Rojas.

No. 2, August 1994: "Options for Integrating Disaster Relief into Development: The Example of USAID/Niger," Elizabeth Adelski.

No. 3, September 1994: "A Guide to the Process of Participatory Research: Examining the Role of Gender in Sustainable Natural Resource Management," Mary Hill Rojas.

No. 4, January 1995: "Information Management Systems for USAID Field Missions," William Fiebig.