CONTRIBUTION TO A MONITORING AND EVALUATION PLAN FOR USAID/NIGER STRATEGIC OBJECTIVE THREE

DATA/INFORMATION RESOURCES FROM THE GOURE NRM INTERVENTIONS COMMUNITY BASED ENVIRONMENTAL MONITORING, EVALUATION AND MITIGATION PLAN CB-EMEMP

USAID NRM Framework level 4: Biophysical indicators

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1 - TDY SCOPE OF WORK 06/06/95 TO 06/16/95

1. Review the SO3 results framework and see which results and accompanying indicators in the Strategic Plan will be achieved through AFRICARE Goure NRM activities and will contribute to achieving SO3 (widespread adoption of NRM practices).

2. Review the present Goure CB-EMEMP and recommend modifications necessary to bring it in line with SO3 M & E plan. Determine common indicators with the socio-economic monitoring system. Consult with the NGO Grants Management Unit to ensure coordination of M & E systems.

3. Assist in determining means and ways of gathering information on NRM projects in Niger. Visit with UTA, C/GRN, IRG, DE, DFPP and DPP. Review the flow of information and recommend how the GON technical agents in the Goure area could contribute in generating this information and how best they could use it.

4. Recommend a monitoring system to determine the effect on the environment of the adoption of NRM practices by rural producers. the purpose is to test the assumptions that adoption of NRM practices result in positive environmental changes.

5. Perform other related NRM tasks as requested and as time permits.

2 - INTRODUCTION

This report is part of the response to USAID/Niger's need to monitor and evaluate the impacts of its activities undertaken under the Strategic Objective Three (SO3): **Sustained widespread adoption of management practices improving the conservation and productive use of Niger's forests, fields, waters and pastures.** Work has been already done towards the establishment of an AID Monitoring and Evaluation (M&E) system[1], and for a GON natural resources

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[1] Following documents are already available: 1) "A monitoring and evaluation plan for USAID/Niger's strategic objective three", DESFIL, E. Adelski, DESFIL and PH. DeCosse, IRG; and 2) "proposed strategic objective three (SO3) Result Package (RP) teams" by the ASDG2 NGO/Private Sector Grants Management Unit. The DESFIL proposed monitoring & evaluation plan includes: 1) Annual records review (GON agencies, AID projects, Other donors projects, Specialized institutions, etc...); 2) National pre-test survey (in 1995); 3) Large scale national survey (in 1996); 4) Mid-term surveys (in 1998); 5) Special case studies.

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monitoring[2] by the World Bank funded "Programme National de Gestion des Ressources Naturelles" (PCGRN). The PNGRN has set up an ad-hoc group for natural resources monitoring and evaluation; and the objective of all these PNGRN activities is to set up a national plan for monitoring natural resources, to be completed by natural resources information system (NRM/GIS). A join venture PCGRN/AID/Other donors could be an excellent approach to set up a national natural resources M&E that serves all stake holders.

This report focuses on the indicators and data that can be obtained from the Gouré NRM Interventions Project's environmental monitoring plan (CB-EMEMP). It will attempt to help identify and integrate to the SO3 M&E appropriate indicators to be collected at the project/village level.

Two sets of proposed indicators to be collected at the project area/village level are:

1) The first set is derived from the indicators identified in the Proposed Country Strategy Plan 1995-2002 (March 1995 version). The report proposes **project/village level** indicators for the level 2 (Enabling conditions for adoption of NRM practices) and level 3 (Adoption of practices) of the AID NRM Framework ; and,

2) The second set from the Gouré EMEMP, provides biophysical indicators to measure the impacts of adoption of new NRM practices and to verify the SO3 hypotheses[3]. The indicators selected are limited on purpose to "cuvettes" critical natural resources: soil and water. The main reasons for this choice are: 1) to limit the time and funds dedicated to data collection and analysis; 2) to leave room to other indicators selected from other projects to feed SO3 M&E, and; 3) to respond to the need to collect the maximum of data and information with the minimum of investment.

The core sections of the report are presented in a tabular form (table 1) for a clearer presentation showing the various linkages of the SO3 and the indicators selected. Table 2 suggests a biophysical database form to integrate in the mission SOs database. The reasons for selecting each indicator are explained

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[2] PNGRN, Document Technique: Suivi Evaluation; version préliminaire, Janvier 1995; Centre Sahel de l'Université Laval.

[3] The adoption of new NRM practices may not necessarily lead to improved natural resources management, or improved conservation and conditions of natural resources. Synergic effects of external factors, the initial conditions of the natural resources, or other practices may inhibit the results expected from adoption of new practices.

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below.

Following assumptions for linking data collected at the Gouré project level with mission SO3 M&E are stated below:

- The Niamey mission will not design and implement a specific project, with funding and personnel, to monitor mission M&E (SO1, SO2, SO3). Rather, mission will rely on various sources for data and information acquisition. At this point, please note that the mission needs to have someone specifically assigned to this task[4].

- Possible data/information sources are: AID program and projects, other donors similar projects, GON ministries, specialized institutions such as UTA, University, research, NGOs, etc...

- Sources in the AID mission will be the mission's various current projects: the Gouré NRM interventions, ASDG II (PA & NPA), NAAR, DPM (PA & NPA), FEWS III, DESFIL?, EPAT?, CRSP (sorghum/millet, soil, peanut), PARTS.

- Participatory approach will continue to be used with the Gouré NRM interventions and CB-EMEMP implementation[5]. Rural population's involvement in data collection and preliminary analysis is important to NRM skills transfer, sustainability, and people level impacts.

- The Gouré NRM Interventions project use of two data acquisition methods continues: 1) collection, preliminary analysis and discussion by farmers; and 2) scientific sampling. The two methods are used in parallel. The purpose is to correlate data collected by farmers against scientific data. Once this is achieved, scientific data collection will be dropped (it is costly and difficult to use sustainably in the field).

Table 1, follows the NRM framework ranking of indicators, visualizes and helps clarify the linkages between the various levels of the SO3 monitoring framework and the various indicators. Village level indicators, NRM framework level 2 and 3, are proposed below (designated as **"proposed project**

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[4] Mission Strategic Plan M&E activities seem to be difficult to combine with other mission activities. The person with this assignment should have it as his/her principal assignment (ie. Chad and Ghana missions).

[5] Efforts need to be made by GON to extend participatory approach to other projects. While the Gouré NRM Interventions uses participatory approach, other neighboring projects are operating in a full traditional way, participation is not promoted. This may lead to frustrations.

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level, L2 & L4 indicators" in the table lower shaded area) from the five "Results Packages", and the level 2 and 3 accompanying indicators identified in the mission proposed Country Strategy Plan 1995-2002,

Table 1 proposes also NRM framework level 4 **biophysical indicators**, only soils and water (table shaded area), to feed data and information to SO# M&E from the Gouré NRM Interventions. Other projects will provide other indicators. Soil and water indicators are completed by indicators on yield of selected crops (crops to be monitored is to be determined by AFRICARE team). Level 4 indicators to be monitored are also described below.

Data on most indicators proposed below are already being collected by AFRICARE. The Gouré NRM implementation uses the project built in monitoring activities complemented by the CB-EMEMP as a "radar" for guidance in the evolution of their activities.

TABLE 1: ANALYSIS OF SO3 INDICATORS AGAINST GOURE CB-EMEMP INDICATORS

LEVELS		RESULTS OF SO3			
PROPOSED NRM LEVEL 4		1) SOILS INDICATORS ▼ ▲	2) WATER INDICATORS ▼ ▲	▼ ▲	▼ ▲
			NRM LEVEL 3: SO3 RESULTS FRAMEWORK **Sustained wide spread adoption of management practices improving the conservation and productive use of Niger's forests, fields, waters and pastures**		
		Result 3.1: Niger's producers, men and women, gain greater control over their productive environment	Result 3.2: Increased producer access to technical information.	Result 3.3: Increased capital available for communities and individuals to invest in NRM practices.	Result 3.4: Nati capacity to promot sustain Results 3.1, and 3.3 is impr
ACCOMPANYING INDICATORS SO3	NRM LEVEL 3	▲ ■ Number of registered community institutions actively managing natural resources. ■ Number of sub-regional disaster response committees formed.	▲ ■ % heads of households, both women and men, able to name at least one new NRM method. ■ % of heads of households, both men and women, in communities targeted by NRM projects able to describe at least one new NRM practice used in another village.	▲	▲
	NRM LEVEL 2	■ Number of new community forest management schemes (cumulative) ■ Number of registered Nigerien intermediary institutions (women's association, village committees, NGOs) ■ Parties in formally adjudicated cases are aware of new land laws (by gender).	■ Proportion of heads of households, both men and women, in target communities with access to market and climatic information.	■ % increase in national financing of projects promoting community-level NRM activities. ■ % customers (by gender) reporting access to funding for NRM inputs.	■ Implementation national short-t impact monitoring sys ■ GON maintains upd NRM strategic pla ■ Creation of a Nati Disaster donor coordination uni ■ Creation of a Nati Disaster Management P ■ District level disbursement of fu
PROPOSED PROJECT LEVEL NRM L2 & L3 INDICATORS		▲ ■ Creation of village NRM committees (ie. Goure project) ■ Design and implementation of village NR management plans (ie. Goure project) ■ Producers (farmers/pastoralists) own their land; ■ Producers invest on their land;	▲ ■ Number of villages where NRM practices are introduced ■ Number of farmers exposed to new NRM practices (ref. NRM framework) ■ Number of farmers exposed to and having adopted new NRM practices and able to describe gains	▲ ■ % increase in local financing (through farmers direct contributions to projects, tontines, rural banks) of projects promoting community-level NRM activities: increase in self financed NRM activities; ■ % increase in rural savings (build up rural banks and tontines and, return loans to farmers)	▲ ■ Existence and cove of funding mechan accessible to far (National Banks, R Banks, Tontines) ■ Existence of information mecha covering key rural a and structures (weekly markets, traders, etc...) ■ [illegible] ■ [illegible] "suggested" practi ■ [illegible] to capital; ■ [illegible] participating in the pro ■ [illegible] package)

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4 - SO3/GOURE RECOMMENDED INDICATORS

The process of identifying indicators and monitoring AID activities responds to a set of questions such as the following suggested by DESFIL: Do the new NRM practices "maintain or improve the productive capacity of soil, forest, range, water resources, and habitat?" Or do they contribute to the degradation of natural resources? What are the causal relationships? An attempt is made at this stage to prognosticate the short-, medium-, and long-term impacts of the continued use of these practices on the natural resource base. Whether this impact of practices on the natural resource base is intended or unintended by users is further examined, at a later stage, in the analysis of the incentive structure.

To respond to those questions, a limited set of indicators are proposed for a optimal "investment/gain" ratio as stated above. Therefore it is proposed that only soil and water indicators are selected from the Gouré NRM project. The indicators will help track changes in soils and water resources in the "cuvettes". Other NRM indicators will be selected from other AID mission projects.

Most of the indicators selected and proposed in this document for the mission SO3 are already being collected at the village level along side with the implementation of the Gouré NRM activities; they are relative to: 1) on the levels 2 and 3 of the AID NRM Framework and 2) on key critical natural resources.

4.1 - ACCOMPANYING INDICATORS, NRM FRAMEWORK LEVEL 2 AND 3, COLLECTED AT THE VILLAGE LEVEL. (Table 1, lower set of indicators)

4.1.1 - FOR RESULT 3.1

<u>Indicators:</u>

- Creation of village NRM committees (ie. Gouré project)
- Design and implementation of village NR management plans (ie. Gouré project)
- Producers (farmers/pastoralists) own their land;
- Producers invest on their land;

<u>Grounds for selecting the indicators:</u>

The first indicator will feed the NRM level 3 of SO3 for information on community and sub-regional levels. This will show the level of control rural people have on their productive environment. The three following indicators show the level of planning capability at the village level, and the level of confidence farmers have on land ownership, both leading to increased investment on the natural resources.

4.1.2 - FOR RESULT 3.2

Indicators:

- Number of villages where NRM practices are introduced
- Number of farmers exposed to new NRM practices (ref. NRM framework)
- Number of farmers exposed to and having adopted new NRM practices and able to describe gains

Grounds for selecting the indicators:

The three indicators selected for results 3.2, at the village/project level, indicate the extent to which farmers are exposed to and adopt new NRM practices. This shows both the level of skills transfer and the level of acceptability of the practices proposed to them.

4.1.3 - FOR RESULT 3.3

Indicators:

- % increase in local financing (through farmers contributions, tontines, rural banks) of projects promoting community-level NRM activities: increase in self financed NRM activities;
- % increase in rural savings (build up rural banks and tontines and, return loans to farmers)

Grounds for selecting the indicators:

Both indicators show the level of saving, therefore capital building, and the level of access, locally, to that capital for investment in NRM. They show in the same time the trend of self financed NRM activities. This also will show another growing financing mechanism that is direct farmer's contributions to projects (money & work). The relation with NRM level 4 is that if farmers have control on their natural resources and have access to finances, they invest on them, and improve their management and condition.

4.1.4 - FOR RESULT 3.4

Indicators:

- Existence and coverage of funding mechanisms accessible to farmers (National Banks, Rural Banks, Tontines)
- Existence of information mechanism covering key rural areas, and structures (ie: weekly markets, key traders, etc...)

Grounds for selecting the indicators:

The first indicator relates to and are complementary with the

village level indicators of "result 3.3", but focuses on the capacity of national authorities to set up mechanisms for village level access to financing services.

4.1.5 - FOR RESULT 3.5

Indicators:

- Pamphlets drafted and distributed to inform farmers (in projects like the Goure NRM interventions)
- Sustained radio/tv informative broadcastings (round table discussion of NRM issues, development of impact and causes/effects debates, etc...)

Grounds for selecting the indicators:

Along side with the second indicator of "Result 3.4", the above two indicators monitor the existence of information mechanisms accessible to farmers. The assumption being that a better informed farmer would manage and conserve better its natural resources. This is the basic explanation why we proposed in the Gouré NRM CB-EMEMP that once the data is collected, farmers discuss them among themselves. That way they would have a mechanism for exchanging information and experience.

4.1.6 - FOR RESULTS 3.4 & 3.5

Indicators:

- Number of people, families, groups involved in NRM;
- Number of village NRM initiatives, as opposed to "suggested" practices;
- Decentralized decision making, information, and access to capital;
- Level of participation (% farmers effectively participating in the project).
- Number of farmer not actively exposed to new NRM practices that have adopted them from other farmers' experience (this seems to be a good indicator of integration of the new practice into the farmers' skill package).

Grounds for selecting the indicators:

The above five indicators show how rural population are exposed to and adopting new NRM practices, use information for decision making, and are having more informed initiatives on NRM. The last indicator shows the spread of new practices without any active promotion. This gives an idea of how much the proposed practices are accepted by farmers.

4.2 - BIOPHYSICAL INDICATORS

As stated above, the biophysical indicators selected from the Gouré NRM environmental monitoring plan will be limited to soil, water and yield. Soil and water are the most critical natural resources in the cuvettes.

Monitoring biophysical indicators, in addition to serving other purposes, are a tool to verify the SO3 major hypothesis: if widespread NRM practices are adopted, natural resources management and conservation will improve. ***For example, if a farmer has access to credit and is ready to invest on NRM, control ownership on his land, acquire the skills, and <u>adopt and implement new practices</u>, will soil and water conservation and management necessarily improve on his land?*** This needs to be verified by monitoring of biophysical parameters of soil and water.

4.2.1 - SOIL INDICATORS

<u>Indicators:</u>

Soil indicators will be limited to:
- Fertility: nutrients content (NPK)
- Erosion and gully formations
- Soil salt content

<u>Grounds for selecting the indicators:</u>

The hypothesis is that adoption of new NRM practices (contour farming, installation of contour bunds and terraces, etc...) will improve soil quality. Collection of field data will help verify the hypothesis by measuring the evolution of soil parameter over time as new NRM practices are implemented. For some parameters such as erosion and gully formation changes can be observed quite rapidly; but for soil nutrient content the time of observation required is often longer. This shows if investment made (training, skills transfer, financing, adoption of practice, etc..) yields the expected gains in natural resources management and conservation.

4.2.2 - WATER INDICATORS

<u>Indicators:</u>

- Water table level as specified in the Gouré CB-EMEMP
- Water quality monitoring will probably include salt and iron concentration (it may be difficult to obtain pesticides and fertilizers residues concentrations).

<u>Grounds for selecting the indicators:</u>

Adoption of new NRM practices include the critical aspect of water conservation and management practices, especially in the cuvettes. The purpose of monitoring water in the Gouré project is mainly to track the water table that usually fluctuate significantly over the seasons. Water conservation practices aim at stabilizing the water table at a level adequate for a proper exploitation and sustainable availability of the resource.

Objective of monitoring is to tack and verify the effect of adoption of practices and in the same time provide data for a proper management of the resource.

4.2.3 - YIELD INDICATORS

Indicator:

- By weight/hectare for selected crops and for each soil type

Grounds for selecting the indicators:

Yield usually integrates the gains and improvements obtained in soils and water management. Although they are many other factors that can influence yield, such as rain patterns and pests, it can be used as a proxy to see if the efforts spent on soil and water management and conservation are paying off. It is a proxy to measure the progress made through adoption of new NRM practices.

The three sets of indicators on soil, water and yield gives an idea on how fare/close we are to achieving sustainable agriculture.

- BIOPHYSICAL DATABASE IN THE MISSION DATABASE YEAR: __/__/__ GPS POSITION (location): ____

PRACTICES RECLAMATION	QUANTITIES	SOIL QUALITY PARAMETERS					WATER		YIELDS				OBSERVATIONS
		P 1	P 2	P 3	P 4	P 5	QUALITY	QUANTITY	CROP 1	CROP 2	CROP 3	CROP 4	

6 - RECOMMENDATIONS

M&E data collection, management, and analysis is a critical task for the Niamey mission to track and analyze its activities. However, It does not seem that the mission needs to put together a "project" specifically for that purpose. DESFIL developed a "MONITORING AND EVALUATION PLAN FOR USAID/NIGER'S STRATEGIC OBJECTIVE 3 (Contract N° DHR-5438-C-1090-00 by E. Adelski and P. DeCosse) that can be used as a basis for the mission M&E. The proposed plan is mainly based on surveys and secondary data collection: a large scale baseline survey, a mid term survey (in 1998) and special studies. All the surveys are limited in time, and are not intended to generate continuous flows of data and infirmation. It needs to be complemented, at the field level, with a mechanism to collect biophysical data from mission projects to verify SO3 hypotheses.

The DESFIL monitoring plan is mainly based on secondary data, interviews and target people's declarations, not on physical data sampling and analysis. There are chances that this monitoring method fails capture critical aspects of changes. It can also lead to false findings because of false declarations. A complementary approach is to cross verify and complement data and information collected this way through steady flows of "scientific" sample data from the project. For example for environment and natural resources, the AID environmental procedures recommend a monitoring plan called EMEMP (environmental monitoring, evaluation and mitigation plan) for most of AID projects. The Africa Bureau Environmental Office and GC recommend that such a plan is designed, implemented and adverse impacts identified mitigated. Such a plan can be a steady source of data to feed in the mission M&E.

Please note: 1) household surveys are not the only source available for M&E; 2) findings from household surveys should be ascertained by local/project level sampling and data collection to confirm adoption of NRM practices and to verify that the expected effects are obtained. Project area monitoring would provide (more efficiently and more accurately?) information on adoption of practices and their NRM impacts. Chances are that data and information specific to impacts of AID activities are difficult to separate from a country wide survey.

Data from current AID projects are major sources of information for SO3 monitoring plan and for the two other SOs. It would be adequate that a mechanism, similar to what is being drafted for the Gouré project, is devised for all the mission projects and activities so that project data feed mission M&E (SOs).

Recommendation 1: use the existing mission data, that are the current program and project activities. There is a need to put together a mechanism whereby each project feed SO3 with

information on progress, achievement, and AID activities people level impact, including adoption of NRM practices. For identifying extended impacts of specific development activities on people social and economic welfare, and on the environment information and data from other sources will collected and integrated in the analysis: results from other donor agencies, the GON, and from other specialized institutions (UTA, ty, etc...).

Recommendation 2: Identify a set of data from current AID projects, and recommend a monitoring system to determine the effect on the environment of AID program/projects.

Recommendation 3: for achieving this, it is recommended to assign the task to a mission agent who becomes the mission Monitoring & Evaluation Specialist. He/she can be a USPSC (like in Ghana) or a FSN/PSC Grade 12 (like in Chad). The person would have responsibilities for data collection, management, analysis and reporting (for SO1, SO2 and SO3). Note that this can be agent already at post in the Niamey mission; however, it seems difficult to handel this task along with other assignments. This seems to be a very good opportunity to have an FSN M&E specialist who will play the role of the **"mission's memory"**.

Recommendation 4: the implementation of SO3 M&E should respond to the need to collect the maximum of adequate data and information with the minimum of investment (work force and funds).

Recommendation 5: A join approach between PCGRN, AID/Niger, Other donors and government institutions to design and implement a national level Natural Resources Monitoring and Evaluation Plan that will serve all stake holders.

7 - ANNEXES

8.1 - ANNEX 1: Environmental indicators identified in the Gouré CB-EMEMP:

GOURE NRM CB-EMEMP INDICATORS

Following are the indicators identified according to project activities, and being implemented under the Gouré NRM Interventions by AFRICARE:

SHIFTING DUNES monitoring method include:

- the establishment of a grid at the front of the shifting dune to monitor dunes movements on a regular basis. Monitoring is done by mapping the dune front according to its position in the grid. The different lines showing the successive positions of the dune will indicate the speed and direction.

- This is complemented by measuring wind speed and direction with simple hand held devices available commercially. This is a critical information for the design of windbreaks and other dune protection systems.

DUNE GULLIES monitoring will:

- Use the same grid method as for measuring dune movements.

SOIL SALT CONCENTRATION monitoring include:

- Observation of salt crusts on irrigated areas of the fields,

- Observation of the crop vitality to detect presence of salt in the soils. Less resistant plants start withering up and more resistant ones will experience nutritional problems; leaves turning yellow. These symptoms are indications and do not provide the amount of salt in the soil.

- Hand probes can be used to measure salt concentration. Different types of probes to measure salt concentration exist. Some types display a different color according to the salt concentration. Those are ideal for use by farmers.

- Data are recorded on tables and mapped according to salt concentration scales.

SOIL FERTILITY monitoring includes:

- Recording of all information on the evolution of soil

fertility that farmers know on the fields they exploit. This may not involve accurate figures but indicate trends.

- Recording yields on a regular basis for each field or field zone, and for each crop. This supposes that AFRICARE an Goure Agriculture service select sample fields and sampling stations in selected fields.

- Identify and monitor plants indicators of soil fertility such as *Callotropis sp* and *Guiera senegalensis*.

VEGETATION: DENSITY AND DIVERSITY MONITORING

- Assesses all types of vegetation, trees and grasses. The Environment and Forest Services will monitor vegetation in close collaboration with farmers. Monitoring involves:

- A description of historical vegetation based on information collected from farmers and elder people of the area.

- *Cuvettes* vegetation mapping. This can be done with the support of the Goure Genie Rural Office.

CROP PESTS MONITORING:

- Will heavily involve existing village crop pest brigades to collect and transmit data on crop pests. With regular skills upgrading the brigades can handle crop pests monitoring on a sustainable basis. Following is an indicative list of crop pests to monitor in the *cuvettes* and surrounding dunes:

- Grasshoppers;

- "Paquenardas", a coleoptere

- Caterpillars, especially *Lema planiformis*

- Aphids, *Aphis craciora*

- Nematodes, especially in the case of continuous monocropping;

- Rodents

- Fennecs.

The use of crop pests biological control techniques can be considered (see below).

WATER TABLE MONITORING:

- Will involve water table measurement and computation as well as water quality:

- Measurement and calculation of the true water table level of the project area. Local fluctuations do not necessarily mean that there is major change on water table level. This requires sophisticated computations that only the Hydraulic Service is able to undertake. With training, farmers can do actual field measurements. Steps to be taken, as indicated by the Department Hydraulic Service, are: a) create a measurement network for the project area; b) select wells to be monitored; c) determine measurement frequency; and d) train scale "readers" among farmers.

- Water quality monitoring will probably include salt and iron concentration, pesticides, fertilizers.

RAIN FED AGRICULTURE AREAS

To be developed by AFRICARE

PASTURE LAND

To be developed by AFRICARE

8.2 - Soils monitoring framework developed by AFRICARE;

RECOMMENDATIONS FOR SOILS MONITORING

David N. Weight, 08/05/93

INDIGENOUS SOILS FRAMEWORK (ISF) Information which can be elicited via MARP by farming systems and livestock specialist regarding (i) land use history incl. use by animals; how many animal days vs nights; estimate of amounts and uses of manure; fertilizers; crop residues; other soil management practices and (ii) indigenous classification systems including erosion surfaces; land types; field classification; and soil classification. Such information can be used as a framework for soils monitoring with focus on Assessment by Villagers, below[6].

I) SOIL FERTILITY : Both Rainy Season Fields and Cuvettes

A) Assessments by Villagers (Not by soil testing)

CRITERIA	METHOD/SCALE	TIMING	COMMENTS
Crop Yields[7]	by weight	during harvests (Timing will vary by crop)	
Plant Indicators[8]	Visual by Spp[9] Presence	System and Timing up to NRM Specialist	Crop and non crop, may include horticultural trees as well as others such as Gao in millet fields

[6] Suggest that not only information but maps should also be derived directly from villagers. Their sense of "spatial geometry" is extremely advanced. May not be able to map on paper or computer-but using physical objects on ground or descriptions vis a vis a transect. Descriptions can include sophisticated appraisals of (indigenous) soil classifications. Most important aspect is attitude of researcher: to listen, with interest and respect. (from Demba Balde, Ford Foundation/ Senegal)

[7] See NRM Specialist; Vegetation Section.

[8] Same as footnote 2.

[9] Spp = Plant species which villagers correlate with soil fertility levels.

CRITERIA	METHOD/SCALE	TIMING	COMMENTS
Evolution & Assessment of Soil Fertility	Elicit factors pertinent to soil fertility incl/ manure inputs/schedules/ soil classification by color, texture, presence of hard-pan in rooting zone.		As part of ISF (above).

B) Measurements by Agents

PARAMETERS	EQUIPMENT	TIMING	COMMENTS
Nutrient Retention (N,P,K)	Field Kits		
Texture[10]	Field Kits		
pH	Field Kits		
Water Retention	Probes (direct in soils)		

C) Measurements in the Laboratory: None

SOIL TESTING FOR FERTILITY: Will be performed by Agents:

We are limited by number of samples which can be taken. Each field kit contains chemicals for 50 samples. Have ordered two kits. Rather than composite sampling, therefore recommend "judgement sampling" where a "representative" field is selected and one sample is taken at a "representative spot" within field which is then marked (permanently) so that same spot is measured over time. If we have 10 villages, with a limit of 50 samples per field kit, then we can only sample 5 fields per village. With two kits, can use one for upland fields (pre-rainy season) and one for cuvettes (pre-dry growing season). "Judgement" sampling is common method for land surveys.

Depth of sample: 0 - 10 cm only, do field tests (above). After field tests are done on surface samples, recommend testing for hard-pans or indurated layers to depth of 1 m. Simply note presence or non-presence of layer with description by villager

[10] See (2) Texture : Special attention should be given to fields or garden plots which appear to be susceptible to sand intrusion (by wind) from dunes. Follow same procedure - but when following results - look for increase in % sand.

(color and classification) e.g. red, laterite at 30 cm.

Timing of Sampling: 1 x year : One month before start of growing season. (See II. Soil Erosion for complimentary assessments which are done in conjunction with soil sampling).

For assessment of crop nutrient uptake, soil sampling would not give good estimate. Would require partitioning of leaching and microbial nutrient losses under strict research conditions.

(II) Soil Erosion : Rainy Season Fields Only

Wind and Water

A) Assessments by Villagers[11]

CRITERIA	METHOD/SCALE	TIMING	COMMENTS
Fertility[12]			
Plant indicator	Measurement Exposure of roots[13]		Measure depth from top of surface root down to soil surface if there is exposure (if not, note 0 or no exposure. (# of measurements, frequency same as fertility samples, see below: Methods of Assessment by Villagers)
Soil Indicator	Feel/ 0-5 Soil Crusting		0 = no crusting, 5 = full crusting, Attempt to have villagers differentiate between erosional crusting (via water erosion on upper surfaces) and depositional crusting (deposition of silt where there is water ponding). (Also in conjunction with fertility samples, see below).

B) Measurements by Agents (A)

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[11] Methods of Assessment by Villagers : As part of soil fertility testing, 1 x year. Before commencement of each sampling, do (3) Soil Crusting assessment in sampling spot, then proceed with soil sampling for fertility. Also examine nearest plant for (2) Exposure of Roots.

[12] refer to soil fertility page / From assessment of soil fertility, use data for assessment of soil erosion, as well as villagers assessments, (1) - (3). Include Agent Measurement (1) - (3), Lab, (1)

[13]

PARAMETER	METHOD	TIME	COMMENT
Fertility			
Soils translocation	a Marked Stakes in Transects with a permanent benchmark at each site (wind and water) (see notes). Timing: 2 x/yr: at end of dry season (same time as annual fertility testing) and at end of rainy season. b. Soil Traps (wind) (see notes). Timing: 1x/yr: at end of dry season (same time as annual fertility testing).		
Gully development (Water)	Grid	1x/yr: also immediately after end of rainy season. (See Dune Gullies-same)	

C) Measurement in Laboratory: Fertility

III) Soil Salt Concentration : Cuvettes

A) Assessments by Villagers (V) (not by soil sampling)

Method/scale

1) [Fertility]

2) Plant Indicators

a) Crop Vitality Timing: 1 x/yr With Crop Yield Sampling at Dry-Season Harvest (See Fertility Page)

1) Withering Visual / 0-5
0 = no withering
5 = completely withered

2) Color: Yellowing/ Reddishness. Note Color, Visual Intensity/ 0-5
0 = no yellowing/reddish hue
5 = complete yellowing/ reddish hue

b) [[species (Spp)]]-

3) Soil indicator Visual / 0-5 < irrigated areas only

Salt Crusting
Expect white/
Special Note if
black or other

0 = no salt crust
3 = 50% crusted
5 = 100 % crusted
Timing: With Salinity Sampling (below),

2x/month. Look at area of 1 square meter at sample spot before extraction of sample.

B) Measurements by Agents (A)

1) [Fertility]

2) None during first season. Will order portable meter for next year depending on results of lab analyses (esp. vis a vis sodicity.

C) Lab (L)
1) [Fertility]
2) Saturation Extract - (incl ESP, SAR, Cation speciation)

Soil Sampling for salt concentration (for lab analysis above): Monthly Sampling During Dry-Season Gardening Period: Recommend composite sampling. 5 sub-samples per composite sample (minimum wt. of composite: 1 kg.) per selected garden plot. Will give exact procedure and bags, etc. in Niamey. Do parallel to water quality testing during irrigation season. Do sampling day before and day after water quality testing (1 x/day)(2x/mo). Because of costs of lab analysis and labor required, recommend doing comparison study of two cuvettes only: Bassouri vs. Kilakina or Karumba in selected number of garden plots (5 each). From preliminary soil sampling, Bassouri has higher clay content (loam) vs others (sandy loam). From Phase I, Bassouri also associated with salinity problems.

[[ ]] with NRM Specialist under Vegetation Section; Spp = Plant species which villagers correlate with soil salt level;
[ ] refer to Soil Fertility Page (see Soil Erosion Page)

Addition:

Dune Gullies (section 5, 3, 2, 4, CB-EMEMP document)

List as separate category (not under Soils or Dune Movement).

Agents only :

(1) Grids - same structure as for measuring dune movement - but smaller dimensions. Suggested dimensions = 1m X 1m. If Gully wider than 1m, build accordingly.
Timing = Measure immediately after end of rainy season, 1 x/yr

only. (Same as Grids for fields).

8.3 - PERSONS MET

- Curt Nissly, USAID/Niger
- Hamadou Bourahima, USAID/Niger
- David Miller, USAID/Niger, NRM specialist
- Ibrahim Idi-Issa, Director PNGRN Niger
- Bill Stringfellow, ASDG II, ONG/ Private Sector Grant Unit
- Ibrahima Amadou, ASDG II, ONG/ Private Sector Grant Unit

8.4 - DOCUMENTS CONSULTED

- Plan for supporting natural resources management in sub-saharan Africa; Regional environmental strategy for the Africa Bureau; AID/ARTS/FARA; May 1992.

- Gouré NRM interventions (683-0278) community based environmental monitoring, evaluation and mitigation plan (CB-EMEMP); I. Samba, REDSO/WCA, J. Grey, AFRICARE/Niger, & B. Rand, USAID/Niger; 1992.

- Environmental indicators; Indicateurs Environnement; OCDE core set; Paris, 1994.

- Proposed Country Strategy Plan, 1995-2002, USAID/Niger, version March 1995.

- AFRICARE's Gouré natural resources management project mid-term evaluation; Team work lead by John Lichte; February 24, 1995.

- A monitoring and evaluation plan for USAID/Niger Strategic objective three; by Ms. Elizabeth Adelski, the DESFIL project, and Philip DeCoss, International Resources Group. DESFIL, May 8, 1995.

- A participatory approach to identifying intermediate indicators for NRM and M&E systems; by W. Roberts, J. Landeck and W. Fiebig, the DESFIL project; January 1995.

- Monitoring and Evaluation systems using a relational NRM database; W. Fiebig and I. Ouedraogo, the DESFIL project; January 17, 1995.

- Development of a NRM database following the ARTS/FAFA NRM analytical framework: a concept paper; I. Ouedraogo & W. Fiebig; the DESFIL project, November 28, 1994.

- Monitoring and evaluation of NRM Interventions in Niger: Strategy and workplan for ASDG II; Philip DeCosse, May 1995.