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WORLD RESOURCES INSTITUTE

1709 New York Avenue, N.W., Washington, D.C. 20006, Telephone: 202-638-6300
Facsimile: 202-638-0036 Telex: 64414 WRIWASH Direct Dial: (202) 662-

NRM FRAMEWORK REVIEW

An analytic review of ANR's present Natural Resource Management (NRM) program framework as a monitoring and design tool with suggestions and recommendations for its use.

Prepared for: World Resources Institute
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By: Fred R. Weber
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TABLE OF CONTENTS

INTRODUCTION	page	1
SUMMARY		2
I. GENERAL CONTEXT		3
A. Natural resources and local people		3
B. NRM Framework: Logframe		3
C. DFA targets		4
II. USING THE FRAMEWORK FOR MONITORING		5
A. Indicators and Means of Verification		5
B. Evaluating progress toward DFA objectives		14
C. As a tool to evaluate program impact on natural resources		17
III. Q & A		18
A. Sufficient rigor		19
B. G I S		20
C. As tool to organize indicators		20
D. It reflects progress of achieving target 3.1		21
E. Different frameworks for different zones and biodiversity		21
F. Field data as basis for designing framework		22
G. Is there enough information?		22
H. How practical is the framework?		22
I. Potential uses other than monitoring		23
J. What next?		24
BIBLIOGRAPHY		
ANNEX 1 Scope of work		

NOTE OF THANKS

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INTRODUCTION

This paper has been prepared in response to an agreement between the World Resources Institute's Center for International Development and Environment and the author. It replies to a request for a review by AID/AFR/TR/ANR/NR in December of 1990 and covers the issues and questions raised shown in Annex 1 "Scope of Work".

This report attempts to analyze the NRM Framework's usefulness from a practical, overall perspective as a future monitoring and planning tool for the missions and AID/W. While the review thoroughly covers the basic question of the NRM Framework's usefulness and, in some respects, goes beyond the original scope of work, it does not fully address the request to conduct some trial runs with program data and information presently available.

The reason for this is explained in the text; the present model, at least in the view of the author, is built on enough, solid evidence from the field so that further trials are no longer necessary. At the same time, it would become unwieldy if additional refinements were added in order to permit more complete coverage of the many variations of conditions which exist at specific, individual sites.

Two other, similar reviews have already been carried out by Freeman [1] and Karsch [2]. These reviews contain detailed suggestions and, in Karsch's paper, extensive data processing and analysis. Their findings and recommendations are synthesized in this report.

[1] Freeman, P.H. "Partial Draft NRMS Analysis Report on Information Support," AID.

[2] Karsch, G.E. "Organization and Further Analysis of NRM Indicators," AID.

SUMMARY

The logic of the organizational framework, particularly its linkages leading from actions to improved natural resource management, were analyzed and checked against experiences of numerous other donor efforts across sub-saharan Africa.

In addition its concept was compared to the overall Development Fund for Africa (DFA) objective-tree and checked against its targets. Parallels to the well-tested Logframe analysis also were developed.

In all situations, the NRM framework seems to hold up quite well, not only providing general programmatic guidance for tracking and monitoring efforts but also being of considerable value for future NRM program and planning purposes.

The framework is well-suited for monitoring purposes on project and program levels. However, some fine-tuning is recommended particularly with respect to:

--- gathering country-wide data on agricultural productivity and income levels,

--- setting up monitoring sampling procedures to conduct a limited number of field surveys and interviews,

--- using indicators described in an AID/PPC publication to supplement those proposed already,and

--- introducing new technologies and approaches as one of the conditions leading to the adoption of new practices.

While much information is already available that supports the usefulness of the Framework, specific "hard" data providing proof that the proposed linkages indeed exist are still lacking in many instances. Most of these data, however, require substantial extensive collection efforts that are beyond the practical reach of most NRM projects or programs.

Finally, the report addresses a number of specific questions that the author was asked to address in the scope of work.

I. GENERAL CONTEXT

A. Natural resources and local people

The organizational NRM framework which has been developed by NR reflects the dynamics that come into play when changes occur in rural areas of sub-saharan Africa. It attempts to systematize what experience has taught is taking place when interventions, either outside induced or spontaneous, are launched and existing natural resource systems are used differently than in the past.

As such, this new framework represents a logical "model" that links new initiatives or interventions to the effects they will have on the natural resource base and its productivity. Based on evidence gathered in the field, it incorporates the most likely reaction(s) of local people to such changes. The framework also takes into consideration two basic factors that are known to greatly influence success or failure of development efforts in general:

--- For quite some time now, it has been well known that what determines (more than anything else) whether rural development efforts in the long run succeed or fail, is the reaction (or non-reaction) of local people to government or donor-induced efforts.

--- In addition, numerous studies[3] have solidly established that local initiative (cooperation, adoption, strengthened local institutions, etc.) is an essential component of all projects or programs which aim to achieve sustainable increases in productivity through better management of natural resources.

The NRM framework takes these two factors into account by highlighting the adoption of new approaches, techniques or procedures by farmers and herders. From this it follows that if the NRM framework is set up realistically, the changes that are promoted by projects or programs using this tool can be tracked more easily, systematically and more efficiently.

B. NRM Framework: Logframe

In this respect, the framework is **similar** to the well- established Logical Framework Analysis (Logframe) which has been used by the

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[3] Rochette, R.M., "Le Sahel en Lutte Contre la Desertification,"; Wright, Weber & Broekhuyse, "Ecology and Rural Develoment in Subsaharan Africa: Selected Case Studies"; Shaikh et al., "Opportunities for Sustained Development." Among many other, similar studies on "what works", publications by IIED, OTA, AID, IBRD, FAO, CILSS, CLUB, WRI and ODI deserve special attention.

agency in project and program design for over 20 years.

The **difference** is that in the NRM framework under review here, local farmers' and herders' reactions to changes are considered an integral part of the process. The way people respond or react to initiatives is made part of the cause-effect chain which connects the different levels (from I to V, see below). In the Logframe, the positive reaction and/or participation of local people toward an output or objective is taken into account as an "assumption", whereas in the NRM framework, it is built in as a link that cannot be circumvented.

The two systems relate to each other in the following manner:

Logframe	NRM framework ("levels" shown in numerals)
GOAL	V Sustainable increases in income and productivity
Purpose (project objectives)	IV Bio-physical changes leading to sustainable increases
Outputs	(III Adoption of practices producing changes in the natural resource base (II Tenure, financial & institutional changes occur that facilitate/enhance adoption of new practices (**by local people**)
(Activities)	I Actions establishing more favorable conditions
Inputs	(Inputs)

C. DFA Targets

Actually, project or program efforts that follow the NRM sequence are also likely to lead to the achievement of the other targets of the DFA Action Plan. The NRM's "Strategic Objective No 3" (Developing the potential for long-term increases in productivity) contains three targets:

--- The first, Target 3.1, "Improved natural resource management" is the one that the organizational NRM framework is concerned with. But the other two are also likely to benefit from efforts to improve the management

of natural resources.

--- Target 3.2, "Accelerated agricultural technology development and transfer" also may be enhanced, depending on the situation in the field. Introducing the concept of windbreaks in Niger, apparently, is producing long-term increases in overall productivity. At the same time, however, a new[4] technology has been developed[5] and is being transferred (to Malian farmers, for example).

--- "Expanded skills and productivity on the job", target 3.3, is also met by efforts which were undertaken primarily to meet target 3.1. (Fruit tree seedling production by women in the CARE project in East Kenya, for example).

The NRM framework, as it is set up now, is tied to the DFA Action Plan objectives as shown below.

II. USING THE FRAMEWORK FOR MONITORING

Ideally, such a framework should be used as a tool or procedure to monitor and assess:

--- progress towards achieving the objectives of the DFA Action Plan,

--- project and program hypotheses and assumptions,

--- reliable proxies for those indicators that are relatively expensive to measure,

--- what lessons from the field can be drawn that should be incorporated into future program/project development.

A. Indicators and Means of Verification (Units of Measurement)

Tracking the changes that will occur at different levels once action has been initiated is done by observation and measurement. What to measure and how to go about it requires selecting a set of indicators and choosing procedures to observe and measure.

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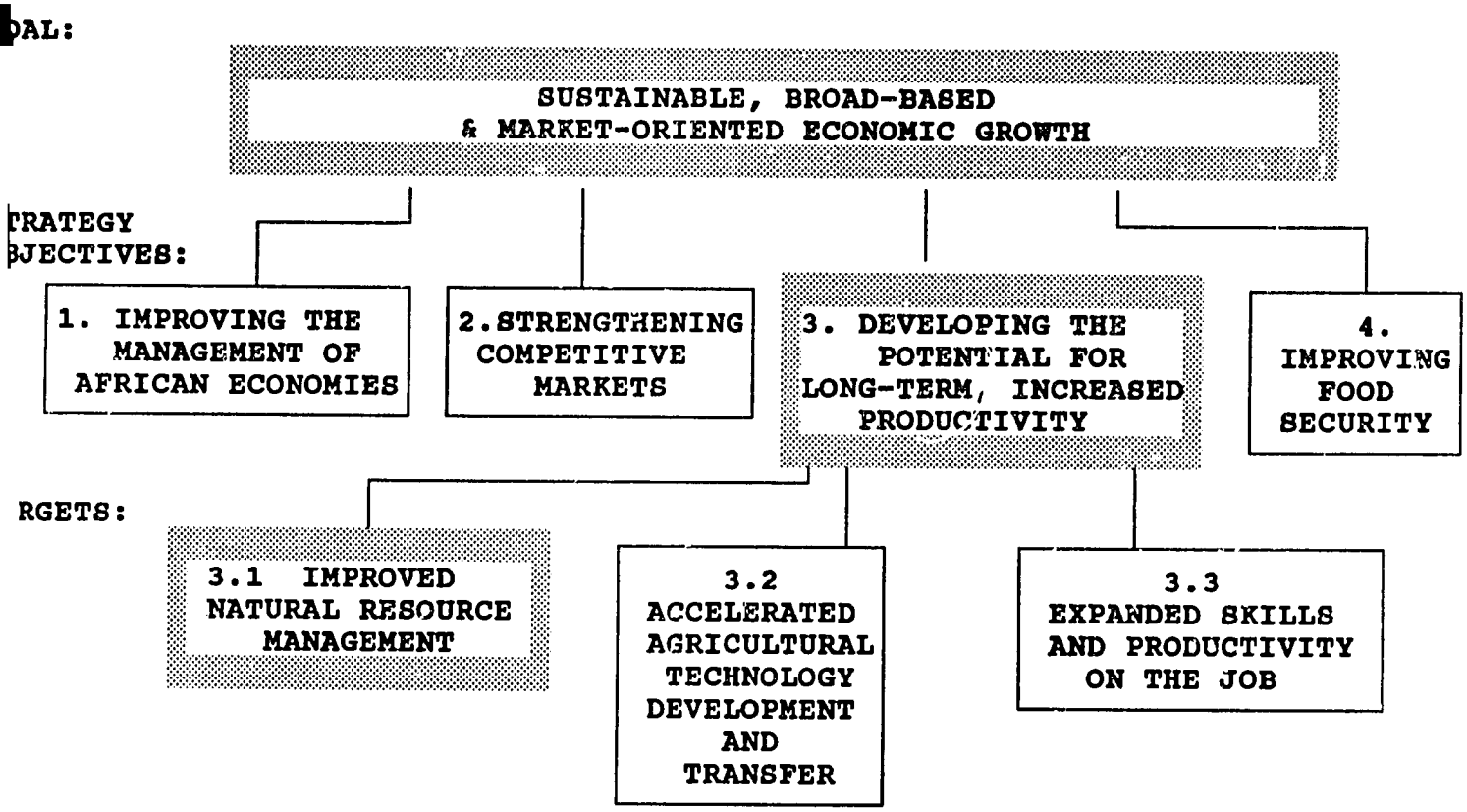
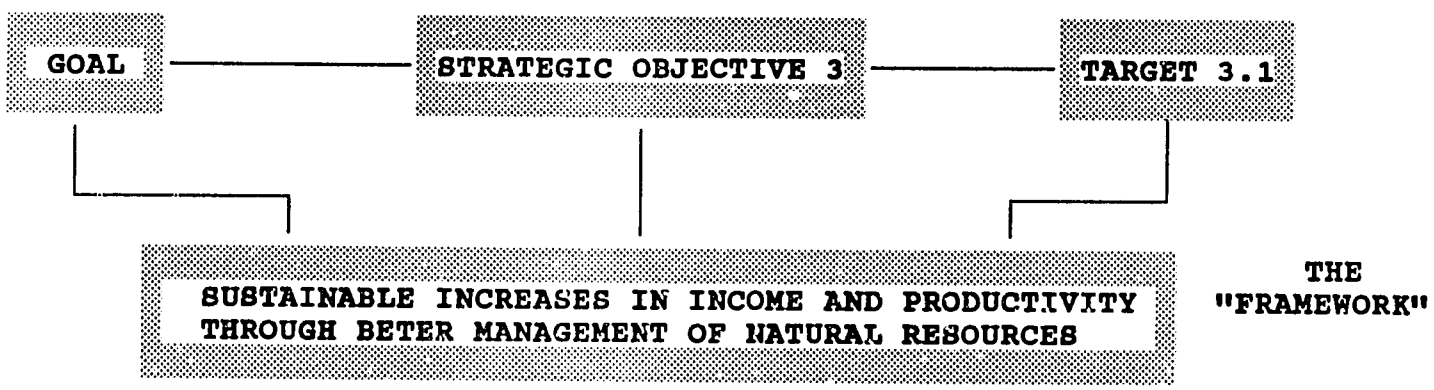
[4] "new" to local people.

[5] field-tested and adjusted to local site conditions.

NRM FRAMEWORK ELEMENTS
(Source: AID, DFA)





From a field- or mission-level perspective, the NRM framework's chances of success are greater given the following criteria[6]:

--- the indicators should provide tangible, easily measurable data,

--- the indicators should be applicable over a range of different ecosystems,

--- data collection should not be too difficult, too costly or too time-consuming,

--- the indicators should address primarily project- and program-level concerns, rather than programmatic, regional or countrywide problems (except for the linkages between the highest two levels: IV and V).

--- where feasible, local people should actively assist in data collection. Therefore the indicators should focus on practical aspects, be straight forward and deal with issues meaningful to rural people (i.e., those people upon which "success" of an intervention depends in the first place).

The Units of Measurement proposed thus far to be used in the NRM organizational framework are shown on the first page of Annex 1. The following comments and recommendations are offered - level by level - in this regard:

Level V: Sustainable Increases in Income and Productivity.

Kg/ha (yield) or $ (i.e., value)/ha. As straightforward as these units appear to be, they are often painfully tedious and difficult to measure in the field. For example, mono-cultures like corn, millet or sorghum produce not only grains, but important by-products like animal feed, fuel and construction materials. In most traditional farming systems plant stalks can also greatly increase yields if left in the fields as soil cover and conditioner. Yields of cereal produced (in kg or value per ha), therefore, is not a good indicator by itself that local people are better off. In order to get an accurate measurement of soil productivity or "income", plant by-products have to be measured as well. Weighing stalks as well is not sufficient either. Stalks can be grazed by animals after the heads or ears have been harvested, or they can be cut, stacked and set aside for the dry season. Their nutritional value in either of these cases is not the same. Also, if they are used for construction, weight alone

[6] The criteria shown here are practically the same as the ones proposed in "Preliminary Indicators for Monitoring Changes in the Natural Resource Base," AID/PPC, 1988.

is no indicator of their usefulness; differences in length and strength, for instance, also come into play.

An additional complication arises from the fact that in many small farming operations a variety of crops are grown together on the same plot of land. In the mountain areas of East Africa, for instance, it is not uncommon to see sorghum, beans, peas, pepper plants and potatoes grown simultaneously on the same plot. Harvest of such systems often stretches over months at a time (two growing cycles exist due to the fact that there are two rainy seasons). This means that yield observations would have to be carried out on an almost year-round basis; this is neither easy or cheap to do.

Traditional animal-raising systems also pose problems. In many areas throughout sub-saharan Africa, animals still graze on "common" pastures and rangeland. Increases in the productivity of this land inevitably attracts additional farmers and herders. It then becomes difficult to measure the target population's increases in income. Another problem occurs when attempting to measure the direct and indirect products of animals. Generally animals are not raised for meat, milk or hides alone; their labor is a valuable input to many income-generating activities. "Productivity" from one hectare of land, therefore, encompasses not only kg/ha but also the indirect benefits resulting from healthier work animals.

Changes in income (individual or family-based) are also difficult to assess. A comprehensive AID-produced report[7] describes some of the problems associated with measuring changes in income. The recommendations offered in this report, however, are rather complex and expensive.

Other donor organizations looking for "indicators" have run into similar difficulties. In the end, it turns out that measuring or observing such general program objectives or goals as "sustainable resource productivity", "increased small holder income levels" or - for that matter - "increased standards of living" is a complex undertaking that requires considerable funds, time and planning.

In a similar study done for the Swiss Development Cooperation agency (unpubl.), it was pointed out that measuring a program's effect on the goal-level (of the Logframe) can not and should not be attempted "internally", that is, within the funds available for a project or program Instead, this should be done on a nation-

[7] "Indicators for Measuring Changes in Income, Food Availability and Consumption, and the Natural Resource Base," AID/PPC.

wide, separate basis in the form of general agricultural surveys[8] or as part of a census-taking operation at reasonably spaced intervals (ten or, at the least, five years apart). This observation seems to apply particularly to level V of the framework.

This does not mean that nothing can or should be done on a smaller scale. For one thing, soil productivity can be measured in the field; at least for small samples which, obviously, must be very carefully selected. This may mean training and paying someone, preferably some local person, to observe and measure all products being harvested from a given plot of land. In addition, a sample of farm families can be interviewed regularly to find out more about the income they are getting from their land. At the same time, information can be gathered about "adoption rates" of new techniques or approaches with which that the family is gaining experience (See recommendation 1b, below).

A CARE natural resource project in Rwanda (Gituza) has done important pioneer work along these lines. A method was developed whereby individual families were selected (according to well-defined patterns) which then were visited at regular, scheduled intervals by specially trained project field staff. These visits did not involve "surveys" or questionnaires. Rather, the staff had specific questions in mind for which they sought answers in the course of an unstructured dialogue with all of the family members. (At the same time, staff also acted as extension advisors passing out information, showing people different techniques, etc.). After each visit, the information was entered into the family's record. The data set of all families together was then analyzed. After a few years, trends began to show for such items as soil (or land) productivity, changes in income from farming operations, etc.

Another, indirect option, consists of analyzing a number of representative soil samples for such characteristics as plant nutrients, CEC, organic matter, ph, texture, etc. Relationships between soil fertility (as observed through soil testing) and productivity, or income, are far from conclusive, especially for situations found in LDCs.

[8]It is noteworthy that in the US, nation-wide soil surveys are conducted at ten year intervals (only) and as separate efforts. Special funds are set aside for these assessments. They are carried out to evaluate the general state the country's soils are in and to determine trends since the last survey.

Recommendation:

(1a) In countries where AID places a major accent on better management of natural resources, carry out (or support) regional or nation-wide agricultural sector surveys that include a component which periodically measures:

--- basic soil productivity (for crops and rangeland), and

--- farm-generated income-levels for individuals or families.

These efforts should be carried out separately and in addition to NRM-specific programs or projects.

(1b) As part of each NRM project or program effort, include a monitoring activity that allows periodic, unstructured but "targeted" visits/interviews of a carefully selected sample of farm/herd families. The idea is to obtain information on soil productivity and changes in income over time from those who benefit most directly.

Soil productivity data gathering can be coupled with actual field measurements of products harvested from sample plots (see above).

Level IV. Biophysical changes that produce the increases (which are mentioned in level V).

An area or country's natural (renewable) resource base consists of its water, soil (land), natural vegetation and wildlife resources. In a stricter sense, air or air-quality should be listed here as well; it is not considered further here because "better management of natural resources" in the context of this paper does not apply to air.

A second point deserves close scrutiny: the text of the organizational NRM framework leads one to believe that it has been prepared primarily with forestry and rain-fed crop activities in mind. For the model to be of wider use, consideration of other resource use systems such as range-livestock production, irrigated agriculture and wildlife efforts (game ranching as well as conservation and protection schemes) should be included. This would necessitate that indicators other than those shown, be added.

Recommendation:

(2) All "primary indicators" mentioned on page 5 of AID's Preliminary Indicator report[9], can serve as a general data base for all NRM-oriented efforts. Depending on whether the intervention focuses primarily on water, soil, vegetation, wildlife or other resources (including bio-diversity), the "secondary indicators" for that resource should also be observed.

Changes in soil productivity can be viewed as one of the biophysical changes and, therefore, should be addressed at this level, rather than level V as mentioned above. Strictly speaking, the issue in level V is not the change in soil productivity but whether or not these changes are sustainable. Sustainability is verified by comparing records over time; that is the critical element and of essence of level V.

Level III. Adoption of Practices that Produce Changes (mentioned in level IV).

The framework text at present mentions "numbers of smallholders and number of hectares with improved practices".

Two observations may be of help in this respect:

--- The ratio of the actual number to the total potential number of people or areas that the practices could be applied to is just as important to the number of smallholders and hectares with improved practices. This ratio would give an idea of the magnitude of the changes compared to the maximum possible. For example: 1,000 farmers having adopted a certain practice means one thing if the total number of farmers is 2,000, another if 20,000 of them exist; in the first case 50 % of all potential users would have been reached, in the second, only 5%.

--- Smallholders are obviously the most important group of "clients" in these efforts. However, in larger operations, cooperatives, agri-business, government or institutional enterprises also adopt such practices, so much the better. Therefore, a system has to be set up so that they be counted too. Indirectly, this is accomplished if one looks at the surface areas covered, provided it is clear that all surfaces count, not only those managed by smallholders.

[9] "Preliminary Indicators for Monitoring Changes in the Natural Resource Base," AID/PPC, 1988.

The question of how to do the measuring is raised here. It is reasonable to propose to do this in similar fashion by observing a sample of family farming operations, as described above for biophysical parameters (recommendation 1b). Adoption rates of industrial operations would then have to be observed separately.

Recommendation:

(3) Use the same sample families as described under 1b to also obtain information about the degree to which improved practices have been adopted. Note that there is a difference between someone trying something new once and staying with it after the original attempt. (Acceptance on a trial basis as opposed to full-fledged, permanent adoption).

Level II. Changes in policies, institutional reforms, etc.

It may be a good idea to prepare a list of all the "etc." items that may be involved: price levels of farm products; farm subsidy levels; land and tree tenure laws; access to ufruct rights; water rights legislation and regulations; policies and regulations pertaining to tree cutting permits; pricing and marketing policies of seedlings produced by project and government nurseries; marketing and transport of farm products; laws pertaining to damage done by grazing animals to crops; land-use regulations (e.g., zoning); wildfire and agricultural burns; fishing and hunting; capturing wild animals; agricultural chemical storage and handling; government support to local resource management efforts; pay scale and merit systems for public employees; and many more. All can make a difference in what resource-use practices people will carry out, old or new.

A more complete tabulation could then be used as a check-list; applicable items could be identified and tracked through scanning government publications and journals, following progress of legislative sessions/meetings and the like.

A number of practical examples exist where changes thus described were not enough to get people to adopt new practices. As seen in the case of the horizontal rock ridges (this movement started in Burkina) or the Niger windbreaks (or small, individual woodlot plantations), local people simply were not aware of what could be done by themselves without (much) outside assistance. A new technology or approach had to first be introduced. Once farmers/herders saw what could be done, they followed through. Not because laws or policies were changed, but because what they saw made sense to them and was replicable as far as they were concerned.

This leads to the conclusion that more than policy and institutional reforms may be needed; often new technologies or approaches have to be "introduced" first, that is, demonstrated, and details made available for local people to observe, consider and perhaps experiment with themselves.

Recommendation:

(4) Add under "units of measurement" an item for "Introduction, demonstration of new technologies and approaches"

As indicators, the following should be considered:

--- Numbers of different techniques introduced (offered) through demonstrations and trials.

--- Number of farmers/herders contacted or exposed to these techniques through field days, visits arranged, etc.

--- Apparent acceptance rate or interest expressed by local people. On the other end of the scale: kinds of objections, constraints expressed.

Level I. Various actions

It would go too far here to list all the different types of actions that would be necessary to trigger the dynamic, level-to-level changes that would result from them. Much depends on which resource (water, soil, vegetation or wildlife) is targeted. Actions also differ markedly from one eco-zone to the next. Local customs as well as differences in modern laws from one country to the next also influence the kind of actions to be taken.

How to chose the right action package is often difficult. In line with the logic behind the framework, the following thought sequence may be of help:

First: determine what it is that people want and can do themselves,

Second: determine what they would want and could do if it were not for some constraints or limitations,

Then: find out more about the nature and reason for these constraints. This will lead to determining which action can and should be taken (through projects or programs) that will help overcome these constraints and limitations.

B. Evaluating progress toward DFA objectives

To what extent natural resource management can or should be improved depends considerably on who is deciding. Opinions on what constitutes good, better or improved management of water, land, vegetation or wildlife resources can vary widely; ranchers, irrigation farmers and loggers have entirely different views on these matters in the U.S. Not surprisingly, many different opinions exist in AID-served countries. Huge differences exist on this issue among donors, as well. Secondly, what host-country agencies consider better or more rational sometimes seems to be the opposite of what local farmers or herders (not to mention charcoal makers or fishermen) sometimes think.

Amidst these variations, the DFA Action Plan provides some clear margins. Terms such as sustainable, broad-based growth, and long-term increased productivity clearly emphasize the need for the natural resource base to be managed (used, harvested, protected, conserved) in such a way that the stock or capital is not depleted or allowed to deteriorate in any way. In addition, AID's emphasis on retaining bio-diversity also points toward the same end. Moreover, implicit in these statements is the will and desire to not only retain what is (still) there, but to possibly improve and, where feasible, restore, reclaim and, in general terms, reverse existing deterioration trends where this can be done without causing undue adverse impact on the local people.

The framework, with its indicators and means of verification, provides a practical tool to track changes and trends along these lines. Improvements on levels II to V can be assessed, recorded and reported.

The only problem that exists is the uncertainty or flaws in the linkage between the different levels. This might be particularly annoying when trying to document sustainable increases through better management of natural resources. As explained above, increases in income and productivity are difficult and tedious to measure accurately. That would not be so bad if we knew for sure that such increases will take place if and when the objectives of the next lower level have been reached (biophysical changes, level IV). Similar uncertainties exist between the other levels; some of the linkages are simply not that well established yet, particularly if the tests are to meet standards of scientific, technical and statistical evaluation. Here are some thoughts on this subject:

Linkages between I and II

Actions by Host Country Governments and AID undertaken to establish the conditions describes in level II may fall short of their mark for a number of reasons: political indecision or instability (in the host country); the scale of the problem simply being much

larger than originally contemplated; changes in policies and institutional arrangements taking more time than assumed; planned changes having potential negative impact on other sectors of a country's economy, among others.

The examples given clearly show that the dynamic forces at work linking causes to effects on these levels are not of technical or scientific nature. Rather, they have a socio-political, administrative and institutional character that eludes exact tracking by figures and formulas. Linkages between actions and the establishment of the conditions do exist. At the same time, there undoubtedly are many ways inputs might be badly timed or otherwise mismanaged so that even the best intended actions will not always lead to establishing the anticipated conditions.

Linkages between II and III

Policy, institutional and economic changes plus the introduction and demonstration of new techniques and approaches should result in people adopting new and different practices. But will they?

The evidence, non-scientific as it may be, is rapidly mounting in reports, publications and literature in general, that they are; not across the board, but in an overwhelming number of cases. This is evident in case study after case study, some of which are included in the publications cited above.

The reason for this change is the simplistically modest expression "if it makes sense to local people". The difficulty starts when one analyzes more closely what this means. Included in the term are considerations spanning technical, economic, social, administrative/policy aspects, all interwoven into the decision-making process of local people. The art, obviously, is to be able to predict what makes sense to people; that would guarantee that the linkage is perfect. As a rough, first approximation one can attempt to find, somewhere in the multitude of case studies, a situation similar to the one at hand and then try to replicate the level II elements that contributed to achieving level III. However, the number of variables involved between these two levels is so great and the number of combinations so large that the formula for a rigorous solution would be so complex it would have no practical meaning. Therefore, while the issue is far from being resolved, it seems to be of little value to pursue the theory behind it any further at this time.

Linkages between III and IV

The hypothesis here is that if certain (the right kind) of practices are adopted (on a large enough scale), favorable changes of the biophysical characteristics of the natural resource base will sooner or later automatically take place.

This obviously is correct in many cases: if poaching stops, wildlife counts are likely to go up; if grazing stops, natural vegetation will become more dense; as vegetation cover in a denuded watershed increases, flood peaks will be less sharp; if a management system is implemented in a stand of natural vegetation, it will not degrade further, etc. In all these cases, however, it is easy to imagine a series of "provided that" reservations:

Wildlife counts will go up, provided that the habitat for them still exists; natural vegetation will become more dense provided that there are no reoccurring fires; flood peaks will flatten out provided that the new vegetation cover is not over-exploited, etc.

The gist of this is that while adoption of resource-friendly practices can and, in many cases, will help, other constricting or destructive factors may still exist that will keep the improvement from taking place. If such other forces are at work, their reduction or elimination is required, or counter-efforts will have to be put in place.

The key question, before a monitoring system is put in place, is: what adverse factors, forces or pressures (other than damaging practices) are now affecting the state of the natural resource base? If the answer is clearly, "none", then chances are very good that adopting different practices will bring about the desired changes. If, on the other hand, "irreversible" damage already hasoccurred (soil washed away, seed sources disappeared, etc.), the anticipated biophysical changes may not materialize.

Linkages between IV and V

Of all the steps between different levels, this one is, in many ways, the most difficult to ascertain and also one that is most easily disrupted by other factors from outside the framework.

Some of the difficulties have been touched upon already; the reasons why income and productivity may increase are difficult to separate from each other and soil, forest or range productivity sometimes do not directly translate simply into more income. In addition, even in donor countries where observations have been carried out for years, it is still debated to what extent erosion control measures enhance farm soil productivity. If it is difficult under these circumstances to draw firm conclusions, then such linkages certainly should not be taken for granted in the setting of LDCs.

But it also seems reasonable to assume that physical improvements such as reducing soil losses, increasing the ratio of permanent vegetation cover over open fields, increasing composition and density of natural ground cover, increasing the tree-cover percentage in an open landscape, and expanding wildlife population or improving habitats will provide a solid, potential base for

income and productivity to also improve.

Across Africa, experience today can be summarized in the following statement: Where re-vegetation, soil conservation and natural forest (or wildlife) management interventions have been successful, income and resource productivity of and for the local people has improved markedly over a five to ten year period. While hard data are not always available, a "local satisfaction" proxy is frequently used. Stated simply, it is based on the fact that if local people are satisfied with the biophysical changes that have occurred in an area, it is because they (somehow) are better off. Therefore, the effort has been worth it, especially when monitoring data begins to confirm that the changes are sustainable (as far as the resource base is concerned)[10].

C. As a tool to evaluate program impact on natural resources

If the indicators are adjusted to include the above recommendations, the organizational framework will lend itself to the assessment of the NRM program's impact on the resource base in the affected area.

How this can be done and to what extent monitoring efforts will provide the needed information has been discussed above. Reference is made once again to publication[11], listed at the end of this text.

What the model is less suited for are impact analyses on country-wide scales, either to measure program impacts or other events (like annually changing rainfall patterns). Many of the larger resource tracking systems like the ones used by FAO to monitor the change of surface areas of remaining tropical forests, are done on scales that are too small to be able to pick up effects of programs, even large ones. Before resource impact detection efforts are undertaken, clients must choose the most appropriate scale. If a country- , continent- or world-wide picture is required, it would be extremely wasteful to measure data on project or village levels. If, on the other hand, a donor organization wants to know what kind of a resource-bang it is getting for an improved-management buck, different scales (and indicators) that are more in line with what is proposed for this framework, are needed. A review of possibilities and limitations of existing

[10] "Sustainability" is one of the terms that can mean many different things to different people. In the context of this paper it pertains only to the sustainability of a resource base, as opposed to "project sustainability", political sustainability, social or cultural sustainability, etc.

[11] "Preliminary Indicators for Monitoring Changes in the Natural Resource Base," AID/PPC, 1990.

large-scale tracking systems that are used on international levels has been prepared by WRI for TNR[12].

One aspect that deserves special consideration as far as resource impact monitoring is concerned, is **bio-diversity** . Most AID efforts in this field are directed toward on-site preservation of plant and animal species as they exist at present. While a host of other activities can and are undertaken by various other foreign assistance organizations, the following remarks limit themselves to in-situ preservation of existing species.

The PPC report[13] mentioned above provides the first clues on where to begin: changes in species composition and densities and surface area are of foremost concern for different vegetation (habitat) types; so is population data for wildlife.

Periodic inventories of forest and range types will indicate trends and show whether the original species diversity is maintained. In addition, and depending on the type of analysis carried out, additional information on species frequencies, growth rates, regeneration, mortality, etc. will become available. Inventory methods can vary from simple and very rapid "wandering quadrant" surveys to extensive, repeated phyto-sociologic investigations. The latter will, once sufficient data is available over time, permit the identification of successions and provide a more complete picture of the changes that occur in natural vegetation systems.

Investigations into the state and condition of the fauna can proceed along similar lines; animal counts give preliminary results. If they are extended over different seasons, repeated regularly and include data on composition (sex, age,etc), a more complete picture emerges. Additional studies and observation on animal behavior provide further insight. This data can then be combined with the various elements of vegetational analyses so that changes in (animal) habitats can be documented.

III. Q & A

The scope of work for this report asks for replies to a host of questions and raises several separate issues. Several of the major points have been covered in the two previous chapters. A series of others, however, needs to be addressed separately. Each is addressed below under its respective heading.

[12] A Review of Existing and Planned Natrual Resource Indicators and Monitoring Programs for Africa, World Resources Institute, Washington, D.C.

[13] "Preliminary Indicators for Monitoring Changes in the Natural Resource Base," AID/PPC, 1990.

A. Is rigor sufficient in the collection and analysis of information ?

Basically, yes, but there is one point that could stand considerable improvement: the credibility of linkages between levels. The fact is that little "hard" data exists which proves conclusively that these linkages are tight. Almost for every general statement that can be made that shows cause-effect relationships, cases can be cited where the relationship is not as simple. Factors not already considered can throw these linkages off track.

Especially when criteria of technical/scientific rigor are applied, many of the relationships become vague and uncertain. Some examples have been mentioned above. Others that have been the cause of many discussions, not to say arguments, have to do with issues such as:

--- scientific proof of how (not that) Acacia albida improves crop yields,

--- are horizontal rock ridges (reducing soil losses) sufficient to guarantee sustainable soil productivity or does it take other interventions (manure, rotation, etc.) to get to that point?,

--- To what extent and with what guarantee will providing local people with "what they want" (wells, schools, vegetable seeds, dispensaries, etc.) reduce pressures on natural forests nearby and thus help to preserve threatened wildlife?

--- Particularly in the case of mountain areas with relatively high rainfall where Al-toxicity in soils is a problem, which of the different interventions that are being advocated will alleviate the problem the best? Is it better to concentrate on one or does combining several give better results?,

--- Is it true that if local people are given free reign (right, power, free access, etc.) to existing natural forest stands, they will take care of them and use them in a sustainable fashion?,

--- What other conditions will have to exist so that local farmers' incomes will rise if farm product prices are de-regulated (free, open markets)?

It would be extremely helpful if these and other similar relationships could be documented with the necessary facts and figures. Solid data on many of these questions exist but they have been collected in other eco-zones and possibly outside of Africa.

This always introduces doubts, often rightfully so.

To provide this kind of data, however, would require "substantial extensive data collection," a condition which is beyond the reach of most NRM programs and projects.

B. G I S

The NRM framework can be incorporated into existing GISs. How useful such a step is depends, among other things, on the size of the basic unit the system uses. Data on natural resources that have been collected as part of AID's Ruhengeri Resource Analysis project (ETMA) in Rwanda have been entered into a GIS specifically designed for it.

This experience showed that the amount of work and time required to enter data was seriously under-projected at the outset. Ultimately, it was found that at least two full-time people were needed to digitize and enter data. Also, the working size of individual data cells (1 km sq.) chosen at the beginning was far too large to show changes on the individual field level; "even the 4 hectare land use maps fail to satisfy the need for tracking changes on the level of individual farms" [Bibliography, #9]. This is not the problem of GIS. It is rather a question of how much detailed work needs to be done for the collected information to be of much use.

In the 1986 evaluation report of the project, this and other "GIS type" problems are summed up as follows: "Before accepting the automated GIS system as a tool for (Rwanda) resource planning (and monitoring), we feel it needs testing of:

- its accuracy portraying resource information,
- the ability of the audience to understand its outputs,
- and it will need objective expert evaluation of its applicability from a technical viewpoint." [Bibliography, #10]

Similar observations and suggestions have been registered in connection with other AID projects such as PIRT (Mali) nd FLUP (Niger).

Pete Freeman has been working on a model where NGO field experiences are incorporated in a different type of GIS. Possibly the framework information could be fitted into something like this.

C. Framework as a tool to organize indicators

Selection, relative weight, and nature of indicators normally depend on the outline and content of a system or model. In this sense, the framework provides the general structure into which indicators must fit to be of much use.

Virtually all of the indicators usually applied to rural development projects dealing with natural resources do fit into this framework. After all, the framework is set up to guide activities toward better management of natural resources. Therefore, the framework should not only be a "tool" in this regard; it is the system into which indicators must fit, otherwise they are of little use. In other words: if the indicators can not be organized by using the framework, it is the indicators' fault, not the framework's!

D. It reflects the process of achieving target 3.1

The framework has been conceived as a program guide to lead to improved management of natural resources. The sequence followed by the different levels does provide a bridge from actions to the desired result. The comparison of the framework with the Logframe shown above, supports this entirely.

E. Different frameworks for zones and biodiversity?

The NRM framework, like the Logframe, is universally applicable and does not attempt to fit each local situation exactly. Developing different frameworks (different linkages, different levels, etc.) for individual eco-zones and a separate one for biodiversity would have the advantage that the process could be tailor-made for separate conditions. The drawback, however, would be that this would introduce a complex system of different models that would become rather unwieldy for the bureau to handle and keep track of. In the extreme, a case could be made that to devise systems that are truly representative of the situation in each mission, there should be separate frameworks for each country as well.

Even the somewhat special case of biodiversity fits quite well into the framework. The common denominator for all different cases and situations concerning biodiversity is the natural resource base and its present and future shape. The framework addresses this in a general fashion. Refining it or developing separate frameworks for different situations gives away the advantage it now offers: a general organizational framework for any effort focussing on improving natural resource management.

Another argument that supports keeping the framework on a relatively generic level is that it also can be helpful and is applicable in its present form to monitor activities that fall outside of the rural development sector but that rely on natural resources in one form or another. One example is **tourism** that is based on natural resources (scenery, clean water, intact natural vegetation, wildlife, points of geologic or historical interest, etc.)

F. Field data as a basis for developing a framework

Field-oriented practitioners would say that using field-based data, information, and experience is the only way to develop any management or planning method or procedure. On the other hand, it is possible to devise a model on an abstract, theoretical basis. A minimum of logic rigor is required in either case and it can be argued further that for the model to be really useful, it must accurately reflect reality. And since, in this case, the reaction of local people (the net gainers or losers in the entire affair) is made one of the central linkage-points, it would be extremely difficult to design a model without using (or disregarding) field-based data and experience.

Planners and theoreticians may disagree with this statement, but unless they incorporate what is going on in the field into their outputs, methods, and approaches designed to improve natural resource management in Africa, they risk to be of little use.

G. Is there enough information?

In terms of project and program experience, definitely yes! If one adds all the reported case studies, examples given in various publications[14], cases used in connection with seminars, etc., experience with several hundred individual activities and interventions can be drawn upon. To this one can add a multitude of data that has accumulated as a result of PVO activities all over Africa, a great share of which has accrued as a result of third country NGOs. Not all of these have been "successful", to be sure. In fact, different people have different opinions on what constitutes successful management of natural resources. But on the whole, there is more than enough information available as a data base.

What is less obvious and always will cause differences of opinion is to what end and how these data are being used, interpreted and presented. This is a judgement call and no amount of additional data will change this. Still, specific information on some of the cause-effect relationships is still lacking as explained above.

H. How practical is the framework?

For monitoring and to evaluate progress and impact, the framework with its indicators is not only useful but "ready to go", provided the recommendations made above are incorporated.

The question of data availability remains open however, especially

[14] "Le Sahel en Lutte Contre la Desertification," 1989, for example.

for some of the individual missions. While there is much information available, it often is not in a place or form that allows easy access.

Donor organizations worldwide are facing an immense problem of efficient data storage and retrieval in this respect. In addition, the "memory" of assistance agencies is sometimes questioned and it can be rightfully pointed out that much data are quickly lost because the collective memory seems to be short. This could easily be overcome by organizing a data bank. Some donor agencies might be interested in sharing some of the information. Of course, this would be an immense undertaking requiring so much effort, time and funds that it is understandable that donors have shied away from it.

If one looks for ways such a data bank could be set up on a manageable, modest scale, one could fall back onto some form of GIS where any intervention-result relationship that has been reported somewhere, is registered. This could be done according to:

--- Location by country, eco-zone, as well as perhaps latitudes and longitudes or geographic coordinates,

--- Resource elements such as water, soil (land), vegetation, wildlife, biodiversity, etc.,

--- Social, cultural and institutional settings

--- type of actions and level-linkages per framework

--- Donor organization

I. Potential uses other than monitoring

One of the framework's strong points is that experiences are organized in such a way that they can be readily accessed to provide future guidance in program and project planning especially in regard to policy, institutional and financial matters. This means that it could be used as a classification system to store information about past experiences where local initiatives were tied to certain favorable conditions which have helped to bring about changes in the way people are now using natural resources.

Like the Logframe, the NRM framework can be used as a "pattern" or "jig" that helps planners and programmers think through the process which, hopefully, will lead from activities and actions to improved management of natural resources in a way that is as direct, straight-forward and effective as possible.

It also can provide valuable guidance to junior planners and field implementing staff (who normally are responsible for the monitoring

at the lower levels of the model) but do not yet have extensive experience to make basic monitoring decisions.

The framework also should be helpful during evaluations in that it sets guidelines and boundaries for what the assumptions, reservations, and limitations are under which certain activities have been designed and carried out.

J. What next ?

(1) Prepare a 5 to 10 page handout that explains what the framework is all about: how it was developed, what its purpose is, how it can (and should) be used for monitoring and other activities.

Prepare a step by step procedure description aimed primarily at mission program and implementing staff. This should be kept short, easy to read, and as simple as possible as some of the users will be not be native english speakers. Include practical examples. Translation into french may eventually be desirable.

(2) Road-test the framework in Washington for two or three countries/programs/projects.

(3) Take the framework to the field and present it to missions in the form of two to three day seminars. Representatives from several nearby missions may be invited to the same session; this way, SSA could be covered in five to six meetings.

(4) Plan for a revision (fine-tuning) at the end of one year.

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SOW FOR ASSESSMENT OF ORGANIZATIONAL FRAMEWORK FOR NRM INDICATORS

A. BACKGROUND

Under the DFA, the Africa Bureau is charged with monitoring progress toward achieving Strategic Objectives. To monitor progress toward Target 3.1--**sustainable increases in income and productivity through better management of natural resources**--AFR/TR/ANR/NR developed an organizational framework. The framework, as follows, is a five-level continuum that hierarchically organizes NRM indicators with respect to how they contribute to the Target:

Level		Units of Measure
-V	Sustainable Increases in Income and Productivity	Kg/ha; $/ha
-IV	Biophysical Changes that Produce the Above Increases	Biophysical Parameters (soil productivity increased, soil conserved, forest cover, habitat protected)
-III	Adoption of Practices that Produce Above Changes	Nos of smallholders, Nos of hectares with improved practices, etc.
-II	Tenure, Financial, and Institutional Changes that Contribute to Adoption of Above	Changes in policies, Institutional reforms etc.
-I	Actions by Host Government and USAID that Establish Above Conditions.	Various actions (see attached)

The above framework was derived empirically by objective tree analysis of several dozen Sahelian case studies where Target 3.1 had been achieved or showed promise of being achieved. The analysis started with the impact from adoption of better practices and worked backwards to identify the various policy, financial and institutional conditions that contributed to adoption of the practices.

Subsequent work with the framework included organizing the NRM indicators from 12 USAID Action Plans and researching 190 literature sources for evidence that would support or refute the plausible linkages among the five levels. This work supported the framework as a valid organizational tool.

In addition to the framework being an indicator tool for monitoring progress toward Target 3.1, the subsequent analyses also indicate that it could also be used for the following:

- Check project and program hypotheses and assumptions upon which investments were made;
- Identify reliable proxies for those indicators that are relatively expensive to measure; and,
- Organize lessons learned from field experiences in a way that lead to meaningful inferences being made for program and project development.

B. OBJECTIVE OF ASSIGNMENT

This scope of work is intended to further assess the usefulness of the framework for monitoring DFA progress and for the above uses. In particular, the consultants will assist in verifying and revising the framework to be more useful:

1) To the Africa Bureau of AID in evaluating the progress of the Agency in meeting Strategic Objective 3.1 of the DFA; and, more generically,

2) To missions as a tool which can be used in evaluating program impact in the natural resource sector.

The activity will be undertaken in two phases, the first phase being a one week review activity during the week of December 13, and the second being a detailed multidisiplinary study, including field review of the use of the indicator framework, for up to five weeks in February-March 1991.

1. Component A - Africa Bureau Focus

The specialists will use first-hand knowledge and relevant literature to challenge the basic assumptions behind the development of the framework. Given that Sahelian experiences served as the empirical foundation for the framework, the specialist needs to give special attention to the validity of the framework for East Africa, southern Africa, and biodiversity.

In addition, the consultant will consider whether sufficient rigor exists in the collection and analysis of information to justify the identified linkages in the framework, and should recommend suggestions to improve the process so as to make the linkages more credible, without requiring substantial extensive data collection.

The consultants will also evaluate the potential for the incorporation of the framework into a GIS which could be used in Africa Bureau and at the mission level.

It is assumed that the framework is a valid tool for organizing indicators. This assumption needs to be challenged. The specialist will use both first-hand knowledge and literature to answer the following questions for the Sahel, East Africa, and southern Africa zones and for biodiversity:

1. Does the framework reflect the process of achieving Target 3.1?

The framework was developed from Sahelian field experiences by using objective tree analysis. The specialist will examine both the approach and the examples used in the analyses and assess both whether the objective tree analysis of localized NRM experiences is sufficient and whether the examples used were sufficiently representative. In this analysis, the specialist will subject other data to objective tree analysis or to another approach. In his/her assessment, the specialist will include the following questions to address:

a. Were the five levels of the continuum sufficient or too many for each zone and for biodiversity? Should there be a different framework for each zone and for biodiversity? If yes, identify the levels (and support them with analysis of several examples).

b. Is it valid to assume that using field-based data is the correct approach to developing a framework? Is there another, more valid approach?

c. Was there enough information in the examples to describe the full complexity of the process to achieve Target 3.1?

d. Based on his/her analysis of field experiences or other sources of information, how would he/she modify the framework?

e. What can be done to collect the information in a more structured, less anecdotal manner?

2. Does the framework identify the elements at each level that are both necessary and sufficient to achieve the next level, and, ultimately, Target 3.1?

This question turns on two assumptions: (a) the plausible linkages between levels are well established and (b) the approach to identifying sufficient and necessary elements in each level is valid both for temporal and spatial concerns

a. Testing Linkages

The specialist will test the first assumption by using first-hand experiences and the literature to conduct analyses (objective tree or otherwise) and assess whether the linkages between the various levels are strong, moderate, or weak. In the case of the linkages being weak, the specialist will suggest further analytical work for strengthening the linkage or choosing new indicators.

b. Temporal Concerns

The second assumption is important for the framework's usefulness in monitoring progress toward sustainable increases in income and productivity. Temporally, it is well known, for example, that short-term increases are produced by water harvesting or application of phosphorus. It is less appreciated that these increases, although brought about by investments in the land, are not sustainable if not accompanied by other measures that have longer-term impacts. It is assumed, that if the biophysical constraints in IV are addressed, that increases will have mid and long-term impacts.

The specialist will use first-hand experience and the literature to analyze cases where the biophysical constraints have been addressed. In the instances where Target 3.1 has not achieved or does not show promise of being achieved, he/she will identify missing elements, either at level IV or elsewhere.

c. Spatial Concerns

Spatially, it is assumed that if the various elements of levels I and II are achieved, that it is reasonable to expect wide-spread achievement of Target 3.1.

As above, the specialist will use first-hand knowledge and the literature to identify cases where elements in levels I and II have been achieved, and, in cases where there is not wide-spread diffusion of better NRM practice or promise of it occurring, he/she will identify constraints not being addressed.

3. How practical is it to use?

This question concerns the availability of data, the cost of collecting and organizing it, and the usefulness of those data. The assumption is that there are many data but that they are not in a place or a form that allows us to use them. To test this assumption, the specialist will do the following:

a. Availability of Data

The specialist will test the availability of data by contacting various agencies and organizations involved in NRM activities--PVOs in particular--and do a survey of the type of project data they collect and how it is maintained.

b. Cost of Collecting Data

The specialist will suggest ways of collecting and storing data. In particular, he/she will test whether the framework is a useful tool for organizing data.

c. Usefulness of Data

To reliably monitor progress, are the data in the framework sufficient? How useful is the framework for organizing data in such a way that meaningful inferences can be made for policy, institutional, and financial decisions? What other data and information are needed? The specialist should use first hand information as much as possible in responding to these questions.

2. Mission Focus

1. Review the framework, and amend it and the guidance provided with the framework to be more generic in nature (ie., not linked necessarily to the DFA's SO 3.1). This more generic framework should be flexible enough to assist Missions to consider program impacts from a variety of activities, including tourism and the protection of biodiversity.

2. Develop guidance to Missions on how to adapt, structure and use the guidelines, with suggestions on how to take into account the temporal and spatial issues discussed above under Section A.

3. Prepare documentation including computer files for use with WordPerfect and Lotus which can be sent to missions. Develop two case studies to be presented as part of the training materials.