HAITI PRODUCTIVE LAND USE SYSTEMS PROJECT

SOUTH EAST CONSORTIUM FOR INTERNATIONAL DEVELOPMENT AND AUBURN UNIVERSITY

FURTHER ASSESSMENT AND REFINEMENT OF THE PLUS M&E SYSTEM

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Preface and Acknowledgements

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List of Abbreviations

FES	Farmer Evaluation Sessions
GIS	Geographic Information System
GPS	Geographic Positioning System
ME	Monitoring and Evaluation
NGO	Non-governmental Organization
PADF	Pan American Development Foundation
PLUS	Productive Land Use Systems Project
PP	Project Paper
PRA	Participatory Rural Appraisal
RRA	Rapid Rural Appraisal
SECID	South East Consortium for International Development
SPI	Strategic Performance Indicator
U.S.A.I.D.	United States Agency for International Development

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Executive Summary

The consultant team found five monitoring and evaluation functions in PLUS: (1) to validate technology or interventions, (2) to track project outputs, (3) to show project and intervention impact in economic and environmental terms, (4) to elicit farmer perceptions and foster their participation for understanding and evaluation, and (5) to support strategic analyses that further project implementation. Our goal is to suggest improvements for all these functions.

SECID has given strong leadership, particularly in monitoring interventions. PADF and CARE have always supported reporting outputs. After some initial concern because of the amount of effort required to implement the system, both implementing agencies now support M&E and advocate its continuing implementation. Both have hired M&E staff at all levels of the project. There is a spirit of innovation and a willingness to try M&E techniques.

The M&E case studies of interventions (hedgerows, rockwalls, gully plugs, and gardens) have been a major effort and the basis for most of SECID's analysis of PLUS interventions. They were designed to provide information on the interventions' effectiveness, costs and returns. They estimate incremental differences in production and income by comparing fields subject to interventions with matched fields using traditional practices on "witness" plots. The data on cost of establishing the technology and maintaining it are from frequent visits to interview the farmers who are involved. Harvest data are obtained by interview or by harvesting sample areas in the treated fields and control fields. The studies are limited to the small monitored areas, with 50 installations on somewhat fewer farms.

The current M&E system has also been following interventions in several zones chosen as representative. The agencies have mapped the plots in these zones.

The case studies and monitored zones feed data to calculate a set of indicators called SPIs. Implementation has been spotty, with data problems for most indicators. For impact estimation, the results of the case studies have been generalized to all adopters, an expedient method that is becoming less appropriate as the number of participating farmers increases. Staff of the implementing agencies recognize the difficulties in using case study data to estimate impact.

Our general principles for modifying the current M&E system are the following:

The M&E should be integrated with PLUS project implementation and relevant to the needs and decisions of farmers, field staff, mid-level managers, participating NGOs, implementing organization managers, and donors. In particular, farmers and farm families should be increasingly active in PLUS M&E using participatory techniques. M&E information should be relevant, clear, accurate, and representative, and it should cover the main impacts of the project every year. The M&E indicators should reported yearly in a uniform manner, put in time series, compared with goals, disseminated, and discussed. Beyond annual reporting, M&E data should be analyzed using statistical and geographical tools to support strategic decisions. M&E information should be focused, reliable, and economical.

Recommendations for Impact Estimates

The project has grown to the point where it is time to estimate impact in a more representative manner. Fortunately, each of the implementing agencies has developed lists of participating farmers with their basic characteristics. PADF maintains file cabinets of dossiers, while CARE has a computerized system. These files are already used for implementation and for counting project outputs. While these files were not developed for M&E, they are an invaluable resource that should be used fully to obtain representative and defensible estimates of project impact. We recommend that they be used as a sample frame to make such estimates.

An extensive survey (short interview, large sample) would be used to estimate gross environmental and economic impact and quality of implementation on farmers fields. The project may choose to implement additional intensive surveys (longer interview, smaller sample) for estimates of other kinds of impact and for quantitative strategic analyses. It may choose to use data from existing GIS data sets. Other low-cost methods are noted for providing socio-economic and environmental data for analysis: regional RRA/PRA methods or sampling localities for group interviews.

The project should estimate the number of secondary adopters, or those who adopt without direct contact with the project. It is possible that project impact is considerably larger than what would be estimated by surveying only participating farmers.

We recommend that the current case studies be continued through the end of 1995 so that they generate detailed data on costs and production. Thereafter, we recommend that the case studies be monitored using less intensive methods to generate time series of gross production and environmental impact.

The economic analysis of the interventions should include representative assessment of gross incremental production, continuing calculation of financial indicators, and rough calculations of two new products: intervention budgets (showing investment, costs, and returns) that can help regional and field staff and approximate whole-farm budgets for typical farmers.

Recommendations for Farmer Participation

We recommend continuation and expansion of the farmer participatory methods already being adopted by PLUS. We recommend a continuation of the use of FSRE Diagnostics or Rapid Rural Appraisals but recommend evolution in the direction of a Participatory Rural Appraisal approach (PRA), with the aim of involving farmers themselves in identification of key constraints and opportunities. We recommend that these Diagnostics, together with other information sources, become the basis for the development of comprehensive descriptions of target-group farms, including the development of whole-farm budgets. We also recommend the adoption of Participatory Monitoring and Evaluation (PME) into future PLUS activities. This will involve the organization of special Farmer Evaluation Sessions (FES) so that farmers, themselves, may be engaged somewhat more formally in the assessment and evaluation of the PLUS interventions.

We recommend that efforts be made to involve regional staff--especially M&E staff--more extensively in the analytic work of the M&E system. The M&E system should support them to do regionally-specific analyses, and that they play a key role in the preparation and use of both intervention-specific and whole-farm budgets.

We recommend that PLUS initiate a dialogue with the local NGO's and farmer groups with which it works to stimulate them to give leadership toward the preparation of a comprehensive plan for the continuation of those elements of PLUS that are essential to make the PLUS efforts and hillside agriculture in Haiti more sustainable.

Recommendations for Land Husbandry Monitoring

Implementation of the PLUS goal and purpose requires the adoption of a `holistic' better land husbandry approach: the care and management of the land for productive purposes.

The impact of the project on the bio-physical environment should be monitored at three levels:

- the individual plot/micro level
- the farm household level

- the macro-geographic or project area level

We recommend that the project compile baseline data sets on the bio-physical conditions within each of the localities where the project has field activities from existing secondary data sources and the knowledge of key local informants. This information should be used for defining and demarcating onto a topographic base map individual land management units for all of the project areas. These LMUs should be used as the basis for stratifying environmental impact and adoption rates of the different project interventions.

The overall conservation effectiveness of farmers land use/management practices should be used as the basic criteria for determining the environmental impact of the project interventions. For instance concern with better land husbandry means that how the land is used between the hedgerows and rock walls, or in the catchment area upstream of a plugged gully, needs to be assessed to determine the overall environmental impact and conservation effectiveness of field level improvements.

Quantitative assessments of the conservation effectiveness of individual interventions in the context in which they are adopted should (in combination with the use of simple visual indicators of the status, type and severity of soil erosion) form the basis for arriving at an overall better land husbandry rating. Its main purpose with regard to the PLUS M&E system would be provide a clear indication as to the extent with which the land use management practices on a particular plot, individual farm holding or over a wider geographic area conform to the principles and practice of better land husbandry. If they do, then they would be in line with the projects goal and purpose and could be used as an indicator of success.

We offer specific guidelines for implementing this concept of land husbandry in the PLUS ME system.

Recommendations on SPIs

The individual SPIs are discussed in this report. We recommend that the SPIs, the output indicators from the project log frame, and a limited number of new indicators be combined and reported in an annual PLUS ME Impact Report.

The Products of the M&E System

The main activities of the PLUS ME system would be,

Participatory Rural Appraisals
Farmer Evaluation Sessions
Farmer Dossiers and Lists

Surrounding Areas Sample Frame
Extensive Survey
Land Husbandry Status Reports
Optional Intensive Surveys
Output Implementation Reports

The reports generated by the PLUS ME system should be integrated into the agencies annual reporting practices in a way that reduces overlap. The elements are as follows,

Annual PLUS M&E and Impact Report for the project as a whole, with the following elements

Output indicators from both implementing organizations
Process indicators of participation, including summaries of area FES, PRA, and staff discussions
Impact indicators for the project as a whole
Intervention-specific results, such as trials, case studies, FES
Appendices: FES, PRAs, technical reports, special studies

Occasional reports on technology, adoption, and impact of each project intervention, with a minimum of one report per intervention over the course of the project.

Mid-term and final impact evaluations

Participatory rural appraisals, with a minimum of one per area.

Annual M&E report from each project area, including a tabulation of some data items, a summary of the Farmer Evaluation Session, a Land Husbandry Status Report, and text by the area project team.

M&E reports TO each area annually, with intervention budgets, tabulations of area data, responses to queries, and comparative data.

Special studies and analyses, minimally to cover the strategic questions on achieving impact raised by project staff.

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The PLUS Project

The Productive Land Use Systems (PLUS) project emerged as an amendment of the previous Agroforestry II (AFII) project, and was designed to take advantage of the lessons learned in AFII and its immediate predecessor project, the Agroforestry Outreach Project (AOP). These projects concentrated on tree planting and soil and water conservation, and were considered successful. AFII was implemented by two non-governmental organizations, CARE and PADF, with support from the South East Consortium for International Development (SECID). It was amended in 1992 to create PLUS, as a "mid-course correction" of AFII, with very ambitious targets for such outputs as trees planted, conservation practices introduced and adopted, productive crops grown, and farmer income increases.

With the same implementing organizations, the primary change was in its implementation strategy. In order to achieve sustainability in the long run, the subsidies used under AFII were to be eliminated, and there was to be a greater focus upon responsiveness to farmers motivations and to farmer economic benefits. As is stated in the PP,

> In the future, the point of departure for determining what activities to promote under the project must be broader than packages of forestry-related interventions. It is the economics of the entire farm system, including not only woody species and soil and water conservation measures, but also annual and permanent crops and livestock, that must become the prime determining factor. Specifically, packages of interventions will be attractive only to the extent that they enable farmers to generate streams of higher income over time--and, thus, induce them to sustain the activities that are the source of their income. Viewed in another way, the criteria of project success must shift from the number of trees planted and the number of conservation measures introduced to the degree to which the project is instrumental in raising farmers' incomes to levels that they can sustain themselves after the project ends (PP, page 14).

A key addition to PLUS was the incorporation of a Monitoring and Evaluation system, which was designed to assist in transforming the project from an "agenda driven" approach to one that is "farmer driven." It would, according to the PP, ". . enable the managers of the program to understand farmers' perceptions of their needs, determine which interventions work and which do not work, and feed that information back into future rounds of the program," (PP, page 16).

CARE is responsible for field implementation of PLUS in four project areas in the Northwest, and PADF works in four larger regions in other parts of the country.

CARE is in the process of expanding into the Grand d'Anse region. The organizational structure and implementation strategy of the two organizations are quite different. The CARE works directly with farmers, while PADF works through local NGO's or farmer organizations, some created to relate to PLUS. In part, this reflects the scarcity of farmer organizations in the Northwest; as CARE expands to the Grand d'Anse, it may also work through local organizations.

Participants and staff regard the basic package of technologies which has come to PLUS from its predecessor projects as generally effective in achieving the dual objectives of resource conservation and increasing farmer well-being.

The PLUS M&E System

SECID gave strong leadership to implementing M&E in the PLUS project; PADF and CARE both now have their own M&E staff. After some initial concern and resistance because of the cost and the amount of effort that was required to implement the system, both implementing agencies now support M&E and advocate its continuing implementation. Still, there are multiple demands on the M&E system, especially as attention now focuses upon what it can contribute to improving field implementation and impact. Thus, this consultancy was designed to seek ways to improve the M&E system.

The Monitoring and Evaluation System (ME) of the PLUS Project reflects the complex and experimental nature of the PLUS Project in general. It has four goals.

The first goal of the current M&E system reflects the need to experiment and validate technology: it follows a limited number of cases of on-farm implementation of the four primary interventions: hedgerows, checkdams, rockwalls and vegetable gardens (Pagoulatos 1994). The professional who designed the system noted that it ". . allows for improving the development and refinement of the (project) interventions", and it provides "information necessary in increasing the effectiveness of the grantees in selecting interventions and making them available to farmers," (Pagoulatos, 1993, 2). The current M&E system focuses on these case studies.

The implementing organizations (CARE and PADF) report their achievements of the project outputs, as specified in the project "logical framework". The project paper refers to such "reports". We will consider this reporting an integral part of the M&E system, for which it is a major goal.

A third goal of the M&E system is to show project and intervention impact in economic and environmental terms. This is not reflected in the design of the M&E case studies, but is happening spontaneously as implementing agencies judge

interventions on the basis of adoption and as the donor and implementors seek to demonstrate that they have used development funding to benefit large numbers of producers. The designer of the M&E system has noted the general need for methodological adjustments to apply the results of the current M&E system to the issue of project-wide impact (Pagoulatos 1994).

A fourth goal of the M&E system is to elicit farmer perceptions and foster their participation for understanding and evaluation.

A fifth goal is to support strategic analyses that further project implementation or achievement of impact.

This document presumes such an integrative view of the PLUS M&E system, which we take to include output or log frame indicators, project impact indicators, feedback/participation processes, intervention-specific evaluations, and special studies. This view reflects what the participants are doing now and their statements to the consultant team.

Methods and Data Components of the PLUS M&E System

The current M&E system is based on case study trials of four of the project interventions; reports of technologies or interventions installed by farmers; more detailed descriptions of adoption in several areas chosen as representative; special studies; and annual reports of interventions installed. Both implementing organizations recently installed databases of participating farmers, and both plan to monitor recipients of tree planting stock. Appendix x lists the several components of the M&E system, broadly conceived. Some of the elements that we feel are most pertinent to future operations are described here.

The Case Studies

The M&E case studies of hedgerows, rockwalls, gully plugs, and gardens were designed to provide information on the efficacy and costs and returns of these selected interventions. They are the basis for most of SECID's analysis to date of PLUS interventions. The are designed to estimate incremental differences in production and income resulting from PLUS interventions by comparing fields subject to interventions with matched fields using traditional practices on "witness" plots. The data on cost of establishing the technology and maintaining it are from frequent visits to interview the farmers who are involved. Harvest data are obtained by interview for the garden and gully plug cases and by harvesting sample areas in the treated fields and control fields for rockwalls and hedgerows.

The studies are limited to the small monitored areas. Because of the widespread

adoption of PLUS interventions in those areas, witness plots have been lost and are increasingly difficult to obtain. Hence, case study monitoring is, now, being reduced and/or being transferred to rented plots.

These case studies have the positive and important function of validating technologies. Because of the study design, the case plots are like on-farm technology validation. They show what the technology can do in relatively favorable conditions when farmers are attentive.

However, the case study fields are not a random or representative sample of fields, of fields with interventions, or of adopters. They are clustered to reduce the work of M&E assistants. For example, all may be in two or three localities, and a single farmer or adjacent farmers may implement several monitored fields. For some interventions, selection of sites was limited to those where farmers were using the intervention as proposed by the project -- for example, hedgerows for crop production rather than for forage, though the latter was more common in the area in the perception of staff. Project staff agree that the weekly or twice-per-week visits of M&E assistants may have affected the care with which farmers implement technologies. We observed varietal trials that were notably more vigorous than the crops on surrounding farmers' fields.

The case studies capture a limited set of benefits and beneficiaries. In the case of hedgerows and rock walls, the harvest of some major crops that are not grains (e.g. manioc, sweet potatoes, plantains) are not monitored. Because the forage hedgerows were excluded from case studies, that use of planted trees is missed, even though it is more common than use for fertility enhancement.

The case studies look more like technology validation trials when the witness plots are planted on land rented by the project, which has begun due to scarcity of appropriate witness plots comparable to "treatment" plots.

Farmers' behavior and the environment add variation that is not captured by the case study method. During the mission, we saw examples of farmers installing interventions in ways that had not been foreseen by the project. Estimates of soil accumulation behind gully plugs (rockwalls?) are made by measuring the height of the installation, its width, and the distance to earth along a zero-slope line. These data are converted to an estimate of volume of earth saved. However, there are several cases of rockwalls built by farmers collaborating with other projects that are not now filled with earth. These indicate that the project should not presume that the installations will perform as hoped.

Micro-watershed, Monitored Areas, Representative Zones

Several of the land-use SPIs are monitored in small areas (up to 2 KM2) chosen within larger project implementation areas. The case studies are located in the monitored areas. There are 4 CARE monitored areas and 13 PADF areas.

CARE has put aerial photo information on farm plots in 2 areas in GIS format; PADF hired a consultant to map the fields in its areas, and M&E staff measure fields and take a Global Positioning System (GPS) reading of location (UTM system).

CARE is able to calculate field and farm areas from the photo/GIS data; PADF had enough data problems ("errors of closure") that SECID is not yet able to calculate field areas. A SECID review of the SPIs found that the monitored areas are not always representative of the impact of the project, referring to an apparent instance of better adoption rates outside the monitored area compared to within the area.

Farmer Lists and Dossiers

Both CARE and PADF now have lists of farmers (or farms) served by an extension agent; one farmer is named per farm. These lists are used to calculate the number of participating farms for output reports.

PADF maintains one file folder or dossier for each farm visited by an extension agent. In the folder, there is one or more sheets covering (1) soil conservation measures, (2) tree seedlings and grafting, and (3) seeds. The data on these sheets cover the NGO providing extension service, the type of technology or intervention provided by the extensionist, the amount of the intervention (meters of soil conservation measure, volume of seeds, number of trees or grafts, etc). Some of the forms have information on implementation of the intervention. For soil conservation measures, there is information on construction labor and work groups.

These dossiers, with extensionist input, are the basis for a computerized list of farmers and the type of intervention implemented. PADF has also censused several small areas, but does not census its entire project area.

CARE has a census list of farmers with locality, name, sex, age, dependents, and interventions implemented, if any. It censused in each area served by an extension agent (82 areas). The system is computerized in a data base.

The CARE and PADF farmer lists and dossiers were not designed to provide all of the information needed for ME. They do not, for example, note the area affected, so it is not possible to assess what percentage of a farmer's total land holding has

been `protected' by runoff control measures. Similarly it is not known whether the improved seed taken by a farmer was planted in a lowland, hillside or homestead plot or what percentage of the total cropped area was planted with the improved variety.

The Indicators

At the present time, the M&E indicators that are to be calculated are the SPIs, though the system is not yet producing information for most of the indicators. What is being reported consistently are the outputs of the project, some of which are listed in the second project amendment. These are being reported in the annual reports of each implementing organization. In this report, the SPIs and the log frame indicators are discussed together with recommendations. An appendix shows the latest 1994 data.

Annual Reports

The M&E data that have been most consistently reported are found in the annual reports of the implementing organization: the outputs related to the project logical framework.

Analysis and Reporting

SECID has responsibility for analysis of the M&E data. To date, the main task has been tabulation of the case study data and some information on yields. Since the data sets for case studies are small, quantitative data have been manipulated using a spreadsheet program. SECID has produced a set of special studies and reports, and the implementing organizations report on outputs in their annual reports, using their own formats.

The Cost Issue

Some earlier, off-hand estimates of the cost of M&E activities suggested that around 30% of project budget might be being used. The cost issue was raised in oral briefings, with the suggestion that cuts might be needed. Both CARE and PADF prepared cost estimates for the consultant team. Both CARE and PADF estimate their M&E costs to be around 12% of total budget. This cost is not an issue for a project that is disseminating innovative technologies and proposes complex goals. Moreover, we found that M&E staff assist with other tasks in the field, like variety trials and training. There is no need to cut the M&E budget.

Underlying Principals for Revisions of the PLUS M&E System

1. The M&E should be integrated with PLUS project implementation so that it provides information on implementation, outputs, and impact that is relevant to the needs and decisions of farmers, field staff, mid-level managers, participating NGOs, implementing organization managers, and donors (See Table 2.1).

2. Monitoring and evaluation activities should involve the various actors in a project (from the beneficiaries to the donor) in learning, including processing, analyzing, and using information to determine the bio-physical and socio-economic impact of the project's interventions. In particular, farmers and farm families should be increasingly active in PLUS M&E using participatory techniques.

3. M&E information should be relevant, clear, accurate, and representative. It should cover the main impacts of the project and any area that is of special concern. Impact should be reported for all activities, every year.

4. The specific M&E indicators (in contrast to special studies) should put in time series, compared with goals, reported in a uniform manner, disseminated, and discussed. Beyond annual reporting, M&E data should be analyzed using statistical and geographical tools to support strategic decisions.

5. M&E information should be focused, reliable, and economical. All M&E systems choose indicators from an array of possible indicators, and all choose issues from possible issues. However, where plausible and important issues of unexpected impact or broader impact come up, and in the baseline phase of ME, the system should have the capability of exploration and or monitoring beyond the most immediate impact of the project. The twin requirements of breadth and economy require trade-offs: some issues may be monitored with annual data gathering, some with less frequent exercises, some with special studies, and some with proxy indicators.

Table 1. M&E Information Needs and Decisions at All Levels

Actors/ M&E Clients/ Project Level	Information Needs	Examples of Use of Information	Prerequisites for M&E System to Satisfy Needs
Farmer	What is working in his or her field, farm, household, and area Assessment of productive practices in terms of cost, benefit, risk, market opportunities, sustainability Solutions to problems	Decide to establish, modify, maintain, or abandon interventions Make recommendations to other farmers Request technology from extension agent	The process of generating M&E data should be educational and stimulating to the farmer The farmer should see some results from the M&E system Extensionist recommendations should be comprehensible to the farmer Farmer situation should drive project.

Extension agent	Relative impact of interventions in his or her environment Complementary activities at the farm level Information about farmer needs, priorities, assessments	Recommend options with individual farmers Plan farm-level interventions Explain importance of complementary activities Modify technology or request modification	ME data on technologies should accurately show what farmers (of typical types and situations) can expect from interventions in a form that is understandable to extensionists and farmers Show local constraints and priorities Reporting issues should lead to technical responses identify regional constraints
Local NGOs and Farmer Groups	Similar to farmer needs Assess relative importance of farmer needs within the membership	Allocate time of extension agent Training and communications programming Decision to seek resources, such as seeds	NGOs should play a role in M&E to achieve sustainability of PLUS

Mid-level PLUS Project Staff	Achievement of outputs Relative impact of interventions by environment and farm type	Allocation of work and resources	ME should organize work reports, lists of farmers, and other documents in a way useful for day-to-day extension planning ME should show that technologies are appropriate to the zone
Implementing organization manager	Relative adoption and impact of interventions in different environments Achievement of outputs	Choice of areas to enter, continue, de-emphasize, or abandon Choice of interventions to include in project Avoid "blind-side " problems.	ME should satisfy donor data requirements ME should feed into program decisions regarding geographic coverage, technologies, and staffing ME should be open enough to allow unexpected problems to rise to the top from farmers, white elephants, and staff.

Donor	Achievement of project output goals Achievement of purposes Project impact comparable to other projects	Evaluate implementation Decide on mid-course corrections Seek or allocate funding Report mission impact Avoid "blind-side " problems.	Reports of outputs and impact should be complete, accurate, aggregatable, comparable with other projects. ME should measure outputs, direct impact, and broader impacts due to the project ME should be open enough to allow unexpected problems to rise to the top, particularly from large numbers of farmers or white elephants.

Recommendations

This section provides recommendations for each of the main M&E activities and areas. A summary of operational recommendations is provided in a later section. Additional guidance is provided in appendices.

Recommendations on the Method for Estimating Project Impact

Estimating project impact (soil captured, value of incremental production) by multiplying the project outputs by the results of the monitored case studies is an expedient method, but all parties are in agreement that the case studies are not representative of all adopters. This method overestimates some kinds of impact and underestimates and misses other kinds (see discussion of the case studies).

The staff of participating institutions know that a broader and more representative estimate of impact is needed. Further, they want to know more than the average and total impact of an intervention; for example, they want to know where an intervention is most likely to be adopted and to have impact. Farmer participatory methods provide feedback, and the M&E system can provide a broader perspective more akin to the marketing studies. To do so, it needs data from a variety of contexts and in sufficient quantity to allow numerical analysis.

Participating institutions have made substantial progress towards accurately counting outputs by instituting databases of producer farms served by extension agents (see Dossiers and Farmer Lists). These allow the implementors to count adopters more accurately, and to identify producers who adopt more than one intervention or technology.

The list of participating farmers would itself provide some impact data. It would serve as a sampling frame for surveys to estimate other kinds of impact in a representative and reliable manner. From this exercise, several outputs would be obtained

1. On the basis of these interviews and observations, CARE, PADF, and SECID would adjust the preliminary reports of outputs and would count the number of farmers adopting any project intervention.

2. CARE, PADF, and SECID would estimate the gross economic and bio-physical impact of the direct adoption of the intervention.

3. CARE, PADF, and SECID would estimate net income, rate of return, and other economic indicators from the gross production figures supplied by the M&E system using cost/benefit ratios derived from the case studies adjusted

as necessary and supplemented by other data.

4. CARE, PADF, and SECID would estimate the number of individual producers (as well as farms) obtaining any monetary benefit from project interventions.

5. Simply by weighting production by caloric and protein content, instead of just market prices, this monitoring data can be converted to an estimate of gross food output, thus contributing to measurement of purpose level achievements.

We have suggested that the micro-level impact that is currently reported is not enough to estimate the SPIs or to deal with some of the more complex monitoring issues that need to be addressed by the project. Issues of household or area impact require more complex interviews.

The following are some specific recommendations for the dossiers, sampling, and surveys.

1. We recommend that a single list be built from the current lists of farmers augmented by farmers obtaining tree planting material, farmers selling produce through any marketing initiatives implemented, or any other farmers deriving monetary or in-kind benefits from the project.

2. CARE, PADF, and SECID should use common software for such lists, and SECID should maintain a common list.

3. These lists should be checked and ready for use a sampling frames by November, 1995.

4. The formats should show adoption of any of the outputs of the project, including the amount of each intervention adopted by the producer in each year and cumulatively over the course of the project.

5. We recommend that the list of adopters be used as a sampling frame for monitoring and evaluating impact as well as outputs. To verify implementation of the interventions (outputs) and to estimate gross impact of the outputs of the project, a yearly monitoring survey should be conducted, beginning in early 1996.

6. We recommend that there be two surveys per year in each area. The first would use a large sample designed to give an extensive, but light, look at the quality and gross impact of the interventions. The questionnaire should be short and focused. It should be implemented on-farm by extension agents who visit the

fields, with the presence of the M&E staff or assistant as needed. Recent special studies of tree survival and hedgerow use show that these surveys are feasible. For this annual monitoring survey, a random sample should be drawn by SECID from the list of producers implementing any project output. The sample size should be large enough to estimate gross impact of the main interventions in each project area.

7. For each farmer in the sample, the project should obtain data

for cumulative units of the intervention before current year and for units implemented in the current year:

units implemented but not effective
units reported but not in fact implemented
quality of the units implemented
uses of the interventions implemented
gross environmental impact of the units implemented*
gross production with the units implemented
number of individuals obtaining monetary or in-kind benefits from the intervention (farmer, paid workers, supplier for a marketing intervention, family member -- all by gender)

* specifically the conservation effectiveness of the adopted interventions, the status, type and severity of erosion within each of the farm plots, and a better land husbandry rating for the different plots within the farm holding.

7. The current dossier system should be modified to include information on the number, location (estimated distance from homestead and land management unit in which located) and size of the farm household plots. Such information should be obtained from qualitative farmer/field agent estimates rather than accurate field measurement. Interventions reported on the dossier sheets should be attributed to individual plots. (For M&E purposes, this information is needed from a large sample, but not all farmers; however, it is already requested on the Dossier forms.)

8. Field agents should be provided with simple guidelines to enable them complete the section on the dossier that reports on the quality and effectiveness of individual soil and water conservation interventions.

9. The dossier system would work best if the data were input at the area level. This may require some additional computers. Hard copies and backup data files should be retained in the uncertain computing environment.

10. Additional characteristics of the farm and the farm family should be gathered

for a smaller sample or using other methods. If detailed surveys are not used, a very limited number of questions on farmers and farms may be added to the extensive survey.

Recommendations on Counting Secondary Adopters

The existing study of rates of adoption suggests that farmers who are not directly visited by extension agents are in fact adopting project technology. They should be counted and the impact on their income and farms estimated. The method used in the existing study was to restrict the sample to very small areas that were known intimately. This method should be replaced by on of the three methods discussed in Appendix x.

Discussion of Detailed Surveys, RRAs or Locality-level Surveys, and GIS

The methods and analyses discussed in this section correspond to some needs felt by implementing agency staff for understanding where an intervention may be most appropriate, for understanding some more detailed kinds of impact, and for quantitative strategic studies.

However, the section is labeled a "discussion" because the kinds of analyses presented here go beyond the basic requirements for monitoring immediate economic impact, monitoring environmental impact using the methods proposed, and fostering farmer participation.

We recognize that staff time may be limited, and we have made many recommendations. Therefore, we recommend only that the implementing organizations discuss the utility and feasibility of the following kinds of exercise and analysis. The methods discussed here would allow a fuller use of the dossiers and extensive surveys that are recommended elsewhere. In that sense, they would derive more benefit with modest cost; but they do bear a cost.

Detailed Surveys for Several Kinds of Analysis

Extensive sample surveys were recommended for measuring project impact and to provide the most basic data for quantitative descriptions of farmer characteristics. We recommended that the sample for those surveys be large and the interview short, to be conducted by field staff.

Some impact issues require more detailed data that would not be available from an estensive survey questionnaire. There are standard methods to measure impact which use quantitative data that are not provided by the extensive survey or the FES reports, though either might suggest an impact issue (examples provided

below). Further, when an FES or PD raises an impact issue, it may be appropriate to confirm it with quantitative data, as in an FSRE "verification survey". For such topics, the project may find it useful to use (1) further exploratory investigations or PRAs and (2) detailed surveys. Although we have suggested that farm characteristics and use of the interventions should be monitored using dossier and externsive survey data, we recognize that some topics may be found to be complex, and hence to require a more detailed interview.

Examples of such studies are,

Whole farm budget impact
Yield confirmation and crop cuts
Post-harvest and marketing practices
Diet, nutrition, and anthropometric measures of impact
Use of income generated by the interventions
Household wealth measures of impact
Gender issues and impact on women
Household, farm or personal characteristics related to adoption and impact
Confirmation of results of PRAs

The project may find it useful to plan for one intensive interview survey per year. The M&E specialist and assistant would have the responsibility for conducting such interviews or surveys, with the presence of the extension agent as needed.

Such survey design should be done with care, attention to cost, and focus. Where an analysis of impact can be done with low-cost alternatives (GIS and village-level data will be discussed), then no intensive survey might be needed.

Intensive interviews typically last from one or two hours, and a field worker can do two or three per day, allowing for travel time. As a rule of thumb, sample size should not be below 200. Typical baseline surveys in Haiti have samples of 1,000 or more, but the precision that such samples allow is rarely needed accept (perhaps) for a final evaluation. One of the main costs of such surveys is development of a sample frame with stratifying variables, which will have been done already for the extensive sample.

If appropriate, implementing agencies might identify the issues that merit a survey annually so that it feeds an annual work plan.

Analyses of Where an Intervention is Having Impact

The project implementing agencies have requested that the M&E system show where an intervention is appropriate and where it is having impact. This

information can be useful for setting priorities, allocating personnel, and judging the potential of modified interventions. For example, once the conditions where a garden is likely to be profitable are known, one can inform the areas of those criteria (which could be modified with more experience) or even map the factors.

M&E extensive surveys and M&E intensive surveys would provide considerable data for this kind of analysis, but they will not provide the data on the geographic and social context that is needed to answer all the questions raised by the implementing agencies. Certain broad strategic issues depend on such analyses.

To answer the "where" question, one needs to know about the socio-economic environment in which the farmer lives. While this data can be obtained from intensive interviews, there are less costly methods available.

Two low-cost methods that can be used to gather the required data on geographic and social context. The first is what is usually called a village-level survey. It can be incorporated into the PD or PRS methods recommended elsewhere in this report. The requirement is that the information cover a project area in a uniform way. In some cases, a key informant may be able to provide the data.

A closed ended RRA or locality-level survey records characteristics of a place. Examples of the data typical on such a survey are,

Distance to roads
Size of village or center of locality
Presence of a school
Settlement pattern
General precipitation and other climatic variables
General farm type
Most important crops by production
Most important crops by consumption
Markets visited by local farmers
etc.

An example of a locality-level survey used to complement a household survey may be found in the current Food Security Information System (FSIS) survey being done by CRS and processed at CARE.

Ideally, but not necessarily, this kind of locality-level information would be gathered at the yearly Farmer Evaluation Sessions.

The second low-cost method to obtain data on some contextual or environmental variables is to use geographic information systems to code other kinds of survey

data with environmental data. In essence, the GIS is used as a way of quickly looking up locations on maps and coding the survey points. The Monitoring Unit of U.S.A.I.D. has a GIS system and is obtaining maps of many social and environmental factors relevant to adoption and understanding differential impact. Among these are altitude, slope, rainfall, distance to roads, and others. The alternatives are to ask about such characteristics from farmers or look up information on maps or reference works.

In any event, it would be useful GIS should also be used to map all the surveys that are done; therefore, each survey form should be coded by approximate latitude and longitude or UTM.

As in the case of intensive surveys, we refrain from recommending a schedule of locality/GIS analyses, but suggest that the implementing agencies and SECID meet yearly to determine an annual work plan.

A decision on intensive interviews, use of GIS, and RRA/locality interviews depends on the priorities that the participating agencies assign to the kinds of impact issues, analyses of geographic factors, and quantitative strategic studies that have been noted here.

Recommendations for the Case Studies:

1. The system should continue, with modifications, for the rest of 1995.

   Monitoring of inputs, yields, and soil retention in the case studies should be continued in an intensive manner until the end of 1995.

2. The 1995 monitoring should be modified in the following manner:

   Harvests of all crops growing in the monitored fields should be monitored or estimated using retrospective data.

   Actual soil accumulation should be measured, rather than "potential" accumulation.

3. The 1995 case study data should be used to calculate model budgets showing costs and returns, interpreted as experiences in places where the environmental is adequate, the farmers are assisted, and drought does not occur. This should be done all project interventions. This recommendation is presented in more detail elsewhere.

4. A quick check of the labor input data should be done.

We recommend the case study data on labor inputs for construction be checked against the PADF farmer dossier data. The dossier information should be summarized and analyzed in a quick, low-cost study.

6. Monitoring of the case studies should continue, but at low intensity, after 1995.

After 1995, the case study plots should be monitored for gross production using low-cost methods (bi-weekly or monthly recall, perhaps, or crop cuts) and for soil conservation; low intensity methods free up staff for the new, extensive type of monitoring.

7. The conservation effectiveness of the interventions in the case studies should be estimated. This estimate should be used as the basis for determining a better land husbandry rating for each case study plot being monitored.

Recommendations on Crops Monitoring

This is an activity that field staff are conducting, though it was not part of the original M&E protocol. It involves crop cuts on 5M by 5M plots. The implementing agencies should meet and write a study design for this activity, if they wish to continue. Methods should be tightened. The harvests of small areas to estimate yield should be integrated with the case study requirements for data.

If the PLUS staff continue with this activity, they should discuss methods and goals with the Food Security Information System (FSIS) activity of the USAID Monitoring Unit and should integrate efforts with that activity.

Recommendations for Financial and Economic Analysis in M&E

Given the importance of economic incentives in the design of PLUS, and, even more importantly, in the behavior of Haitian (like all other) farmers, basic financial analysis of PLUS interventions at the farm level continues to be fundamental. We recommend building on what has been done so far, but moving further in two complementary directions simultaneously. First, simple intervention budgets should be prepared, initially using the economic information available from the Case Studies and subsequently expanding to other interventions as well, using information to be obtained from representative farmer surveys. These budgets are primarily for the use of implementing staff, but can also be used for impact analysis, etc. Second, rough whole-farm budgets should be developed for selected "typical" target-group farms, first during the process of carrying out additional Participatory Diagnostic exercises in project areas, later to be supplemented through use of data obtain from representative surveys, standard cost data, etc.

Accomplishment of these objectives will provide PLUS much-needed information about the economic impact of its interventions upon Haitian farm families.

1. Begin to shift emphasis in data collection for financial analysis to yields and gross revenue generated and expand this to obtain more representative data on all interventions. Detailed monitoring of inputs--especially labor inputs--is extremely expensive and, and, in any case, M&E is building a base of cost data that may--with caution--be applied somewhat generally.

2. Continue the financial analysis being done on the selected interventions or enterprises, including the calculation of NPV IRR, with appropriate alterations to deal with the loss of witness plots, the use of rented plots, and the question of representativeness of the data obtained from currently monitored plots. Decrease the intensity of monitoring the case study plots after 1995.

3. Produce and make available to technicians and field agents simple intervention budgets based upon M&E results and/or based upon information compiled by technicians and field agents. Budget coverage should be expanded to include all of the major interventions being used in PLUS, and, to the extent feasible, should be specific to variation in environmental conditions. They should be done both with and without labor as a cost. Expansion beyond the case study interventions will require a sample survey approach. It may also be facilitated by farmer record keeping (See recommendation 4 below).

4. Expand the coverage of these enterprise budgets to all project interventions, and engage in dialogue with regional CARE and PADF staff about these enterprise budgets and with farmers themselves, so as to (a) fine-tune the budgets on a region and target-group specific basis where necessary and (b) assist the respective actors in being able to project the potential financial impact of interventions at the farm level.

5. As an output of the PRA or PD process, and using other information sources available (e. g., standard prices, standard labor requirements, etc.) develop typical whole-farm descriptions of key target group farms, and include, in this process, rough whole-farm budgets.[1] These descriptions should include the following:

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[1] This recommendation poses somewhat of a dilemma. The detailed monitoring required to obtain accurate data on a whole-farm basis, especially labor inputs, is prohibitively expensive, as was apparently realized when the whole-farm approach was dropped earlier. However, it is also true that a major decision to invest in PLUS was made based upon one, standard, whole-farm model for Haitian hillside farms (PP, pp.). That strongly suggests that it should be possible to build rough and

a. the physical layout of the typical farm,
b. description of the various enterprises on the farm and their interactions (e. g., outputs of one enterprise as inputs into another),
c. description of the farm family,
d. description of labor, cropping/production, and consumption calendars,
e. rough whole-farm budgets, including, to the extent feasible, all income sources and expenditures.

These are used as a yardstick to gauge future changes, to judge the fit of project technologies or of proposed technologies, and to understand farmer incentives for accepting or rejecting proposed technologies. While acknowledging the complexity of this task, at present, with financial information available only on an enterprise-by-enterprise basis, PLUS runs the risk of:

a. underestimating the benefits resulting from complementarity among enterprises (the benefits of biomass for animal production), or,
b. overestimating the benefits due to incompatibility of enterprises (e. g., a farm family transfers wage labor on the road to building a gully plug which, in the end, returns less than the labor).

Recommendations on Farmer Involvement and Input in M&E

In view of the importance of being sure that PLUS interventions respond to real farmer needs and preferences, and the need to strengthen the role of farm families in PLUS so as to contribute to sustainability, we recommend continuation and expansion of the farmer participatory methods already being adopted by PLUS, especially the adoption of key elements of the Farming Systems Research and Extension (FSRE) approach. However, FSRE must be adapted to Haitian and PLUS project circumstances, and particular elements are of special importance to PLUS. We recommend a continuation of the use of FSRE Diagnostic's or Rapid Rural Appraisals but recommend evolution in the direction of a Participatory Rural Appraisal approach (PRA), which, in contrast to traditional FSRE techniques, involves farmers themselves in key aspects of the Diagnostic, especially in the identification of key constraints and opportunities. We recommend that these Diagnostics, together with other information sources, become the basis for the development of comprehensive descriptions of target-group farms, including the development whole-farm budgets. We also recommend the adoption of Participatory Monitoring and Evaluation (PME) into future PLUS activities. This will involve the organization of special Farmer Evaluation Sessions (FES) so that farmers, themselves, may be engaged somewhat more formally in the assessment

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useful budgets without a costly monitoring effort.

and evaluation of the PLUS interventions.

We recommend a continued decentralization of PLUS; specifically we recommend that efforts be made to involve regional staff--especially M&E staff--more extensively in the analytic work of the M&E system. We recommend that they become more involved in analysis, that the M&E system evolve toward a support system for them to do regionally-specific analyses, and that they play a key role in the preparation and use of both intervention-specific and whole-farm budgets.

Finally, we recommend that PLUS initiate a dialogue with the local NGO's and farmer groups with which it works to stimulate them to give leadership toward the preparation of a comprehensive plan for the continuation of those elements of PLUS that are essential to make the PLUS efforts--and, much more importantly--the hillside agriculture of Haiti--sustainable.

1. Continued evolution in the use of FSRE, making the currently used Diagnostics somewhat more participatory, at least in new areas and for new staff (as is being done currently by PADF, at least one should be done per area), strengthening the approach in two ways:

a. Involve farmers themselves, especially in the prioritization of constraints and potential solutions, as is done in the emerging pattern of Diagnostic, referred to as Participatory Rural Appraisal (PRA).

b. Become more explicit in the identification and description of target groups (Key target groups could, then, become the basis for detailed description of "typical" whole-farm systems (recommendation 4).

2. Implementation of Participatory Monitoring and Evaluation (PME) through the incorporation of Farmer Evaluation Sessions (see pp. __ to __).

Given the respective implementation strategies of the implementing agencies, and the evolution of each of them, considerable flexibility will have to be exercised in implementing PME in PLUS. However, it should be possible to develop a relatively simple and standard protocol which can achieve PME's objectives.

Farmer evaluation sessions are held on a periodic basis. Groups of farmers are assembled to examine, discuss, and evaluate their own projects. This process is facilitated by the respective M&E and field agents. The specific groups that are assembled will vary between CARE and PADF, and also among NGO's for PADF and among sites for CARE, depending upon the nature of local implementation strategy. Work groups, farmers who share a common micro-watershed (ravine), farmers affiliated with a particular NGO, and farmers who share a common

intervention provide alternative bases for group definition. In any case, these farmer discussion/assessment sessions should, to the extent feasible, be done on-site, they should be carried out in such a way that they both focus upon a few key issues, but also that they allow free and open discussion.

The largely qualitative information which would emerge from Farmer Evaluation Sessions in PLUS would include: (1) the farmers' own assessment of technologies; (2) evidence of expressed farmer needs and desires; (3) tabulation of farmer responses to summary questions asked at the end of the sessions; (4) simple records of the number of Farmer Evaluation Sessions held, their attendance, etc., and, finally, (5) evidence (perhaps primarily anecdotal) of project response and reaction to Farmer Evaluation Sessions. These Farmer Evaluation Sessions would provide a firm basis for assessing PLUS achievement of this overall purpose of direct responsiveness to farmer needs, supplementing the other kinds of evidence of responsiveness that is already available (Baseline surveys, Swanson survey, adoption rates, etc.). At the same time, the information obtained from the Farmer Evaluation Sessions would contribute substantially to the measurement of other SPI's (e. g., environmental impacts and farmer economic benefits), contributing to a multi-measure or triangulation approach to measurement, in which different forms of data complement each other.

3. Conduct a pilot exercise of methods of farmer record keeping and analysis within specific domains or contexts. This could contribute to a number of objectives. The most important, of course, is the effect it would have on the farmers themselves. For PLUS, however, it could contribute to expanding the base of enterprise budgets, to developing pictures of whole-farm situations, especially whole-farm budgets, as well as to easier measurement of yields, to easier recording of inputs, etc.

4. As an output of the PD process, and using other information sources available (e. g., annual sample surveys, standard prices, standard labor requirements, etc.) develop typical whole-farm descriptions of key target group farms (See pp. __ to __). These descriptions should include the following:

a. The physical layout of the typical farm,
b. description of the various enterprises on the farm and their interactions (e. g., outputs of one enterprise as inputs into another)
c. description of the farm family,
d. description of labor, cropping/production, and consumption calendars,
e. rough whole-farm budgets, including, to the extent feasible, all income sources and expenditures.

These are used as a yardstick to gauge future changes, to judge the fit of project

technologies or of proposed technologies, and to understand farmer incentives for accepting or rejecting proposed technologies. While acknowledging the complexity of this task, at present, with financial information available only on an enterprise-by-enterprise basis, PLUS runs the risk of:

a. underestimating the benefits resulting from complementarity among enterprises (the benefits of biomass for animal production), or,
b. overestimating the benefits due to incompatibility of enterprises (e. g., a farm family transfers wage labor on the road to building a gully plug which, in the end, returns less than the labor).

5. Capture the participatory processes currently being done and those introduced in these recommendations (Farmer involvement in PD, in Farmer Evaluation Sessions, Farmer training sessions, on-farm record keeping) for reporting purposes. Simple quantitative parameters (numbers of sessions held, attendance, etc.) are indicative of human resource development inputs. Much of this is already being done, but it will expand somewhat with the performance of additional Participatory Diagnostics and the Farmer Evaluation Sessions. However, this material needs to be captured systematically under the rubric of farmer involvement and human resource development for reporting purposes.

To accomplish this we recommend that CARE and PADF jointly prepare a brief outline of indicators of farmer involvement and participation, including both current practice and implementation of these recommendations, to be used and reported in their annual reports.

6. Involve regional staff somewhat more extensively and somewhat differently in the M&E system so as to make it more meaningful and useful to them, through:

a. Opening a dialogue with them about what the M&E system can and should do for them,
b. Involving them in the analysis of data at the regional level,
c. Involving them extensively in the development of the whole-farm descriptions recommended in number 5 above.
d. Supporting them in carrying out strategic regional-level problem-solving activities (e. g., screening varieties, special surveys dealing with region specific issues, etc.)

7. Continue, as in the study of hedgerows by Pierre, the study of trees by Street, to identify key problems confronted by PLUS and do special studies to resolve them. However, to the extent feasible, PLUS should de-emphasize the use of outside consultants and move towards the use of team efforts involving the regional staff as well as target farmers and their farm groups and organizations.

Initial studies chosen could include [those identified by Lea, and/or (a) farmer record keeping (recommendation __, or (b) the feasibility of preparing whole-farm budgets for target farms (recommendation __).

8. Enter into dialogue with the local NGO's and farmer organizations concerning specific plans for long-term sustainability of the activities now going on under PLUS, and assist them in preparing such plans and proposals.

This will involve at least four key questions: (a) what level and type of activity will be needed in the post-PLUS period?, (b) what elements of these can be supported by whom in the post-PLUS situation?, (c) what will need to be subsidized, and at what level, and, finally (d) who should do what to prepare for the post-PLUS situation? This would require, among other things, analysis (including financial) of the capabilities of the respective actors who will remain. It could, itself, result in strong momentum to see that the effects of PLUS are, in fact, sustainable.

Recommendations on Assessing the Bio-physical Impact - M&E of Better Land Husbandry

Implementation of the PLUS goal and purpose requires the adoption of a `holistic' better land husbandry approach. This requires a shift in emphasis of the development focus away from soil conservation per se to what has been termed land husbandry. The concept of husbandry is widely understood when applied to crops and animals. As a concept signifying understanding, management and improvement, it is equally applicable to land. At its most basic land husbandry can thus be defined as the care and management of the land for productive purposes. To reverse the present hillside degradation in Haiti and to sustain and enhance the productive potential of the country's land resources requires the adoption of better land husbandry practices.

What has been termed the better land husbandry approach is based on two key principles:

- that it is possible to combat land degradation through the adoption of management practices which yield production benefits while being conservation-effective;

- that rural people, educated or not, have a greater ability than previously assumed by outside experts to analyze, plan, and implement as well as monitor and evaluate their own research and development activities.

The PLUS project interventions have been formulated in line with the first of these two principles. Although the project amendment document states that "for this

initiative to be successful, interventions must be responsive to the motivations which drive farmers' decisions" the implementation strategy being followed has not yet taken on board the importance of the second of these key principles. Hence the belief that the PLUS M&E system should start at the bottom with the active involvement of the farmers in participatory M&E.

Participatory monitoring and evaluation (PME) should be an essential component of the M&E system of any project that is working with farmers for better land husbandry. PME would serve two further purposes for increasing the potential impact of the PLUS project. Firstly it would provide project management with a tool for assisting farmers to improve the efficiency and effectiveness of the adopted soil and water conservation practices. Secondly it would serve as an educational process helping the participating farmers to increase their awareness and understanding of the various factors that affect the productivity and sustainability of their farming systems. Furthermore by actively involving farmers in the M&E process it increases their control over, and feeling of involvement in, the overall development process.

It is essential that the M&E system should capture the bio-physical dimension of the project. It is believed that bio-physical data is needed for two major purposes within the PLUS M&E system. Firstly to determine the extent to which project performance is influenced by the bio-physical factors at play within the different project areas (eg seasonal and spatial variations in climate, as well as differences in slope and soil type will all affect the impact of specific project interventions). Secondly to monitor and evaluate changes in some of those factors (eg. soil productivity, soil erosion) as a result of the project's activities. A knowledge of the bio-physical conditions within the different PLUS project areas is essential for M&E purposes in order to determine the extent to which project performance is influenced by the beneficiaries natural, as opposed to socio-economic, circumstances. A failure to achieve target outputs may not be because the project staff failed to organise their work programme in an optimal manner. Instead it may be that specific technical recommendations (eg. hedgerows and rockwalls on steep slopes) were unsuited to the prevailing bio-physical conditions of particular project localities.

The impact of the project on the bio-physical environment should be monitored at three levels:

- the individual plot/micro level
- the farm household level
- the macro-geographic project concentration area level

The baseline data sets should be expanded to include basic information on the bio-

physical conditions within each of the localities where the project has field activities. A bio-physical database should be compiled for each project area from existing secondary data sources and the knowledge of key local informants. This information should be used for defining and demarcating onto a topographic base map individual land management units for all of the project areas. These LMUs should be used as the basis for stratifying environmental impact and adoption rates of the different project interventions.

The overall conservation effectiveness of farmers land use/management practices should be used as the basic criteria for determining the environmental impact of the project interventions. Monitoring should not just focus on the impact of individual interventions but consider how they interact within the farm household system. For instance concern with better land husbandry means that how the land is used between the hedgerows and rock walls, or in the catchment area upstream of a plugged gully, needs to be assessed to determine the overall environmental impact and conservation effectiveness of field level improvements.

Quantitative assessments of the conservation effectiveness of individual interventions in the context in which they are adopted should in combination with the use of simple visual indicators of the status, type and severity of soil erosion form the basis for arriving at an overall better land husbandry rating. Such a rating would of necessity be subjective but it would enable a qualitative assessment to be made of the overall environmental impact of the project. Its main purpose with regard to the PLUS M&E system would be provide a clear indication as to the extent with which the land use management practices on a particular plot, individual farm holding or over a wider geographic area conform to the principles and practice of better land husbandry. If they do then they would be in line with the projects goal and purpose and could be used as an indicator of success.

The degree to which the land use management practices conform to the principles and practice of better land husbandry would correspond to the following ratings (see also appendix ...):

Rating	Criteria	Score
Excellent	The land husbandry practices are exemplary	4
Good	The land husbandry practices are of acceptable quality	3
Fair	The land husbandry practices give some cause for concern and require minor corrective action	2
Poor	The land husbandry practices give major cause for concern and require considerable corrective action	1
Very poor	Conforms to none of the requirements for better land husbandry	0

Recommendations for the SPIs and Other Indicators

I.1. Percent of area of a micro-watershed in environmentally improved land use practices

The current micro-watersheds used for the case study monitoring are not always representative of the wider project area. Their boundaries have typically been delineated on the basis of topographic features, rather than conforming to the social and cultural boundaries in which the participating farmers operate. Thus the impact of project interventions may be recorded for those plots operated by a farm household located within the micro-watershed but miss recording the impact on those plots located elsewhere.

This SPI should be modified. The area of focus should be expanded to cover the total land area for each of the PADF and CARE project concentration areas. This would enable an assessment to be made as to what percentage of the total project area is being used in a manner that would conform to the requirements for better land husbandry (i.e. under environmentally improved land use practices). This would require PADF and CARE to define the geographic area coverage of their activities and to demarcate the boundaries on a 1:50,000 topographic base map. As far as is practical these boundaries should conform to the social and cultural boundaries of all the farming communities participating in PLUS activities.

It is accepted that it may not be possible to include all the plots of every participating farmer within the boundary of the area to be monitored, particularly where individual households would have access to plots several kilometers away

from their homestead. However every effort should be made to cover all the land used by most of the project beneficiaries. The geographic area for this SPI should, as far as is practical, also seek to embrace the land holdings of most of the secondary adopters. As well as plotting the project's geographic boundaries, the different land management units (see appendix ...), within each project area, should be defined and delineated on the topographic base map.

Data for this SPI would come largely from qualitative estimates arrived at by using direct field observation techniques. This would involve PLUS M&E staff, at the regional level, `sampling' each project concentration area by means of cross sectional transects through representative areas. These transects would be undertaken on a participatory basis with the M&E specialist walking each transect accompanied by the local field agent and key informants from among the participating farmers. Together they would discuss what they see and arrive at a consensus assessment as to the better land husbandry status of the area. This would require that they consider the quality of the various project interventions adopted in order to assess their conservation effectiveness (environmental impact). It cannot be assumed that an area with hedgerows and rockwalls automatically qualifies as an area with environmentally improved land use practices. Only land that could be assigned a better land husbandry rating of good or excellent would meet the requirements for this SPI (see appendix....).

For each project concentration area an annual land husbandry status report/inventory (see appendix ...) should be prepared that would document both quantitative and qualitative environmental changes. This inventory would contain all the data required to calculate SPI I.1. In addition to documenting the land husbandry status of the project area the inventory would include information on the climatic conditions experienced during the year using the daily rainfall and temperature records kept by PLUS field staff. This would allow M&E staff to take into consideration the quality of each cropping season i.e. its variability from the norm and the likely effect on agricultural production for that year.

The qualitative field estimate arrived at from the participatory transects would be cross checked with the data in the farmer dossiers and obtained from the annual monitoring survey to obtain a geographic area dimension to the figures reported for the number of interventions adopted.

I.2 Secondary adopters per area per project assisted farmer.

A "secondary"adopter is a farmer using project technology who is not served directly by an extensionist. We feel that this is a very important ratio for the project. Implementing agencies (especially CARE) use adoption as an indicator of how appropriate the project interventions are. They know that some extensionists

get farmers to adopt out of personal loyalty or motives other than acceptance of the technology. Secondary adopters have less mixed motives; their adoption is much more likely to show that a technology is appreciated and likely to be used and maintained. Maintaining and using technology, rather than just installing it, is so important that we also recommend direct observations.

There are problems with the current calculation of this ratio. Following is a hypothetical tabulation of data on this subject. At present, this figure is calculated as the ratio B/I. The simplest interpretation of the SPI is that the ratio should be B/A. Another standard ratio (from the literature on technology dissemination) would be B/H. For both B/A and B/H, the higher the ratio, the better the project is at disseminating technology.

		Participating Farmer?		
		Yes	No	total
Adopter?	Yes	A	B	E
	No	0*	C	F
	total	G	H	I

* by definition.

The ratio in use (B/I) is not easy to interpret. Since the data refer to small areas, the more efficient the project, the larger will be figure A, the smaller B (because the extensionists make all the farmers "primary"adopters), and the smaller the ratio B/I. It is not clear if we should applaud, or lament, a higher ratio.

Because the number of farmers surveyed is so limited, the overall adoption ratio E/G is more a measure of restrictions on surveying than on reaching any target population.

SECID takes the words "per area" in this SPI to mean that the indices should be calculated for each project area.

We recommend three changes. Change the ambiguous wording by eliminating the words "per area". Calculate the ratio as B/A, not B/I. Find the population of secondary adopters using one of the methods outlined elsewhere. If the census listing option is used, obtain data on a large population of potential adopters in an area wide enough so that the number of ever-participating farmers is less than 10% of the total in year 2 of the project. If this is done, the ratio B/H and E/I should also be reported. If secondary adopters are found using the network method, the ratio

to use is still B/A, but the ratios B/H and E/I are no longer meaningful.

I.3 Physical soil build-up behind structures (m3/m)

The rationale for this SPI is questionable as loss of soil productivity is much more important than the loss of soil itself. This SPI is a product of past thinking on soil and water conservation where the tendency was to place great emphasis on assessing soil degradation on the basis of the weight (or volume) of soil lost. The real issue for environmental impact M&E is not the amount of soil lost or the area of land degraded, but the effect of this loss on the productivity of the land.

Soil productivity, like soil fertility, is a real property of the soil, but is incapable of direct physical measurement. Crop yield is therefore commonly taken as a useful proxy indicator of soil productivity because of its measurability, its relevance to farmers and planners, and the possibility to quantify it in monetary terms. Comparative time series yield data (minimum 5 years), from each level monitored, should be analyzed to determine the mid to long term impact of the project interventions on soil productivity.

This SPI has played a role in validating the effectiveness of particular project interventions in trapping soil. It can thus be said that when properly installed and correctly maintained the type of hedgerows, rockwalls and gully plugs as advocated by PLUS have the technical capability to catch and retain eroded soil on their uphill side. For the future this SPI should only be assessed on an annual basis at the micro plot level as part of the monitoring of the existing case studies. This SPI is no longer required for monitoring the environmental impact at the farm household and project concentration area level. Instead the emphasis should be on assessing the overall environmental impact by means of a better land husbandry rating for the plot/area in which the project promoted interventions have been adopted.

For selected case studies, particularly those in the PADF areas on rented land (i.e. researcher rather than farmer managed trials) it would be possible to broaden this SPI in order to obtain indicative figures for erosion from the cropped land between the hedgerows and rockwalls, and the relative proportion of soil trapped by the conservation measures compared to that lost from the plot in runoff. A variety of simple reconnaissance methods for estimating soil loss and deposition are described in chapter 2 of the FAO Soils Bulletin No 68 *Field Measurement of Soil Erosion and Runoff* some of these, notably erosion pins and simple catch pits lined with polyethylene, would be suitable for trying in the PLUS project. This would require extra monitoring effort as frequent visits would be required to see the effect with regard to runoff following particular storm events. For this reason consideration could be given to involving a local school in the exercise. By making it a school project not only would it devolve most of the routine data collection work to the

school but by engendering a sense of ownership of the case study it should reduce the risk of theft and vandalism to the erosion pins and catch pits. Note this expansion of the current field measurement of soil erosion and runoff is a suggestion for consideration by PADF, CARE and SECID rather than a mandated recommendation.

I.4 Percent of secure household farm in the intervention area in environmentally appropriate land use practices.

Since almost all of the households in the monitored areas turned out to be "secure", and since the farmers reported feeling secure even when they had no legal tenure, the restriction on tenure for this SPI is not needed.

I.5 Area of arable land created by mechanical structures (checkdams)

It has been reported that by January 1995 the construction of 33,702 check dams had resulted in the creation of 175 hectares (on average some 5m^2 per dam). In reality some of the figures reported for the area of land are expectations of what will happen rather than what has happened. Likewise some of the gully floors were already under some form of productive land use, whereas growing conditions will have been improved with the trapped sediments it is not true to say that the area behind the checkdam is new arable land.

It is recommended that this SPI be dropped. It is believed that the extensive and intensive monitoring household level surveys should detect the financial benefits to those who have undertaken gully plugging and the environmental benefits should be detected from the participatory transects and reported in the area land husbandry status reports/inventories.

II.1 Improvement of contiguous farm land adoption of conservation land use practices within the micro-watershed

This SPI was intended to address the notion that the more completely a section of land is covered with appropriate land use practices the more effective will the project's interventions will be in conserving soil and water. It is believed that this SPI to a large extent duplicates that of the revised SPI I.1 which has as its purpose the estimation on an area basis the proportion of land under better land husbandry. For this reason it is recommended that this SPI be dropped.

III.1 Incremental net returns for each intervention

At the project and donor levels, measures like net present value and the internal rate of return are useful. For farmers and extensionists, investment budgets, costs

and income in a more basic format may be more useful. For assessing levels of project or intervention impact, the incremental gross revenue generated by the project and the interventions may be sufficient and requires less effort. Incremental gross revenue is the difference in gross production valued at farm-gate prices between the with-interventions situation compared with the without-interventions situation.

One reason for this change is that for this sample, the "cost" of labor may not be relevant. First, the cost of labor to the participating farmers is a benefit to laborers, who are certainly people that the project would do well to assist. Second, let us suppose that we use the prevailing agricultural wage as our labor cost. If the enterprise is using family labor and there are no other remunerative opportunities for the people working on the farm (alas, the market is not perfect), we may be confronted by farms with negative net return and farmers who are happy to adopt. In the real world, it is not clear that we should gather the data and devote the limited analytic capacity needed to sort this out; rather, we should rejoice in adopting farmers who are producing more.

At the same time, we do need financial analysis to compare the interventions, as discussed in the section on economic indicators.

IV.1 Number of farmers adopting improved seed (commercial or seed bank) and number of participating farmers and amount of seed handled for: cereals, vegetables, fruit, hardwood and fast-growing tree seedlings, etc.

The project is already using farmer lists (see section on the dossier system), and we are recommending that the project obtain data on secondary adopters. With the dossier system in place, there is no reason to limit adoption figures to any one intervention. The project should get data on all interventions, both primary and secondary adopters. The primary adopters should be tabulated separately; the figure is important, and it serves as a backup in case there are problems getting data on secondary adopters.

IV.2 Area of M&E watershed under improved seed (or better quality seed).

The area of focus for this SPI should be expanded to cover the total land area for each of the PADF and CARE project concentration areas. The annual amount of seed and planting material distributed to individual farmers by the project can be obtained from the CARE and PADF participant dossiers. Using data from the baseline surveys on typical crop spacing/plant density this quantitative data can be converted into an area equivalent should it be planted on a mono-crop basis. Data from the extensive and intensive surveys and the participatory M&E work would be expected to detect the area planted to the improved seed in subsequent years. The

secondary adopter surveys would likewise pick up the area planted to improved seed by farmers who obtained their planting material from non project sources.

Additional SPI: SPI IV.2a Number of trees per hectare within the farm holding

The purpose of this SPI would be to monitor the number of trees (as opposed to hedgerows) farmers plant and/or retain within their farm plots. As farmers do not typically plant trees in consolidated blocks (woodlots or mini plantations) the SPI should focus on the number of trees planted rather than the planted area. establish A distinction should be made between intensive tree planting in the homestead home garden and the more extensive tree planting on field boundaries and in association with the hedgerows, bandes mange, and rock walls in individual crop and pasture plots. This data to be derived from the expanded farmer dossiers, special field surveys and to form a component of the intensive farm household surveys.

IV.3 Hedgerows installed (area) and percent still effective

This issue has been addressed by a very recent SECID special study into hedgerow management within three PADF/PLUS monitoring micro-watersheds near to Camp Perrin. This study represents a start on measuring this SPI but the area coverage is small and as indicated earlier there are basic questions concerning the representativeness of the intensively monitored micro-watershed areas. Information on the length of hedgerows installed is contained in the farmer dossiers. By including an estimate of the area of the farm holding and noting in which plots the hedgerows have been established it should be possible to arrive at an estimate of the total area that is in theory protected by hedgerows.

The issue of concern is the number, quality or conservation effectiveness of the surviving hedgerows. Information on this should be collected during the extensive and intensive surveys as well as from the participatory M&E work. A basic quality rating could be arrived at using the following criteria:

Criteria	Yes	No
Follows the contour		
Stems spaced close enough together to function as a cross slope runoff control barrier		
Presence of gaps of more than 40 cm width		
Presence of moderate sheet and rill erosion immediately below hedgerow		
Effective in trapping soil above hedgerow		
Heavily browsed		
Pruning on a regular and sustainable basis		

Note the quality of the hedgerows is one factor that is considered when determining the appropriate better land husbandry rating as part of the environmental impact monitoring (appendix ...) at the plot, farm household and geographic area level.

IV.4 Percent of farmer income gains from interventions with environmentally improved land use practices

SPIs V.1 - V.4

These SPIs are intended to demonstrate project responsiveness to farmer' desires. It is recommended that they should be dropped as separate SPIs. Instead their spirit should be fulfilled through the adoption of a program of participatory M&E activities. The information from these activities would be reported in the annual M&E reports from the areas and, in summary form, in the annual M&E report for the project as a whole. The occurrence of these activities would be monitored.

V.1 Interventions addressing farmer's most preferred farm-based income-earning enterprise.
V.2 Risk reductions associated with each intervention as perceived by farmer
V.3 Correspondence between project calculated evaluation and farmer evaluation of income potentia for each intervention
V.4 Refinement of interventions based on problems and constraints identified by farmers.

V.5. Human resource development.

This SPI raises the issue of use for management decisions. If it is relevant to management choices, it should be operationalized and measured. Some illustrative indicators are presented in the following table.

On the basis of our review of the SPIs, we recommend that some of them be kept as they are, some re-worded and others be dropped. We recommend that some indicators be added, noting that they require no additional data gathering cost because they can be calculated from the data to be gathered for the SPIs. We recommend that a single list of indicators of output and impact be monitored on a yearly basis be compiled, and that that list include the reworded SPIs, the log frame indicators, and other indicators. This list should be renumbered.

Table 2. The SPIs

The SPIs	Recommended Wording	Comments
I.1. Percent of area of a micro-watershed in environmentally improved land use practices	I.1 Percentage of each project area rated as good to excellent on better land husbandry scale.	not reported in 1995 Rating criteria and procedures defined in appendix. Area includes total planimetric area.
I.2 Secondary adopters per area per project assisted farmer	I.2 Secondary adopters per project-assisted adopter, analyzed by area and intervention. Number of secondary adopters, analyzed by area and intervention.	Method issue remains: census list, network, or locality sample to find secondary adopters If the network method is chosen, re-word this as "minimal number of documented secondary adopters..."
I.3 Physical soil build-up behind structures (m3/m)		Only calculated in case study fields.

I.4 Percent of secure household farm in the intervention area in environmentally appropriate land use practices.	I.4 Percent of census-listed farms using each and any project intervention, analyzed by area, intervention, and environmental impact class of interventions. Number of primary adopters (farms). Number of producers gaining income from project interventions, by area, intervention, and gender, analyzed by primary and secondary adopters.	 "producers"are individuals, including owners, workers, suppliers.
I.5 Area of arable land created by mechanical structures (checkdams)	drop; use volume of soil captured in case studies only	
II.1 Improvement of contiguous farm land adoption of conservation land use practices within the micro-watershed	drop	

III.1 Incremental net returns for each intervention	III.1 Incremental net returns per unit area or per unit intervention, for each intervention Incremental gross revenue to primary producers, analyzed by intervention and area Incremental food production (calories and protein), analyzed by intervention and area	Based on case study cost data and monitored production data. Based on food composition tables and monitored production.
IV.1 Number of farmers adopting improved seed (commercial or seed bank) and number of participating farmers and amount of seed handled for: cereals, vegetables, fruit, hardwood and fast-growing tree seedlings, etc.	IV.1 Number of farmers adopting each and any project intervention, both cumulative and in the year, analyzed by intervention, primary/secondary, and area.	
new	Area of farm land with more than 25 trees per ha.	Analysis should distinguish among woodlots, home gardens, and other farm land.
IV.2 Area of M&E watershed under improved seed (or better quality seed).	Area planted with project seed/planting material (monocrop equivalent)	"Area" calculated at typical small farmer planting densities for areas.
IV.3 Hedgerows installed (area) and percent still effective	IV.3 Amount of each intervention installed and percent of each intervention ever installed still effective or in use.	Installation is now covered in SPI IV.1

IV.4 Percent of farmer income gains from interventions with environmentally improved land use practices	IV.4 Percent of farmers adopting any intervention who adopt interventions judged ex ante to be "environmentally beneficial", analyzed by primary/secondary adopters and by area. Percent of farmers adopting any intervention who adopt interventions judged ex post to be "environmentally beneficial", analyzed by primary/secondary adopters and by area. Percent of producer gross income gains from interventions judged ex ante to be "environmentally beneficial", analyzed by primary/secondary adoption and by area.	The purpose of this indicator is to show the degree to which the project focuses on environment/ income interventions; it does not show impact.
IV.5 (dropped)	drop	
IV.6 (dropped)	drop	

V.1 Interventions addressing farmer's most preferred farm-based income-earning enterprise.	drop V.1 to V.5 ME would include a. Summary report of Farmer Evaluation Sessions b. Number of FES done in the year and cumulatively c. Summary report of Participatory Rural Appraisal d. Number of PRAs done in the year and cumulatively	
V.2 Risk reductions associated with each intervention as perceived by farmer	drop	
V.3 Correspondence between project calculated evaluation and farmer evaluation of income potentia for each intervention	drop	
V.4 Refinement of interventions based on problems and constraints identified by farmers.	drop	

V.5. Human resource development.	V.5. Human resource development: Illustrative examples a. Non-farm enterprises operating commercially, by type b. Enterprise or group accounting systems in operation c. Individuals trained, by type of training	Issue: This illustrative list should be expanded.

Output indicators like the log frame indicators are typically part of M&E systems, and we have suggested that they be included in a yearly M&E report. We suggest no modifications of the log frame indicators because of their contractual nature; but we do suggest that the M&E report include all the outputs of the projects, not just those listed on the log frame.

Not all of the "objectively verifiable indicators" in the project log frame (Amendment 2) are tied to appropriate "means of verification", and we do think that the modifications of the M&E system suggested here will provide better data. For example, the means of verification of the Goal level (income, forested land, soil erosion, farmers trained) are national statistics that are not clearly tied to project output. It is not clear how "national agricultural production statistics" tell us about "incomes for participating farmers".

Among the Goals Level indicators, a few bear comment.

Increased income for participating farmers. This indicator will be measured by survey. The M&E effort will focus on increasing incremental gross revenue; net revenue and financial indicators will be calculated as well using less intensive methods.

Increased forested and on-farm planted hectares in project areas. Area forested is a difficult indicator for small farmer tree planting, which is more likely to be found in compounds, borders, or single trees than in orchards or lots. The more appropriate indicators may be (a) number of trees planted, (b) number of farms planting trees, and (c) number of hectares with more than (25?) trees per hectare, which will capture mixed use tree planting.

Reduced soil erosion This indicator is to be measured by the annual land husbandry status reports or inventories in which the status, type and severity of erosion is documented by means of simple visual indicators as described in appendix x.

Recommendations for Involving the Ministry of Agriculture

The recommendations that we have made require considerable analytic skill, time, and personnel. All of the participating institutions have computer capacity and the ability to do M&E reports. SECID has substantial analytic capacity, and CARE has just hired a staff member with such skills.

But this is not enough for complete analysis of the data that are to be generated and particularly for applying those data to strategic issues in a continuing way. SECID simply does not have the time and, in any event, the role of SECID after 1997 is not defined.

In the short term, we recommend that SECID hire a data management specialist and that SECID seek funding for a full-time analyst with substantial expertise.

At the same time, the Ministry of Agriculture is re-building. It has voiced interest in assuming a monitoring and evaluation role for the country as a whole. Participating in PLUS M&E on a long-term basis offers an excellent opportunity for training and hands-on experience in methods and analysis.

We recommend that Ministry personnel participate in PLUS M&E, and that training funds be sought for analysis of PLUS data in conjunction with Ministry staff. In any event, we recommend that the Ministry receive a copy of data and reports.

Reporting Requirements

We suggest the following reporting outputs from the M&E system.

1. Annual PLUS M&E and Impact Report for the project as a whole.

Minimally, this annual report would contain the following elements:

Output indicators from both implementing organizations
Process indicators of participation, including summaries of area FES, PRA, and staff discussions
Impact indicators for the project as a whole
Intervention-specific results, such as trials, case studies, FES
Appendices: FES, PRAs, technical reports, special studies

All indicators should be put into a single, organized table with a new number system.

2. Occasional reports on technology, adoption, and impact of each project intervention, with a minimum of one report per intervention over the course of the project.

3. Mid-term and final impact evaluation.

4. Participatory rural appraisals, with a minimum of one per area.

5. Annual M&E report from each project area, including a tabulation of some data items, a summary of the Farmer Evaluation Session, a Land Husbandry Status Report, and text by the area project team.

6. M&E reports TO each area annually, with intervention budgets, tabulations of area data, responses to queries, and comparative data.

7. Special studies and analyses, minimally to cover the strategic questions on achieving impact raised by project staff.

8. Archive copies of all reports and data so that future development projects can access the PLUS experience. One archive should be in Haiti and one in the United States. An agreement should be reached for proper storage of the documents and electronic data and for public access.

Summary of Operational Recommendations

In summary, what M&E activities will produce the data sets, indicators, analyses, and reports that have been recommended?

Major activities:

Participating farmer dossiers; Surrounding areas farmer lists	Extensive survey: broad coverage, short interview	Intensive survey: smaller sample, longer interview
Land husbandry status reports/ inventories.	Farmer Evaluation Sessions (FES)	Participatory Rural Appraisals (PRA)

Supporting activities:

Case studies. The current case studies will be monitored in 1995; thereafter, they will be checked yearly with low-intensity monitoring for production, soil retention, and environmental conditions.

Geographic Information Systems and Geographic Position System GIS will be used to map and analyze the data from surveys, as well as to code farmers for environmental characteristics from pre-existing data sets. To some extent, GIS will substitute for labor intense methods (e.g. general area slope may substitute for precise slope of farmer's field). GIS would assist the project to delineate project areas and to define and delineate land management units within project areas.

Village-level (or locality) interviews. Data on the general cultural, social, and economic characteristics of an area may be gathered quickly by conducting key-informant interviews or group interviews.
Add the following between items 1 & 2

Definition of the geographic area coverage of both PADF and CARE activities and the demarcation of the boundaries of their concentration areas onto 1:50,000 topographic base maps.

Compilation of baseline bio-physical databases for each of the PADF and CARE PLUS project concentration areas. Definition and delineation on the base map of the

land mangement units within each project area.

Major products:

Annual M&E PLUS Impact Report	Participatory Rural Appraisals	Intervention Reports	Impact contributions to Mid-term and Final Evaluations
Annual M&E Report from the Areas, including Farmer Evaluation Session Reports and Land Husbandry Status Reports	ME Reports to the Areas	Special Studies and Analyses	

Implementation Strategy and Scheduling

The following lists some of the milestones for implementing the recommendations made in this report.

Table 3. Suggested Implementation Schedule

	CARE	PADF	SECID	Special Studies
1995 Farmer impact	1 typical whole-farm description and budget Statistical capacity in place Continue case studies Agree on dossier form Input dossier data Develop census/ sampling frame for secondary adopters Develop and finalize survey forms All preparations complete for surveys M&E workplan for 1996, identifying studies	1 typical whole-farm description and budget Statistical capacity in place Continue case studies Agree on dossier form Input dossier data Develop census/sampling frame for secondary adopters Develop and finalize survey forms All preparations complete for surveys M&E workplan for 1996, identifying studies	4 budgets for case-study interventions for use by regional staff Format for rough whole-farm budgets from PD's Calculate SPI's Begin time series of indicators Write 1994 PLUS ME report with SPIs and outputs Survey plan prepared for 1996 M&E workplan for 1996, identifying studies	

1995 Environment	Improved micro-measures used for 1995 data	Improved micro-measures used for 1995 data	Adjust 1994 data and start time series of micro-measures	Study on intensive environmental monitoring as part of PD process
1995 Participation	Participatory Diagnostics in 3 regions of Grand d'Anse 4-5 Farmer Evaluation Sessions	Participatory Diagnostic (4-5?) 4-5 Farmer Evaluations Sessions	Support Participatory Diagnostics and Farmer Evaluation Sessions Incorporate results into project reporting	Study on intensive environmental monitoring as part of PD process (Save as above)
1996 Farmer impact	Reduce case study monitoring Report on impact using new measures Staff works with SECID in expanding intervention budgets to (at least 1) additional intervention Add one target group whole-farm budget Up-date budgets with survey data	Reduce case study monitoring Report on impact using new measures Staff works with SECID in expanding intervention budgets to (at least 1) additional intervention Add one target group whole-farm budget Up-date budgets with survey data	Continue annual impact report and time series Assist CARE and PADF regional staff in developing additional intervention budgets Give leadership to development of whole-farm budgets	Market-style analysis for all monitored implement ations Study of applicability and use of whole-farm budgets from PD's

1996 environment				
1996 Participation	Participatory Diagnostics in Northwest 4-5 Farmer Evaluation Sessions Begin dialogue with farmer NGO's re long-term sustainability plan	Up-date previously done (1992-1994) Diagnostics 4-5 Farmer Evaluation Sessions Begin dialogue with farmer NGO's re long-term sustainability plan	Support CARE and PADF staff in PD's and FES. Incorporate results in project reporting Assist CARE/PADF in dialogue with farmer NGO's re long-term sustainability	Study of applicability and use of whole-farm budgets from PD's (Same as above)
1997 Farmer impact	With leadership from SECID, summarize assessments of farmer impact from intervention budgets, whole-farm budgets, M& E	With leadership from SECID, summarize assessments of farmer impact from intervention budgets, whole-farm budgets, and M&E	Give leadership to, and provide rubrics for summarization of farmer impacts SECID prepares exit reports on farmer impacts and measures of farmer impacts	Mid-term Impact Evaluation
1997 Environmental impact				Midterm Evaluation

1997 Participation	Update PD's done in Northwest in 1995 4-5 Farmer evaluation Sessions	Up-date 1995 PD's 4-5 Farmer Evaluation Sessions	Incorporate results of PD's and FES in project reporting SECID prepares exit reports on farmer participation	Midterm Evaluation
1998 Farmer impact	Regional staff is routinely using intervention and whole-farm budgets	Regional staff is routinely using intervention and whole-farm budgets		
1998 Environmental impact				
1998 Participation	Additional PD's and FES as necessary Dialogue on sustainabibility	Additional PD's and FES as necessary Dialogue on sustainabibility		
1999 Farmer impact	Continued use and development of budgets Transfer of responsibility to other partners (e.g.) MARDNR Focus PD's upon long-term household impact	Continued use and development of budgets Transfer of responsibility to other partners (e.g.) MARDNR Focus PD's upon long-term household impact		Final impact Evaluation

1999 Environ-mental impact				Final impact Evaluation
1999 Partici-pation	Focus upon developing sustainability plan with farmer NGO's Continued use of PD's and FES as necessary Transfer techniques to other partners (e.g.) MARDNR	Focus upon developing sustainability plan with farmer NGO's Continued use of PD's and FES as necessary Transfer techniques to other partners (e.g.) MARDNR		Final evaluation

The consulting team, at the request of the implementing agencies, has compiled a very rough estimate of the staff time required to implement the recommendations made in this report. With the proviso that these are first-cut figures, the implementation time required is very modest in comparison to both the resources available and the size of the overall project.

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List of Appendices

Appendix 1. Terms of Reference and Team Activities

This assessment of the Productive Land Use Systems (PLUS) projects (521-0217) Monitoring and Evaluation (M&E) system was performed by a team consisting of Steven A. Romanoff, Team Leader; Malcolm G. Douglas; and Donald E. Voth. The assessment was conducted in Haiti from April 3 to 28, 1995.

The objectives of the Term of Reference were as follows:

To evaluate current monitoring and evaluaiton system both in scope and with respect to the individual SPI's.

To make recommendatons for improving the M&E System. Among the specific aspects to consider were:

Examine soil conservation practices implemented by the project and make recommendations regarding their implementation and the data collection process.

Examine data collection and reporting procedures in general and evaluate for efficiency and efficacy. Make recommendations to improve and/or stremline the data collection procedures if needed.

Assess means employed to attain farmer input into project and make recommendations as to improving feedback mechanisms within the project.

The team spent a total of 21 work days performing the assessment. The team spent three days in the CARE Northwest operational zones and three days in the PADF Lower Plateau operational zone. Douglas and Voth spent an additional 2-3 days in the PADF Southwest operational zone. The team met several times with SECID, CARE, PADF, and USAID staff together, first to discuss its assigment and subsequently to discuss preliminary and final recommendations. It also met separately with SECID, CARE, and PADF staff in Port-au-Prince. Finally, in the field trips, it met with PADF and CARE regional staff, field staff, and spent a considerable amount of time visiting field sites in both CARE and PADF zones. Thus, the team visited and examined a large number of PLUS project interventions in the field. In the field visits the team had the opportunity to talk to numerous farmers, representatives of local NGO's and farmer organizations, and to have candid discussions with CARE and PADF field staff. Finally, as the team was hosted on these field visits by CARE and PADF central staff, it had extensive opportunity for discussions with them.

Appendix 2. SPIs and Log Frame Indicators

The following tables are a compilation of the indicators currently in use (both Strategic Performance Indicators and log frame indicators). Our recommendation is to combine these sets of indicators, modify them as necessary, add other simple indicators as needed, re-order them, compare them to goals, and begin a yearly time series.

The SPIs	1994 CARE	1994 PADF	Cumulative CARE	Cumulative PADF	Cumulative total
I.1. Percent of area of a micro-watershed in environmentally improved land use practices			62% farm area. 1 case		
I.2 Secondary adopters per area per project assisted farmer			.68 in project areas		
I.3 Physical soil build-up behind structures (m3/m): rockwalls	0.23	0.4	31,740 m3	95,205 m3	126,948 m3
hedgerows	0.24	0.05	179,000 m3	110,558 m3	289,538 m3
I.4 Percent of secure household farm in the intervention area in environmentally appropriate land use practices.					
I.5 Area of arable land created by mechanical structures (checkdams)			50 HA (potential)	17 HA (potential)	67 HA
II.1 Improvement of contiguous farm land adoption of conservation land use practices within the micro-watershed					

III.1 Incremental net returns for each intervention: gully plug veg. garden rockwall hedgerow	33 Gde /plot		140 G/ garden 139 G/ ha	95 G/ garden 63 G/ plot	
IV.1 Number of farmers adopting improved seed (commercial or seed bank) and number of participating farmers and amount of seed handled for: cereals, vegetables, fruit, hardwood and fast-growing tree seedlings, etc.			1293	6850	8143
IV.2 Area of M&E watershed under improved seed (or better quality seed).					
IV.3 Hedgerows installed (area) and percent still effective				70% effec-tive (study)	
IV.4 Percent of farmer income gains from interventions with environmentally improved land use practices					
IV.5 (dropped)					
IV.6 (dropped)					
V.1 Interventions addressing farmer's most preferred farm-based income-earning enterprise.					

V.2 Risk reductions associated with each intervention as perceived by farmer					
V.3 Correspondence between project calculated evaluation and farmer evaluation of income potentia for each intervention					
V.4 Refinement of interventions based on problems and constraints identified by farmers.					
V.5. Human resource development.					

The Log Frame Indicators

Indicator	1994 CARE	1994 PADF	Cumulative CARE	Cumulative PADF	Cumulative total
Goals: Increased income for participating farmers	see SPIs				
Increased forested and on-farm planted hectares in project areas	see SPIs				
Reduced soil erosion	see SPIs				
Farmers trained in improved land use management technologies					
Purpose: 80,000 farmers have adopted improved land use practices over 3 growing seasons				27728	27728

18,000 farmers have produced tree seedlings			5307		5307
19,000 farmers have had bio-intensive gardens for more than 2 seasons	1293 (seasons?)	4509 (seasons?)		6823	6823
38,000 farmers have increased their income at least 25%					
Outputs: 4 million fruit trees planted		379K	20K	639K	659K
40,300 bio-intensive gardens in production	1600	4509	1200	6823	8023
7,200 km of hedgerorws planted		1448	622	2211	2833
150,000 gully plugs		12272	11912	17047	29459
2,000 km of rock walls built	113	182	182	238	420
4,000 km of dead barriers established		533	712	616	1328
30,000 hectares under improved land use and income increasing practices		2700	796	3650	4446
100,000 farmers trained in soil conserving practices, tree seedling production, and income enhancing activities			3945 person days	27725	3167 0
18,000 tree nurseries in place		1892	426	3152	3578
5.0 million multipurpose tree seedlings planted		541K hdwd 379 K fruit	690K	889K hdwd 639 K fruit	

Appendix 3. Data Components of the PLUS M&E System

The following table compiles the information gatherin activities of the current M&E system.

Data Set/ Study	Description	Data flow	Results
Baseline Survey	1993 survey of 16 monitoring zones (12 PADF and 4 CARE)	CARE, PADF provide data to SECID	Report written
Census to support baseline survey	census of aprox. 2,100 farmers in 4 CARE and __ PADF areas, whether participating or not		
ME case studies: gardens check dams (gully plugs) hedgerows rock walls	1994, 1995 data on aprox. 25 CARE and 25 PADF installations, plus witness or control plots weekly visits on costs, harvests grain harvest monitored for hedgerows and rockwalls physical measures of soil accumulation supposed to be taken for rock walls, checkdams	ME assistant ME supervisor, field level ME supervisors, CARE and PADF SECID analyst	some first year's data analyzed

Representative area monitoring	For 2 areas, CARE has mapped fields on a GIS and monitors adoption of interventions by farmers For 4 areas, PADF has mapped fields and monitors location of interventions		calculation of SPIs
Crop yields, farmer's plots	5M by 5M plots harvested yearly		not used yet
Crop yields, multiplication plots and on-farm trials (CARE)	On-farm plantings are made and monitored		in CARE area, used for varietal validation
Participating farmer dossiers and listing, PADF	each farmer served by an extensionists has a file in which the local extensionist records information on interventions	extensionist fills forms area project office inputs name, location, and intervention class in a database	used for managing extensionists used for end-of-year totals of adopters
Farmer listing, CARE	each farmer in the 82 areas served by an extensionist (whether participating or not) is listed in a database	extensionist lists farmers name input in CARE database	just implemented, not yet used
1995 tree planters and followup checks for PLUS areas (planned)			
1995 hedgerow adopters study (survey)			

Annual output reports	number of units of interventions implemented in the year	area offices either direct to central office or through regional office data copied to SECID in reports	the most consistently reported indicators

Appendix 4. Involvement and Participation of Farmers in PLUS

Contents

Summary of Recommendations

In view of the importance of being sure that PLUS interventions respond to real farmer needs and preferences, and the need to strengthen the role of farm families in PLUS so as to contribute to sustainability, we recommend continuation and expansion of the farmer participatory methods already being adopted by PLUS, especially the adoption of key elements of the Farming Systems Research and Extension (FSRE) approach. However, FSRE must be adapted to Haitian and PLUS project circumstances, and particular elements are of special importance to PLUS. We recommend a continuation of the use of FSRE Diagnostic's or Rapid Rural Appraisals but recommend evolution in the direction of a Participatory Rural Appraisal approach (PRA), which, in contrast to traditional FSRE techniques, involves farmers themselves in key aspects of the Diagnostic, especially in the identification of key constraints and opportunities. We recommend that these Diagnostics, together with other information sources, become the basis for the development of comprehensive descriptions of target-group farms, including the development whole-farm budgets, and the monitoring of family well-being and food security. We also recommend the adoption of Participatory Monitoring and Evaluation (PME) into future PLUS activities. This will involve the organization of special Farmer Evaluation Sessions (FES) so that farmers, themselves, may be engaged somewhat more formally in the assessment and evaluation of the PLUS interventions.

These two recommendations, Participatory Diagnostic and FES, are quite time consuming, especially PD. However, they provide powerful means for engaging farm families themselves in the kind of qualitative monitoring and evaluation of their own situation with respect to protecting and enhancing the bio-physical environment in which they live and their own well being. Due to the flexibility with which PD can be applied, many other forms of detailed, qualitative monitoring (Such as bio-physical assessments) can be included in the PD and PD up-date process.

We recommend a continued decentralization of PLUS; specifically we recommend that efforts be made to involve regional staff--especially M&E staff--more extensively in the analytic work of the M&E system. We recommend that they become more involved in analysis, that the M&E system evolve toward a support system for them to do regionally-specific analyses, and that they play a key role in the preparation and use of both intervention-specific and whole-farm budgets.

Finally, we recommend that PLUS initiate a dialogue with the local NGO's and farmer groups with which it works to stimulate them to give leadership toward the preparation of a comprehensive plan for the continuation of those elements of PLUS that are essential to make the PLUS efforts--and, much more importantly--the hillside agriculture of Haiti--sustainable. Detailed recommendations are given in the main body of the report. Additional details for implementation are given in "Responsibility, Products, Time Requirements and Proposed Schedule for Recommendations" below.

Farmer participation and involvement in PLUS

Farmer participation and involvement in the PLUS strategy

The PLUS PP states that: "The project is venturing into new implementation territory, both in terms of the material it is extending and the actual changes it is attempting to achieve. As a result, the development and implementation of an effective monitoring and evaluation system is essential. This is true, not because of externally imposed reporting requirements, but to enable the managers of the program to understand farmers' perceptions of their needs, determine which interventions work and which do not work, and feed that information back into future rounds of the program" (PP, p. 16). It is this statement, more than anything else, which brought PLUS to the point where our consultancy was required. There are many very good methods for incorporating farmers' perceptions and needs and to determine whether interventions are biophysically, economically, and socially viable. In part, those objectives are achieved through a project structure which links closely to farmers through farmer organizations, as PLUS does. Elsewhere it would have been achieved through application of a participatory Farming Systems Research and Extension (FSRE) approach. The designers of PLUS chose to use an M&E system as a major mechanism to achieve this.[1]

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[1] Unfortunately, there appears to be no Technical Analysis nor any Institutional Analysis for PLUS. Hence, the formal justification for the decision to use an M&E system, and the reasons for rejecting the other alternatives was not made formally. This is noteworthy since ADSII is, arguably, both a predecessor project to PLUS and

PLUS Strategy for ascertaining, responding to, and documenting response to farmer needs

One of the three distinct purpose-level targets of PLUS is evidence of responsiveness of PLUS interventions to real farmer needs and desires. This is implicit in the PLUS intervention strategy and explicit in the PP statement of purposes, as well as in the original versions of the M&E system (SPI's V-1 to V-5). This issue really involves two sets of questions. The first has to do with methods used by PLUS to obtain information about real farmer needs and preferences and how these have been fed back into PLUS. To a significant extent, it seems that this as been the focus of SPI's V-1 to V-5--ascertaining farmer needs and preferences, feeding them back into the system, and documenting that this is being done. The second issue concerns direct involvement of farmers themselves. In what ways are farmers involved in PLUS interventions?, in decision-making about PLUS interventions?, and what is the evidence that this involvement has affected PLUS interventions and their implementation?

Evidence of PLUS efforts to incorporate farmer input.--Past efforts to incorporate the farmer involvement explicitly into project strategy at the overall PLUS project level, in keeping with the PP's intent, include:

1. CARE and PADF baseline surveys (In the case of CARE this became a complete census of farmers [Lea, Baseline Survey, p. 4])
2. Needs Assessment Surveys of Swanson et al.
3. Acquisition, manipulation, and use of monitoring data itself, especially with respect to costs and returns, and risk.
4. FSR Diagnostics or Rapid Rural Appraisals which were carried out as an FSR training exercise in 1992, and have been repeated in several project regions by both CARE and PADF.
5. The logic of adoption itself. CARE, especially, considers adoption by farmers as adequate evidence of the project's meeting actual farmer needs.
6. Farmer-based or local organization-based extension strategies.
7. Employment of farmers as technical staff.

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the one project in Haiti most similar to PLUS (Villaneuva, 1993). It specifically designed to implement the FSRE approach, and Villaneuva attributed what success it achieved to its close integration of farmers into technology assessment and decision-making through FSR.

8. Project recognition of some technical innovations by farmers and consequent incorporation in the intervention options.

And, of course, there has been the continuing effort to explicitly measure farmer input in some way in the M&E system using specific SPI's for that purpose. Both implementing agencies use implementation strategies that are very closely linked to farmers, either directly or through farmer groups and organizations. The implementation strategy of PADF depends entirely upon local NGO's which are presumably responsive to their farmer members. These local organizations separately, and in cooperation with the farmer project-employed field agents, do systematically evaluate the program and its interventions. CARE focuses heavily upon the use of farmer-agents and upon the logic of adoption itself as evidence of meeting actual farmer needs and preferences. As it moves into a new project area in Jeremie it intends, further, to both work through local organizations as PADF does, and to incorporate some of the participatory elements of FSRE.

Finally, CARE has experimented on a very limited basis with the use of focus groups to elicit farmer input, and has found the results to be disappointing.

Assessment and critique of strategies for assuring responsiveness to real farmer needs and involving farmers in decision-making.--It is clear that both PADF an CARE have been and continue to work hard at responding to farmer preferences and needs. However, except for the obvious fact that farmers are the ones implementing the interventions, and that their adoption of the interventions proposed by the project itself is a strong indicator that the interventions do respond to their needs, some of the explicit strategies pursued to obtain farmer input so far are very indirect. This is particularly true of the tendency in PLUS, until now, to depend heavily upon standard surveys and/or analyses performed by outside consultants to try to identify farmer needs, constraints, and opportunities.

The relatively widespread adoption of the proposed interventions, expressed in terms of targets met, etc., was a major justification for building PLUS on the experience of the previous projects. And, of course, it provides strong evidence that interventions are, in fact, consistent with farmer needs and aspirations. There are several reasons, though, why adoption alone is not an adequate indicator.

First, one of the major changes in PLUS is movement away from subsidization of adoption which was common in previous projects. Hence, adoption, itself--why interventions are adopted or rejected, etc.--becomes an

issue important in its own right. Is it, indeed, short-run economic benefits that motivates adoption?

Second, there is at least some evidence of over adoption or over enthusiastic adoption of some practices--rock walls, for instance. It seems clear that there is at least some labor that has been invested in rock walls that will bring little, if any return to those who built the walls. How is this adoption to be explained?, and, hopefully, to be reduced in the future without the constant fine-tuning, as seems to be the case now, at the level of the implementing agencies, or even the funding agency itself?

Third, adoption information alone cannot inform project personnel of the reasons for non-adoption of practices that are not adopted. There is, then, risk of rejecting potentially valuable practices because of non-adoption when minor alterations may have made them acceptable. Fourth, farmer input into the entire constraint identification to on-farm testing process provides opportunity to profit from farmer (indigenous) knowledge, including closely related or alternative existing practices. Finally, the human resource of the farmers is the most basic resource in agricultural production, especially in an environment as bereft of resources as Haiti. The best way to develop this human resource is by involving farmers themselves in the problem solving process. This can only be done by having them participate actively, to become the subjects of the process rather than is objects.

Probably the most effective way to insure that interventions are responsive and accountable to the farm families they are supposed to serve is the empowerment of farmers through the use of local NGO's and farmer groups, as is done extensively, at least in some PLUS regions. This approach is used extensively by PADF, and is applied somewhat differently in the different areas, from the Cape Haitien area where the PLUS program depends heavily upon NGO's to the Caye region where it works quite directly with small, organized farmer groups, which were essentially organized specifically for PLUS and do not serve other functions. As CARE moves into the Grand d'Anse region, it also intends to work through local NGO's.

There is little question that this is an excellent approach to achieve effective communication with farm families, and to make the project accountable to them and their felt needs, and represents one of the strengths of the PLUS program.

We go now to the issue of the explicit efforts to measure responsiveness to farmer needs and preferences and to include farmer input in the M&E system.

Measurement of Farmer Participation in the SPI's.--The original set of SPI's included 19 under five categories, classified respectively as quantitative and qualitative SPI's. Category V, entitled "Environmental and Income Sustainability SPI's" included the following 5 SPI's:

1. Interventions addressing farmers' most preferred farm-based income-earning enterprises.

2. Risk reduction associated with each intervention as perceived by farmer.

3. Correspondence between project calculated evaluation and farmer evaluations of income potential for each intervention.

4. Refinement of interventions based on problems and constraints identified by farmers.

5. Human resource development.

Implicit in several of these is the need for both the explicit use of farmer participatory methods in project implementation and for the actual monitoring and measurement of the extent to which (or whether) farmers have actually participated in [something] and/or evidence that the interventions are consistent with farmer needs. The original M&E document continues to elaborate on this point with a brief discussion of the Farming Systems Research (FSR) approach, which it apparently advocates. It focuses upon several elements of this approach, including informal surveys (diagnostic surveys, rapid rural appraisal, etc.; identification and prioritization of the major constraints identified by farmers; and causal diagramming in order to more fully comprehend the causes of the constraints identified by farmers, and to ascertain potential solutions (Appendix C).[2]

However, in his March 30, 1995 review of the status of the SPI's, Lea reports what he feels is a consensus recommendation that SPI's V-1 to V-5 be dropped as PLUS project SPI's and concludes by saying: ". . however, the

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[2] These are only a few elements of the FSR approach. They are primarily those in which "researchers" dominate and to which they give leadership. Other important elements include farmer identification and screening of potential technologies, farmer involvement in the applied research process, especially in the form of on-farm, farmer managed trials, and, more recently, explicit farmer participatory evaluation of interventions (Norman and Douglas, 1944: 154-157).

information objectives of these SPI's appear potentially important enough that SECID should develop proposals discussing how the information targeted by these SPI's could be obtained. CARE and PADF will then work individually with SECID to decide how to proceed."

The situation we have, then, is one in which one of the most important elements of the redesigned project, active farm family participation in assessment and evaluation of the technological packages being presented to them is somewhat in limbo. One can say that the implementation of PLUS strategy, although still largely agenda driven, is evolving and that much of this evolution is in response to what are seen as farmer needs and preferences. A Farming Systems Research (FSR) approach has been incorporated into the programming of both PADF and CARE. In the following we discuss, and ultimately recommend, continued and somewhat expanded use of the "Diagnostic" or "Rapid Rural Appraisal" aspect of FSR. We also recommend further involvement of farm families through the incorporation of Participatory Monitoring and Evaluation (PME), incorporating day-long Farmer Evaluation Sessions (FES). We do not recommend re-incorporation of this set of SPI's (V-1 to V-5), or the creation of new SPI's to measure participation. We do recommend continued use of participatory methods, and even expansion of these methods (See recommendations above), but these are means toward achieving PLUS goals, not ends in themselves.

Participatory Rural Appraisal (Diagnostic)

Farming Systems Research and Extension (FSRE)

Farming Systems Research and Extension (FSRE) arose more or less simultaneously in Asia, Latin America, and in Africa, largely in response to what was seen as some of the major weaknesses of the "Green Revolution" approach to agricultural development. Because of its alternative origins and subsequent evolution, the terminology of FSRE has become somewhat confusing. However, the different versions share many common features, which include attention to the entire farm (or community) system; a logical series of steps in the research and development process; involvement of farm families in those steps to the maximum extent feasible; and the use of an iterative, problem solving process. Numerous guidelines for implementing FSRE are available. Perhaps the most extensive is that produced by the Farming Systems Support Project (FSSP) at the University of Florida which is the version of FSRE which has been introduced into Haiti (IFAS and PADF, 1992).

Participatory approaches like FSRE have recently gained wide acceptance in the areas of forestry and soil conservation, as it has been recognized that "conventional" top-down approaches were failing. Norman and Douglas outline the use of FSRE in Soil Conservation (1994, pp. 31-86).

The Early "Characterization" Phase of FSRE

One of the early phases of the FSRE approach is development of a comprehensive characterization of the specific farming system in question for a particular program or intervention. This is variously referred to as the Diagnostic, the Rapid Rural Appraisal, or the Diagnostic. This is normally initially done in a period of about 2-3 weeks by a FSRE team, using secondary data and carrying out interviews with farm families. These interviews are more informal than formal, tend to be open-ended, and are designed to focus in depth upon all major aspects of the farming system with several farmers. Samples are not drawn scientifically, but are chosen so as to represent a wide range of circumstances in the target area.

The products of this process are descriptions of the major features of the relevant farming systems, a preliminary identification of major target groups among these farming systems, and an identification of the major constraints and/or opportunities within the farming system. Another product is the education of the project implementation staff. The final product is the initial involvement of farm families, themselves, in defining what interventions should be tried, how they should be used, etc. The results of this process, then guide the next steps of the FSRE process.

Both PADF and CARE have performed Diagnostics Surveys of this kind in some parts of their areas of intervention. Our recommendation is that this be continued, expanded, that they become more participatory as farmers themselves become involved in the identification of constraints/opportunities, and that the be used to contribute to the development of comprehensive descriptions of "typical" target group farms, including the development of rough whole-farm budgets.

Rapid Rural Appraisal and Participatory Rural Appraisal

Rapid Rural Appraisal (RRA)

A variety of RRA techniques have been developed that can be used to identify and analyze the circumstances of farming communities, diagnose their problems and design conservation orientated solutions. With RRA the analysis and identification of solutions is still primarily done by the experts. It

is bottom up in the sense that it is based on detailed discussions with the target land users, but it is still largely appraisal by outsiders.

RRA has been used to elicit a range and quality of information and insights inaccessible with more traditional methods, not only for farming systems development but also for a range of other social and rural development issues. Experience from a number of countries has shown that RRA is a cost effective way of obtaining relevant information on rural household circumstances. It is believed to be an effective tool for quickly characterizing the circumstances of rural households engaged in small-scale farming and/or forestry activities.

RRA is a semi-structured activity carried out primarily in the field by an inter-disciplinary team. Key features of the approach are that it is:

a) **Iterative:** data collection, analysis and review are on-going activities throughout the study. This involves 'learning as you go', whereby newly generated information refines the original understanding and helps to set the agenda for the later stages of the analysis.

b) **Flexible:** the sequence of activities and goals of the study are not immutably fixed before hand, but constantly under review and modified as the team realizes what is or is not relevant.

c) **Innovative:** there is no simple, standardized methodology. Techniques are developed and modified for particular situations depending on the local circumstances and the skills and knowledge of the team members.

d) **Interactive:** all team members and disciplines combine together in a way that fosters lateral thinking and inter-disciplinary insights. A systems perspective helps to make communication easy.

e) **Informal:** the emphasis is, in contrast to the formality of other approaches, on partly structured and informal interviews and discussions.

f) **In the Community:** learning takes place largely in the field and in particular farmers' perspectives are used to help define differences in field conditions.

Participatory Rural Appraisal (PRA)

RRA has recently evolved into the approach termed participatory rural appraisal (PRA). RRA has been described as mainly extractive, whereas PRA in contrast is participatory. With RRA outside professionals go to rural areas obtain information and then bring it away to process and analyze. With PRA outside professionals still go to rural areas, but their role is more to facilitate the collection, presentation and analysis of information by rural people themselves.

PRA is an approach where the "outside experts" have to "unlearn" to realize they have no monopoly of wisdom and knowledge, where they have to sit down with farmers, to listen to and learn from them and to respect their expertise and ability.

Similarities and Differences between RRA and PRA

Good RRA and PRA have the following features in common:

A reversal of learning - outsiders learning from and with rural people, on site and face to face. Rural people's criteria, categories, and priorities, and their indigenous technical knowledge are respected and deliberately sought.

Learning is rapid and progressive - conscious choice and flexible use of methods to explore important questions as they arise, with improvisation, iteration and probing.

Trade-offs - sought between quantity, accuracy, timeliness and relevance of information.

Triangulation - used to crosscheck and confirm data and to improve approximations, using several, often three, methods of sources and information.

Optimal ignorance is sought - meaning not trying to find out more than is needed, and not making inappropriately precise measurements. The collection is avoided of data that will not be used.

Biases are recognized and offset - for example biases of movement and contact which are spatial (where outsiders go), institutional (what organizations they visit), personal (who is met) and temporal (when they go, by seasons and time of day). Special efforts are made to meet those, often women and the poorer, who tend otherwise to be missed.

Team composition balanced - in terms of gender, discipline, and other dimensions, and team interactions are consciously managed.

Beyond these common features, PRA has added others which have not been prominent in RRA. These include:

They do it - facilitating investigation, analysis, presentation and learning by rural people themselves, so that they own the outcomes. This often entails starting a process and then sitting back and not interviewing or interrupting.

Self critical awareness - meaning that practitioners are continuously examining their behavior, and trying to do better.

Relaxing and not rushing - exploiting the paradox that taking plenty of time in PRA is often faster and better than trying to be quick.

Embracing error - meaning welcoming error as an opportunity to learn to do better.

Using one's own best judgement at all times - meaning accepting personal responsibility rather than vesting it in a manual or rigid set of rules.

Sharing of information and ideas - between rural people, between them and practitioners, and between different practitioners, and sharing camps, training and experiences between different organizations.

Role of the External Planning Team

In a PRA exercise the members of an external planning team should see their role as being that of facilitators enabling farmers to determine the problems associated with productive and sustainable land management, to identify the constraints, and to develop locally adoptable solutions. Instead of 'making recommendations' their role should be primarily to 'offer advice and information' concerning alternative conservation effective management practices that have proved acceptable in other farming communities with similar problems, bio-physical and socio-economic circumstances.

The planning team will ultimately have to write a report of the exercise so as to pass on the findings to senior decision makers and other interested parties. They may also need to prepare a formal project document, ie. one that conforms to the requirements of a funding agency, should there be a need for additional financial and technical man power resources to implement the agreed development plan. But what appears in the report and any project document should be based on a joint investigation, analysis and design

process that has recognized and used the complementary skills and expertise of the farming community and the members of the external planning team.

PRA Methods

A range of PRA methods exist and new ones are being developed all the time. Those using them should have the confidence and willingness to experiment. Providing a good rapport has been established with the farmers, and the outside 'experts' have their respect, if something doesn't work the first time no one looses face or needs to worry and there is always scope for trying something new. The ultimate recommendation from those with experience in participatory rural appraisal is simply to "use your own best judgement".

The following list gives an idea of the range and variety of RRA/PRA methods currently being used:

Collection/Review Secondary Sources (background information)
Direct Field Observation
Key Informants (local 'experts')
Group Interviews
Individual Interviews
Learning by Doing (outsiders being taught to perform farm tasks)
Participatory Transects (systematically walking with local informants through an area)
Participatory Mapping
Participatory Village Landscape Modelling
Participatory Analysis of Aerial Photographs (eyeballing enlargements of standard 23cm square panchromatic photographs)
Participatory Seasonal Profiles
Participatory Historical Profiles
Participatory Diagramming
Ranking/Scoring Matrices
Use of Local Value Criteria
Use of Proxy Indicators
Community Level Presentation and Analysis
Community Problem Brainstorming

It needs to be remembered that there is no one definitive RRA/PRA method. The method or group of methods used in any one exercise will vary depending on the social and cultural circumstances of the communities involved, the nature of the local problems and the skill and experience of the members of the external planning team.

Suggested focus in future PLUS Participatory Diagnostics

Participatory Diagnostics of PRA's, especially the initial ones, should attempt to be comprehensive in scope. However, not all information is relevant and, for PLUS, three inter-related issues will provide a focus for performing the Participatory Diagnostics. These are the status of the bio-physical environment (environmental protection/degradation), the total farm household economy, and the well-being and food security situation of the farm household. Providing special focus upon these, together with the much more focused Farmer Evaluation Sessions recommended below, will provide PLUS a strong, bottom-up information base for understanding the extent to which it is achieving its objectives.

The farmer role in monitoring and evaluation

Monitoring and Evaluation: Some basic concepts

Monitoring and Evaluation (M&E) implies two only partially distinct activities and associated logics. Monitoring refers to ". . the efficiency with which (a) program is implemented--including measurement of the quantity and timing of input delivery and output produced. Monitoring is usually understood to include the tracking of both financial and physical activity through regular quantified reports." Evaluation, on the other hand, refers to the assessments of the results of implementing the program or activity (Slade, et al., 1986:3; Norman and Douglas, 1994:154-157). In a sense monitoring provides data, and evaluation makes judgments--turns data into information.

Evaluation is classified in many different ways, the major one having to do with the stage in the program, project or activity causal sequence the evaluation is done; hence the usual distinction between formative (process) and summative (impact) evaluation. There is, however, another very important way to differentiate evaluation, which is by the respective stakeholders it serves, hence the gross distinction between internal and external evaluation, or evaluation by "insiders" and/or by "outsiders". Evaluation is seldom clearly internal or external, however. There are fine--and important--gradations on this continuum. Thus, one can usually distinguish at least three levels: (1) evaluation by and for project/program/activity target groups or clients themselves (self evaluation, or Participatory Monitoring and Evaluation (PME)), (2) evaluation for project/program/activity implementors (PLUS project personnel. This, itself, of course has several levels) and (3) evaluation for project/program/activity funders, and, finally (4) evaluation for society at large (see PADF report for a very clear explication of the various stakeholders for M&E. For an excellent presentation of participatory evaluation of forestry interventions, which

makes a similar distinction among levels of evaluation, see Davis-Case, et al., 1990.). See also Davis-Case, 1989, p. viii and 1990, p. ii for the "insider/outsider" distinction. Davis-Case says: "The terms 'insider' and 'outsider' are used to define the two major actors in the development process. 'Insiders' are those who are part of the community, are privy to community information and hold the community perspective. 'Outsiders' are those who come into the community from time to time, but are not considered community members, although with consent, they can represent the interests of the community. Outsiders can often be beneficial to insiders because they have access to different information or power and can mediate conflict within a community," (1989, p. viii).

Participatory Monitoring and Evaluation (PME)

It may not be necessary, perhaps not even desirable, to include explicit "farmer participation" SPI's as part of the M&E system. However, we believe that this is not nearly as important as the role of expanded farmer participation in fundamental sustainability of PLUS. If PLUS activities are to be sustainable, a very considerable portion of the burden of carrying them out in the future will have to be borne by the farmers families, farmer groups, and the NGO's which represent them. Hence, much is to be gained by expanding and increasingly formalizing the role of farmers in discussing, evaluating and assessing the technologies they are being offered and are adopting. We believe that this can be accomplished efficiently, and, very importantly, we believe that the explicit incorporation of farmer participation in evaluating PLUS interventions and intervention strategy can and should inform not only the question of farmer involvement but, more importantly, the evaluation of all PLUS interventions. The method we propose involves, essentially, farmer self evaluation. This approach not only contributes to the fundamental goal of incorporating farmer preferences and farmer involvement into project implementation. It will also provide qualitative information which helps assess the validity of all of the other SPI's in the M&E system.

Thus we recommend the adoption (perhaps it would be more appropriate to say the development of) a **Participatory Monitoring and Evaluation (PME)** strategy as an important supplement to project implementation and evaluation (Douglas, 1994; Davis-Case, 1989, 1990).

Functions of PME.--PME is an appropriate component of any project that is claiming to be farmer driven, including any which uses the Farming Systems Research approach. It would provide PLUS project management with a methodology for enabling the project beneficiaries:

- to participate actively in assessing the progress and effectiveness of the various project activities that they themselves are involved with;
- to identify local level implementation difficulties and consider ways of resolving such problems;
- to have an input in changing objectives and adjusting activities where necessary.

Thus, the primary focus of PME is on the information needs of the local community or the farm families, while the secondary focus is on the information needs of the project. This prioritization ensures that people are not merely collecting information that outsiders need to monitor and evaluate. It insures that the information is relevant to the real issues of agricultural development. It is absolutely essential to recognize that information received directly from the farm families and the local communities is valid, legitimate, and important. (paraphrased from Davis-Case, 1989, p. 5).

The benefits of PME for PLUS.--Key benefits PME would provide to PLUS project management are that it would not only contribute to the measurement of the accomplishment of project targets and SPI's, but, even more importantly it would:

- enable them to adjust or refine particular field interventions;
- to identify new farm household and community level problems and constraints requiring investigation; and
- to recommend changes and improvements to policies and institutional support services.

Relation to PLUS M&E SPI's.--The SPIs V.1 - V.5 are intended to demonstrate project responsiveness to farmer' desires. PME would be an appropriate way to fulfil the spirit of these SPIs. PME would serve two further purposes for increasing the potential impact of the PLUS project. Firstly it would provide project management with a tool for assisting farmers to improve the efficiency and effectiveness of the adopted soil and water conservation practices. Secondly it would serve as an educational process helping the participating farmers to increase their awareness and understanding of the various factors that affect the productivity and sustainability of their farming systems. Furthermore by actively involving farmers in the M&E process it increases their control over, and feeling of involvement in, the overall development process.

Functions of farmer groups in PME.--PME would enable groups of farmers in collaboration with the local field agent to:

- assess the progress and impact of the project as it affects them directly;
- check if the objectives are realistic and appropriate to their local circumstances, or if they need to be revised; and
- identify and anticipate local problems so that they can take steps to avoid or solve them.

PME's link to PLUS decision-making.--PME is linked to decision-making in that it enables individual groups of participating farmers to have a direct say in redefining objectives and adjusting project activities, if needed, to meet their area specific needs. This requires that the monitoring and evaluation is carried out by the project beneficiaries themselves. PME within PLUS would mean that it is the individual groups of farmers who:

- decide what should be monitored and evaluated;
- select indicators for doing so (ie formulating their own criteria for judging whether the project has been successful);
- organize the collection of information - ie. determine a) how can this be done? b) who should do what? and c) when?
- analyze and interpret data;
- use the information.

Specific information outputs of PME.--The largely qualitative information which would emerge from Farmer Evaluation Sessions in PLUS would include: (1) the farmers' own assessment of technologies; (2) evidence of expressed farmer needs and desires; (3) tabulation of farmer responses to summary questions asked at the end of the sessions; (4) simple records of the number of Farmer Evaluation Sessions held, their attendance, etc., and, finally, (5) evidence (perhaps primarily anecdotal) of project response and reaction to Farmer Evaluation Sessions. These Farmer Evaluation Sessions would provide a firm basis for assessing PLUS achievement of this overall purpose of direct responsiveness to farmer needs, supplementing the other kinds of evidence of responsiveness that is already available (Baseline surveys, Swanson survey, adoption rates, etc.). At the same time, the information obtained from the Farmer Evaluation Sessions would contribute substantially to the measurement of other SPI's (e. g., environmental impacts and farmer economic benefits), contributing to a multi-measure or triangulation approach to measurement, in which different forms of data complement each other.

And, it may well be that the most important contribution to be made by Farmer Evaluation Sessions is its potential contribution to sustainability through its important human resource development function as farmers,

themselves, progressively take responsibility for evaluating and choosing among the options offered to them by PLUS.[3]

In addition to the advantage of having direct evaluation of project interventions by project beneficiaries, this participatory approach to evaluation can have significant human resource development effects. Farmers, as well as project field agents, learn in this process.

What does each party bring to the PME Farmer Evaluation Sessions?

The role of the field agent would be to participate in and facilitate this process by assisting individual groups of farmers (through discussion and training) to design and operate their own system. The field agent would also seek to follow, but not lead, the collection and analysis of the PME information. He/she would also be responsible for feeding the findings and conclusions of the individual PME exercises up the appropriate project management reporting channels. The role of the agronomes and senior level project staff would be to equip the field agents with the necessary skills to work with farmers in this way, as well as providing them with the necessary technical backstopping and supervision. They would coordinate the different PME groups and consolidate the M&E outputs. In addition they would have a duty to respond to specific requests for assistance from individual PME groups. Notably to tackle any identified problems that are beyond the capabilities and expertise of the farmers or field agent to solve on their own.

How is PME to be carried out in PLUS?

Given the respective implementation strategies of the implementing agencies, and the evolution of each of them, considerable flexibility will have to be exercised in implementing PME in PLUS. However, it should be possible to develop a relatively simple and standard protocol which can achieve PME's objectives.

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[3] Given the relative inability of Haitian governmental institutions to support Haiti's farmers and the PLUS mandate to strengthen these institutions and ultimately to transfer responsibility to them, the goal of improving the decision-making and management capability of Haitian farmers should, one would think, have the highest priority.

Farmer evaluation sessions are held on a periodic basis. Groups of farmers are assembled to examine, discuss, and evaluate their own projects.[4] This process is facilitated by the respective M&E and field agents. The specific groups that are assembled will vary between CARE and PADF, and also among NGO's for PADF and among sites for CARE, depending upon the nature of local implementation strategy. Work groups, farmers who share a common micro-watershed (ravine), farmers affiliated with a particular NGO, and farmers who share a common intervention provide alternative bases for group definition. In any case, these farmer discussion/assessment sessions should, to the extent feasible, be done on-site, they should be carried out in such a way that they both focus upon a few key issues (cost-benefit-risk and environmental impact), but also that they allow free and open discussion.

One aspect of these farmer evaluation sessions is the incorporation of results (even preliminary, tentative results) of the M&E process, especially the compilation of "typical," or "average" costs and benefits experienced by farmers, information that is currently being obtained from the case studies and their control or witness cases and, in the future, may be obtained from those, plus a variety of additional sources and special studies. Thus, one aspect of the farmer evaluation will be for the M&E agent to be prepared to present to the farmers, and discuss with them, simple enterprise budget information (the details of this information are discussed further in Appendix 11, Financial and Economic Analysis).

What are the tools of PME?

- simple farm level recording sheets;
- consolidated group records;
- participatory village level workshops; and
- participatory transects.

By using symbols rather than words, on farm and group level forms and charts, even illiterate farmers can participate in collecting and recording their own data. Participatory monitoring is a process through which the intended beneficiaries of the project's field level innovations can educate themselves, and others, while retaining control over the data collection and analysis.

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[4] The term "project" is used to distinguish from the idea of particular "technologies," particular structures, etc., since, for micro-watersheds or hillsides, for example, farmer evaluation would ideally consider more than looking at the individual interventions.

They thus become active rather than passive participants with a real interest in the outcome.

Documentation of Farmer Evaluation sessions

The extension agent and the M&E technician are jointly responsible for carrying out the farmer evaluation sessions. The M&E technician is responsible for preparing a brief report on each session. This report includes the location of the session, the topics discussed, the major conclusions reached by the farmers in discussing each topic, the attendance and the amount of time spent in the session. It should also include a brief statement of the technician and extensionists evaluation of the session itself. Near the end of the session the farmers could also be asked to complete very simple prepared forms in which they summarize their own views on the key issues discussed in the farmer evaluation session. These forms are, then, tabulated and included by the M&E technician in his or her report on the session (See below for suggested reporting forms for FES).

Suggested Guides and Resource Materials for PME and FES

In addition to a brief discussion by Norman and Douglas (1994), and the guidelines prepared by Douglas in Appendix 13, Examples of worksheets for characterizing rural household circumstances, more detailed guidelines for Participatory Monitoring and Evaluation are available in the following:

Davis-Case, D'Arcy

1989 Community Forestry: participatory assessment, monitoring, and evaluation. Rome: Food and Agriculture Organization of the United Nations. (For copies contact Marilyn Hoskins, Senior Community Forestry Officer, FAO/SIDA Forest , Trees and People Programme, Via delle Terme de Caracalla, Rome 00100, Italy).

Davis-Case, D'Arcy

1990 The Community's Toolbox: The idea, methods and tools for participatory assessment, monitoring and evaluation in community forestry. Community Forestry Field Manual 2. Rome: Food and Agriculture Organization of the United Nations. (For copies contact Marilyn Hoskins, Senior Community Forestry Officer, FAO/SIDA Forest , Trees and People Programme, Via delle Terme de Caracalla, Rome 00100, Italy).

Slade, R. H., and J. Gabriel Campbell

1986 Monitoring and evaluation of social forestry in India: An operational guide. Rome, Food and Agriculture Organization of the United Nations.

Stephens, Alexandra and Kees Putman

1990 Participatory monitoring and evaluation: Handbook for training field workers. Bangkok: FAO Regional Office for Asia and the Pacific. (For copies write to Alexandra Stephens, Regional Sociologist and Women in Development Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok, Thailand).

It is recommended that Farmer Evaluation Sessions (FES) be incorporated in PLUS, and that these sessions result in some form of formal report which serves several functions: First, of course, they document the session itself, and make its results available to regional staff, farmer groups, NGO's, etc.. Second, they provide a qualitative supplement to the respective SPI's (for example, the report of an FES on the environmental effectiveness of rockwalls could be used to supplement SPI's dealing with environmental effectiveness).

These forms could be designed for completion by farmers, in which case symbols would have to be used, or, more likely, by the M&E specialist responsible for the FES. A suggested example of a form to be used for the latter is presented below:

Farmer Evaluation Session (FES)
For technologies and/or interventions

Date
Location
Name and position of FES organizer
Intervention, crop, or whatever was evaluated
Describe origin of intervention (PLUS intervention, traditional practice, farmer creation, etc.)
Organization of FES
    Length of time
    Who organized FES?
    Attendance
    Major characteristics of participants (type of farmer, organizational membership, officers, male/female, etc.)
    Describe what was done
What were the results of Farmers' evaluations?
    Potential for increasing production
    Potential for increasing income
    Potential for conservation effectiveness
    How can it be improved?
    Will they (who have not already) accept it?
    What constraints would they encounter if they did?
M&E and Extension Agronome evaluation of the session itself

Farmer Evaluation Session (FES)
For evaluation of farm, transect or area/community environmental assessment

Date
Location
Name and position of FES organizer
Describe the farm/area evaluated
Organization of FES
    Length of time
    Who organized FES?
    Attendance
    Major characteristics of participants (type of farmer, organizational membership, officers, male/female, etc.)
    Describe what was done
What were the results of Farmers' evaluations?
    What were the major problems?
    What solutions do they have?
    What resources would the solutions need?
    Will any of them implement the solutions?
    If not, why not?
M&E and Extension Agronome evaluation of the session itself

Evidence for the Effectiveness Participatory Methods in Haiti

The PP makes the argument for a stronger focus upon farmer needs and preferences on the basis of the obvious principle that the intervention which are proposed must be both conservation effective and beneficial to farmers, probably in the short run. To determine whether they meet the latter criterion, therefore, implies the need to focus upon the farmer's needs and preferences. Hence the transformation from an "agenda driven" approach to a "farmer oriented" approach. However, in the absence of a Technical or Institutional Analysis, no specific evidence is given of which "farmer oriented" approaches are most likely to work in Haiti, under what circumstances. The consultant team has not had time to examine this literature. However, we note that the experience of ADSII in this regard is mentioned favorably in the Villaneuva report. ADSII was, of course, a rather standard Farming Systems Research project, which linked researchers with farmers through a participatory FSR methodology.

Both PADF and CARE do have extensive experience already in working closely with farmers, and have learned much from that experience. There has been some less that satisfactory experience in CARE in the use of focus groups. It is felt that farmers simply responded with what they felt the project implementers, who apparently carried out the focus groups, wanted

to hear. This is, of course, very common, perhaps more so in Haiti where various side benefits and subsidies have usually been associated with participation in projects. The consultant team feels that, rather than discouraging participatory methods (e. g., the Farmer Evaluation Sessions recommended below and in the body of the report) this experience should encourage use of them. If the dynamic of pleasing the project exists in focus groups, it probably exists even more strongly in decisions to adopt proposed technologies. It is necessary to get behind this and to literally find the authentic voice of the farmer. Highly targeted, on-site discussions of interventions which they, themselves, have implemented is one way that this can be done.

Decentralization and empowerment of regional staff

As important as farmer involvement is, it cannot be effective until the staff directly responsible working with them can to their priorities. As PLUS evolves from an agenda-driven program to a farmer driven program, the role of mid-level staff is transformed. PLUS does benefit from many structural features (use of farmer agents, NGO's, farmer groups, etc.) which facilitate this transformation. The M&E system, though, tended to emerge as a top-down activity. It mandated clearly specified tasks without, perhaps, allowing them to play active roles in. Thus, we recommend the continuation of the decentralization that is already in process, through broadening the analytic and decision-making role played by the mid-level staff.

Detailed Recommendations, Responsibility, Products, Time Requirements and Proposed Schedule for Recommendations

1. Continued evolution in the use of FSRE, and implement Participatory Rural Appraisals, or, for Haiti, they might be called Participatory Diagnostics (PD), making the currently used Diagnostics somewhat more participatory, at least in new areas and for new staff (as is being done currently by PADF, at least one should be done per area), strengthening the approach in two ways:

a. Involve farmers themselves, especially in the prioritization of constraints and potential solutions, as is done in the emerging pattern of Diagnostic, referred to as Participatory Rural Appraisal (PRA).

b. Become more explicit in the identification and description of target groups (Key target groups could, then, become the basis for detailed description of "typical" whole-farm systems (recommendation 4).

Although PD's are usually quite comprehensive, not all information is needed or useful. It is suggested that, in PLUS, the PD's focus upon the three main thrusts of the PLUS program, the state of the farm family's bio-physical environment, the farm family's entire economic situation, and the farm family's well-being and food security. As such, these topics as foci for the PD's and their up-dates provides the umbrella for performing many of the tasks in the more detailed qualitative assessment procedures recommended elsewhere (e. g., assessment of the bio-physical environment, whole farm budgets).

Responsibility.--Major responsibility for implementing this recommendation will rest with PADF and CARE PLUS project administrators and with regional teams, with support and assistance from SECID. Responsibility for implementation rests with the regional teams, regional managers and agronomist and M&E members working together.

Products.--The products of this activity of the characterizations of farming systems of the various project areas of concentration, focusing upon the resource conservation (husbandry) situation, farm family well-being, inputs and outputs to the farming system, and the major constraints confronting farmers in simultaneously engaging in resource-conserving husbandry practices and increasing the production on their farms. One element of this should be a rough picture of the total farm economy of typical, target group farms.

Time requirements.--Both CARE and PADF regional staffs have already received training in FSR, and have implemented FSR Diagnostics. Hence, this is a continuation, evolution, and expansion of this activity.

SECID.--It is estimated that supporting this activity, especially the recommendation that whole-farm descriptions be prepared for target-group farmers, will require about 15 person-days of the SECID Economist in the next year.

Central PADF/CARE Staff.--We estimate that supporting this recommendation will take about 15 person-days of central staff time during the next year.

Regional PADF/CARE Staff.--Staffing patterns differ somewhat between the two organizations, but we estimate, in generally, that each Participatory Diagnostic will take about 25 person-days of regional staff time (involving about three people) and about 20 person-days of assistants and/or area staff (involving about 2 people).

Recommended scheduling.--Since CARE is in the process of moving into the Grand d'Anse area, in which it identifies three regions, these three CARE Participatory Diagnostics should be done in 1995. PADF has done some Diagnostics already. To cover the remaining areas (8-10 areas) we suggest 4-5 Diagnostics in 1995 and 4-5 in 1996.

2. Implementation of Participatory Monitoring and Evaluation (PME) through the incorporation of Farmer Evaluation Sessions (see above).

Given the respective implementation strategies of the implementing agencies, and the evolution of each of them, considerable flexibility will have to be exercised in implementing PME in PLUS. However, it should be possible to develop a relatively simple and standard protocol which can achieve PME's objectives.

Farmer evaluation sessions are held on a periodic basis. Groups of farmers are assembled to examine, discuss, and evaluate their own projects. This process is facilitated by the respective M&E and field agents. The specific groups that are assembled will vary between CARE and PADF, and also among NGO's for PADF and among sites for CARE, depending upon the nature of local implementation strategy. Work groups, farmers who share a common micro-watershed (ravine), farmers affiliated with a particular NGO, and farmers who share a common intervention provide alternative bases for group definition. In any case, these farmer discussion/assessment sessions should, to the extent feasible, be done on-site, they should be carried out in

such a way that they both focus upon a few key issues, but also that they allow free and open discussion.

The largely qualitative information which would emerge from Farmer Evaluation Sessions in PLUS would include: (1) the farmers' own assessment of technologies; (2) evidence of expressed farmer needs and desires; (3) tabulation of farmer responses to summary questions asked at the end of the sessions; (4) simple records of the number of Farmer Evaluation Sessions held, their attendance, etc., and, finally, (5) evidence (perhaps primarily anecdotal) of project response and reaction to Farmer Evaluation Sessions. These Farmer Evaluation Sessions would provide a firm basis for assessing PLUS achievement of this overall purpose of direct responsiveness to farmer needs, supplementing the other kinds of evidence of responsiveness that is already available (Baseline surveys, Swanson survey, adoption rates, etc.). At the same time, the information obtained from the Farmer Evaluation Sessions would contribute substantially to the measurement of other SPI's (e. g., environmental impacts and farmer economic benefits), contributing to a multi-measure or triangulation approach to measurement, in which different forms of data complement each other.

Responsibility.--Since this is the only really new procedure being introduced in these recommendations, it will require firm commitment and leadership at the PADF/CARE project level. At the same time, it comes in relatively small units, and should result in quite concrete information, which can be used to document both real farmer response and the process of farmer involvement, it can be implemented at relatively low cost in terms of time and risk.

Thus, responsibility for leadership will rest with central staff, with support from SECID. They will work with regional staff in developing the actual protocols for the Farmer Evaluation Sessions, depending upon how local implementation is organized. Particular responsibility will rest with M&E staff at all levels.

Products.--The major products of these Farmer Evaluation Sessions (FES) will be direct farmer assessment and evaluation of the interventions in which they have invested. This can be used as feedback to improve the interventions, to better understand reluctance to adopt or variation in application. Another product will be PLUS project-wide documentation both of farmers assessment of interventions and also documentation of the fact farmer assessments have, in fact, been made.

Time requirements.--We estimate that each Farmer Evaluation Session will take, in total, from 8 to 10 person-days, most of it from the regional

extension and M&E staff (2 days and 3 days respectively). Thus, if, during the two years, one FES is done per area (9 FES), the time requirement for PADF would be approximately 90 person-days distributed among the 4 PADF regions. If, in CARE, 2 FES are done per region in the Northwest (8 FES), the time requirements for CARE in the next two years would be about 80 person-days.

Scheduling.--We suggest that, during 1995, both PADF and CARE do 4-5 FES in selected regions on selected interventions. It is assumed that CARE would probably do these in the Northwest, since programming is just beginning in the Grand d'Anse, and participatory activity there should focus upon the Participatory Diagnostics.

3. Conduct a pilot exercise of methods of farmer record keeping and analysis within specific domains or contexts. This could contribute to a number of objectives. The most important, of course, is the effect it would have on the farmers themselves. For PLUS, however, it could contribute to expanding the base of enterprise budgets, to developing pictures of whole-farm situations, especially whole-farm budgets, as well as to easier measurement of yields, to easier recording of inputs, etc.

Responsibility.--SECID, in close collaboration with CARE and PADF M&E staff, could carry out a special study to experiment with farmer record keeping. Of course, in the selected sites, the regional M&E Agronome would be responsible for implementing the experiment with farmers, with the collaboration of the farm agents and farm groups.

Product.--The major product could be a significant improvement in farm management from systematic record keeping, hence an improvement in farmer capability and well-being. For project actors, if it works, it would provide information, hopefully at least as accurate, and perhaps much more accurate, at a much lower cost.

Time Requirement.--The time required to achieve this is extremely difficult to estimate. Our recommendation is an experiment in at least one location, engaging, of course, regional PLUS staff (Ext. and M&E Agronome) with the M&E Agronome taking leadership. Farm agents (especially those who are literate) could play key roles. Thus, we estimate some 2-3 person-days for the SECID Economist, some 2-3 person-days each for PADF and CARE central staff, some 10 person-days for the regional Agronomes, plus additional time (perhaps 10 person-days) for the farm agents (or formateurs).

Scheduling.--Given the heavy load involved in implementing these recommendations in 1995, we suggest that CARE and PADF each institute one experiment in a selected area in 1996.

4. As an output of the PRA process, and using other information sources available (e. g., annual sample surveys, standard prices, standard labor requirements, etc.) develop typical whole-farm descriptions of key target group farms. This recommendation is the same as recommendation 5 in Appendix 11, "Financial and economic analysis." For details see that section.

5. Capture the participatory processes currently being done and those introduced in these recommendations (Farmer involvement in PRA, in Farmer Evaluation Sessions, Farmer training sessions, on-farm record keeping) for reporting purposes. Simple quantitative parameters (numbers of sessions held, attendance, etc.) are indicative of human resource development inputs. Much of this is already being done, but it will expand somewhat with the performance of additional Participatory Diagnostics and the Farmer Evaluation Sessions. However, this material needs to be captured systematically under the rubric of farmer involvement and human resource development for reporting purposes.

To accomplish this we recommend that CARE and PADF jointly prepare a brief outline of indicators of farmer involvement and participation, including both current practice and implementation of these recommendations, to be used and reported in their annual reports.

Responsibility.--Responsibility for this lies with project managers, at the regional and central levels. Assistance should come, however, from PADF and CARE central offices, to make sure that this information is incorporated into project reports.

Product.--Systematic records of the extent of explicit farmer involvement in project implementation.

Time requirement.--This will add little in terms of time, perhaps a few days per year at the central agency level.

Scheduling.--CARE and PADF staff should meet and prepare the outline above in 1995. This should be transmitted to regional directors in time for their preparation of the 1995 annual report.

6. Involve regional staff somewhat more extensively and somewhat differently in the M&E system so as to make it more meaningful and useful to them, through:

a. Opening a dialogue with them about what the M&E system can and should do for them,
b. Involving them in the analysis of data at the regional level,
c. Involving them extensively in the development of the whole-farm descriptions recommended in number 5 above.
d. Supporting them in carrying out strategic regional-level problem-solving activities (e. g., screening varieties, special surveys dealing with region specific issues, etc.)

Responsibility.--Responsibility for leadership in this will lie with the CARE and PADF central staff, with support from the SECID Economist. However, regional team leaders, and, of course, the regional staffs who are to become more involved themselves, will have to make the appropriate commitments.

Product.--More involved and committed regional staffs, especially M&E staffs and, especially, the results of regional level problem analysis and problem solving.

Time Requirement.--This will probably take, during the next year, something like 5 person-days of the SECID Economist, 5 person-days each of the respective M&E specialists in CARE and PADF, one person-day each of the regional team leaders, and, finally, 3-5 person-days each of the regional M&E specialists (currently 8 persons = 32 person-days total).

Scheduling.--We recommend that, by the end of 1995, both CARE and PADF have developed, in close consultation with their regional staff, a plan for increased involvement of regional staff in M&E activities. This plan can, then, be implemented in 1996.

7. Continue, as in the study of hedgerows by Pierre, the study of trees by Street, to identify key problems confronted by PLUS and do special studies to resolve them. However, to the extent feasible, PLUS should de-emphasize the use of outside consultants and move towards the use of team efforts involving the regional staff as well as target farmers and their farm groups and organizations. Initial studies chosen could include [those identified by Lea, and/or (a) farmer record keeping, or (b) the feasibility of preparing whole-farm budgets for target farms.

Responsibility.--Since responsibility for special studies rests primarily with SECID, leadership for this rather minor change will need to come from SECID.

Product.--Reports on selected problem issues, similar to that prepared by Street on trees and by Pierre on Hedgerows. However, these reports would, increasingly, be the product of regional teams' efforts.

Time Requirement.--About 10 person-days per report for the SECID Economist, perhaps as much as 20-30 person-days for the respective regional teams.

Scheduling.--We recommend that three special studies be carried out in 1995-1996 period, one focusing upon the measurement of the soil conservation effect of project interventions (See recommendations for assessing the bio-physical environment), one focusing upon the development of the whole-farm descriptions discussed in recommendations 1 and 4 above), and, finally, one focusing upon farmer record keeping.

8. Enter into dialogue with the local NGO's and farmer organizations concerning specific plans for long-term sustainability of the activities now going on under PLUS, and assist them in preparing such plans and proposals.

This will involve at least four key questions: (a) what level and type of activity will be needed in the post-PLUS period?, (b) what elements of these can be supported by whom in the post-PLUS situation?, (c) what will need to be subsidized, and at what level, and, finally (d) who should do what to prepare for the post-PLUS situation? This would require, among other things, analysis (including financial) of the capabilities of the respective actors who will remain. It could, itself, result in strong momentum to see that the effects of PLUS are, in fact, sustainable.

Responsibility.--Leadership for this effort must come from the PADF and CARE agencies, with technical support from SECID, and with the very active involvement, especially, of the regional team leaders, and, to the extent feasible, the involvement of the Ministry of Agriculture, Rural Development, and Natural Resources (MARDNR). Ultimately, of course, the goal is to shift a considerable amount of responsibility to local NGO's and/or farmer groups.

Product.--The final product should be, on a region-by-region basis, a plan for the sustainability of the support necessary to continue to further the objectives of PLUS after PLUS terminates. These region-by-region plans should also merge into an overall post-PLUS plan for the kind and quantities of support that are necessary to sustain Haiti's hillside agriculture.

Time Requirement.--The time required for this is, obviously, almost impossible to estimate. Since it is a long-term recommendation, and since

the next year will be burdened, among other things, by implementing other of these recommendations, realistically, it probably will not begin immediately.

Scheduling.--We cannot set the time for this activity, except to suggest that it should be an integral part of PLUS' efforts to integrate into MARDNR to achieve sustainability, and that it need not be initiated immediately. That means that it probably does not need to be initiated until 1996-1997.

Calculations for Estimated levels of effort required

Participatory Monitoring and Evaluation: Farmer Evaluation Sessions

Calculations for Estimated Levels of effort required

Participatory Monitoring and Evaluation: Farmer Evaluation Sessions

	Number of persons	Days per	Sub-total	CARE total	PADF total
SECID Staff					
Central PADF/CARE Staff		0.1	0.1	2.8	1.6
Retional Staff					
Team Leader	1	0.5	0.5	14	8
Agronomes					
Extension	1	2.0	2.0	56	32
M&E	1	3.0	3.0	84	48
Technicians	2	2.0	4.0	112	64
Total per FES	9.6				
Number of sessions per year per region	4				
Number of PADF regions	4				
Number of CARE regions	7				
Total person-days by agency				268.8	153.6
Total number of persons				28.0	16.0

Estimate of time requirements for initial Participatory Diagnostics: PADF

	Number of persons for Diagnostic	Person-days for Diagnostic/	Person-days to complete diagnostic
SECID Staff (estimate for all PD's)			15
Central PADV Staff			
M&E Specialist			10
Agroforestry specialist			10
Training coordinator			10
Regional PADF Staff			
Team Leader	1	5	50
Extension Agronome	1	10	100
M&E Agronome	1	10	100
Area Level			
Assistants	2	10	100
Extensionist	2	10	100
Total person-days to complete Diagnostics			480
Number of Diagnostics/Region	2.5		
Number of regions	4		
Number of years to complet all Diagnostics	2		

Estimate of time requirements for initial Participatory Diagnostics: CARE Northwest

	Number of persons for Diagnostic	Person-days for Diagnostic/	Person-days to complete diagnostic
SECID Staff (estimate for all PD's)			15
Central CARE Staff ED/Comm. Specialist Training coordinator			 10 10
Regional CARE Staff Team Leader Extension Agronome M&E Agronome	 1 1 1	 5 10 10	 20 40 40
Area Level Assistants Extensionist	 2 2	 10 10	 40 40
Total person-days to complete Diagnostics			200
Number of Diagnostics/Region	1		
Number of regions	4		
Number of years to complet all Diagnostics	2		

Estimate of time requirements for initial Participatory Diagnostics: CARE Grand d'Anse

	Number of persons for Diagnostic	Person-days for Diagnostic/	Person-days to complete diagnostic
SECID Staff (estimate for all PD's)			15
Central CARE Staff ED/Comm. Specialist Training coordinator			 10 10
Regional CARE Staff Team Leader Extension Agronome M&E Agronome	 1 1 1	 5 10 10	 15 30 30
Area Level Assistants Extensionist	 2 2	 10 10	 30 30
Total person-days to complete Diagnostics			155
Number of Diagnostics/Region	1		
Number of regions	3		
Number of years to complet all Diagnostics	2		

Appendix 5

Review of the PLUS Soil and Water Conservation Interventions in the Context of Better Land Husbandry

Background

The goal (development objective) of the Productive Land Use Systems (PLUS) project is:

> to maximise the productive potential of Haitian hillside agriculture by reducing the on-going degradation of the country's natural resource base through sustainable land-use interventions.

The purpose (immediate objective) of the project is:

> to achieve sustainable increases in on-farm productivity and income generation by integrating into existing farming systems appropriate land use and soil and water conservation measures, involving trees, shrubs, grasses, and other plant material which will enhance soil fertility.

The PLUS project arose out of a redesign of the USAID/Haiti Agroforestry II project (AFII). The objective of the redesign was to shift the emphasis away from subsidized tree planting and conventional land conservation to land use interventions which would provide sustainable income for Haitian hillside farmers. The underlying development strategy of PLUS can therefore be summarised as the identification, development and dissemination of sustainable livelihoods for small-scale hill farming households. To achieve this requires a shift in development focus away from soil conservation per se to what has been termed land husbandry.

The Better Land Husbandry Concept

The concept of husbandry is widely understood when applied to crops and animals. As a concept signifying understanding, management and improvement, it is equally applicable to land. At its most basic land husbandry can thus be defined as the care and management of the land for productive purposes. Reversal of the present hillside degradation in Haiti and sustaining and enhancing the productive potential of the country's land resources requires the adoption of better land husbandry practices.

What has been termed the better land husbandry approach is based on two key principles:

- that it is possible to combat land degradation through the adoption of management practices which yield production benefits while being conservation-effective;
- that rural people, educated or not, have a greater ability than previously assumed by outside experts to analyze, plan, implement and evaluate their own research and development activities.

The PLUS project interventions have been formulated in line with the first of these two principles. Although the project amendment document states that "for this initiative to be successful, interventions must be responsive to the motivations which drive farmers' decisions" the implementation strategy being followed has not yet completely taken on board the importance of the second of these key principles.

There are a number of key concepts that underlie the better land husbandry approach. The following are considered important to any review of the soil and water conservation practices implemented by the PLUS project:

- loss of soil productivity is much more important than the loss of soil itself;
- land degradation should be prevented before it arises, instead of attempting to cure it afterwards - ie. the focus should be on sustaining the productive potential of the soil resource;
- erosion is a consequence of how the land is used and is itself not the cause of soil degradation;
- plant yields are reduced more by a shortage or excess of soil moisture than they are by loss of soil, hence there should be more emphasis on rain water management, particularly water conservation, and less on soil conservation per se;
- run-off should be reduced (by encouraging infiltration) before trying to control its overland flow, consequently, agronomic measures (tillage, crop management practices) are potentially more significant than mechanical measures in preventing erosion and run-off;
- improved organic matter management is the key to maintaining soil productivity (improved soil nutrient levels, moisture retention, structure and resistance to erosion);
- soil and water conservation should be promoted as an integral part of a productive farming system rather than as a separate land management exercise.
- it is necessary to understand the socio-economic constraints that influence how and why land is used the way it is (eg. land tenure, market access, holding size, gender and age differences).
- soil conservation activities must be 'bottom-up' rather than 'top-down' in orientation and planned and implemented from the outset, with the full knowledge, cooperation and involvement of the farmers and local communities;
- to be attractive to farmers any proposed soil conservation activity must provide them with short-term benefits (eg. higher yields, greater availability of fodder and fuelwood, reduction in labour and input costs);
- indigenous land management practices and community based social organisations are the starting points for sustainable natural resource management programmes.
- participatory development calls for small inter-disciplinary teams of technical advisers to facilitate land users own appraisal and planning activities.
- a participatory approach recognises the key role of land users in the development process and enhances the effectiveness of inter-disciplinary advisors;
- combatting land degradation requires an integrated and multi-sectoral development approach that includes public and private sector collaboration.

Better Land Husbandry Requirements

The promotion of better land husbandry within the PLUS project areas would require:

- the recognition of the active and central role of the land user as the steward and manager of the land resource;
- an understanding of rural household social, cultural and economic circumstances, and the local constraints and opportunities of different land users;
- an understanding of the characteristics, potentials and limitations of different types of plants (crop, tree and pasture species), animals and lands;
- the prediction of the likely positive or negative effects on the productive potential of different farming systems resulting from a given change in management, or when exposed to stress ie. regular and predictable constraints (eg. low rainfall) or severe irregular adverse events (floods, prolonged drought);
- the design of resilient and flexible land use systems that can overcome the negative effects of changing circumstances and critical events;
- the adoption of financially viable (cost effective) systems of management that maintain and enhance their productivity and usefulness over time (conservation effective); and
- the promotion of socially and culturally appropriate and gender sensitive conservation effective systems of management.

Working with farmers for better land husbandry in line with the above concepts has a number of implications for PLUS project management, notably:

- It is to accept that the participating farmer (project beneficiary) is in the 'driver's seat' as far as any changes are concerned. Thus, he/she has to be treated as a person who can interact constructively and cooperatively with outside experts. He/she can no longer be treated as an object or as part of the problem, but as a person who can suggest and implement strategies that can help solve the problem. For this to occur, the PLUS extension staff have to become experts in communication, and must have credibility in the eyes of farmers.
- PLUS requires a more 'holistic' approach than was the case for the AOP and AFII projects. This requires thinking in a systems and interdisciplinary context and necessitates the collection and analysis of many different types of data (ie. both bio-physical and socio-economic in nature).
- Because of the need for greater amounts and types of data, much of which should be obtained directly from farmers, alternative informal methods are required for collecting and analysing the data. In particular, in the interests of using project manpower resources in a time-efficient manner, much greater reliance needs to be placed on RRA/PRA survey methods. There is less emphasis on, and need for, formal natural resource or socio-economic (questionnaire based) surveys.

Purpose of the Review

The terms of reference for the consultancy included the following as one of the specific aspects to consider:

- Examine the soil conservation practices implemented by the project and make recommendations regarding their implementation.

This appendix will restrict itself to reviewing those PLUS project interventions and farmer practices that relate to the principles and practice of better land husbandry. It does not claim to be a comprehensive review due to time limitations of the consultancy, both for field work and reviewing documents.

Farmers Indigenous Soil and Water Conservation Practices

A recent paper[1] notes that the widespread annual cropping of hillslopes is a fairly recent phenomenon, having only occurred in the last few generations. There is thus no long term indigenous tradition of sustainable hillside farming and as a result most of the present generation of Haitian hill farmers are using farming techniques that were originally evolved in a lowland environment. That said the same paper notes that some peasants have developed and adopted techniques more appropriate to the mountain conditions in which they now farm and which help reduce soil erosion. These indigenous techniques are often associated with higher value crops and are constructed primarily to retain moisture and increase agricultural production, not to retain soil per se.

The term indigenous is used here to refer to the farmer's 'own' practices. That is both traditional practices and ones developed recently by innovative farmers in response to changing circumstances. They are distinct from research derived technologies adopted as the result of participation in a soil and water conservation project. This distinction is important as farmers are far from being conservative land users sticking obstinately to traditional practices. In reality they constantly experiment, adapt and innovate, within the resources available to them, with the aim of making adaptive improvements to their farming systems.

Examples of the following indigenous techniques associated with annual cropping were seen during the field visits to CARE project areas in the northwest and PADF project areas near Mirebalais and Les Cayes:

- *zare* - soil and stubble formed into mini-catchments in local lowland/valley floor sites to retain water for rice cultivation;
- *sakle en woulo* - weeds and trash hoed into closely spaced, cross slope ridges prior to planting;
- *ramp pay* - cross slope trash barriers;
- *kleonaj* - wattling constructed in ravines to retain sediment for banana, taro, or yam cultivation; and
- *bit* - contour crop ridges for sweet potato and cassava cultivation.

Key features of the above techniques is that they require limited amounts of labour and little if any external inputs, and can be implemented with the traditional farm tools (hoes and

[1]White T.A. & Jickling J.L. 1995. *Peasants, experts, and land use in Haiti: Lessons from indigenous and project technology*. Journal of Soil and Water Conservation January-February pp7-14. SWCS Ankenny Iowa USA.

machetes).

Farmers indigenous techniques can provide the starting point from which to make adaptive improvements. As one author[2] puts it "The easiest way to encourage farmer participation (and to insure that a method is sound!) is to modify practices which are already well known to the farmer". Several others[3] recommend that soil and water conservation techniques should where possible build on indigenous practices with which land users are already familiar, rather than introduce new technologies. Both PADF and CARE recognise these points and have at times sought to build on, or improve some of these practices.

Farmers have been taught to use an A'frame to peg contour lines and this has enabled them to improve the alignment and effectiveness of their *sakle en woulo* and *ramp pay*. Both of these techniques would appear to be the starting point for the development of the crop contour bands or *bann manje* soil and water conservation technology. This is a recent intervention being promoted in several PLUS areas and has been described as a farmer driven modification of the project's alley cropping/hedgerow intervention (see later for a more detailed description). The project's gully plugging techniques complement and seek to improve the indigenous *kleonaj* technology by using live stakes of tree and shrub species which root easily from cuttings.

Although some Haitian farmers have developed improved land use techniques, the severe environmental degradation and poverty found in the mountain areas are clear evidence that the processes of innovation and adoption have not kept pace with the changing conditions of production. These indigenous techniques are either not practised widely enough to have significantly contributed to the prevention of land degradation, or they may no longer be adequate to control erosion and maintain soil productivity in the light of changing farm household circumstances (eg. land pressure, insecure tenure, lack of access to markets and external farm inputs). The existing range of indigenous practices have their technical and financial limitations when it comes to the development of productive and sustainable livelihood systems for those rural households dependent on hillside farming. This is ultimately the justification for the PLUS project, which is seen as a means to offer farmers a range of alternative production and conservation oriented field level interventions.

PLUS Project Interventions

The following field level interventions have been, or are currently being, promoted by the PLUS project:

- Hedgerows
- Bann manje
- Trash lines[4]

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[2]Fones-Sundell M. 1989. *Perspectives on Soil Erosion in Africa: Whose Problem?* Gatekeeper Series No SA14. IIED London.

[3]See : Critchley W. 1991. *Looking After Our Land New Approaches to Soil & Water Conservation in Dryland Africa.* IIED/OXFAM Oxford. IFAD 1992. *Soil and Water Conservation in Sub-Saharan Africa. Towards sustainable production by the rural poor.* IFAD Rome Italy

[4]It is assumed that trash lines are the same as the dead barriers referred to in the list of output targets given in the project logical framework.

- Rock walls
- Gully plugs/check dams
- Bio-intensive vegetable gardens
- Deep tillage
- Cover cropping
- Tree planting
- Fruit tree grafting
- Distribution of improved seeds and planting material
- Improved crop husbandry

All of these have the technical potential on their own, or in association with other interventions, to make a positive contribution to the promotion of better land husbandry within the PLUS project area.

Hedgerows

Within PLUS the hedgerow intervention is promoted specifically as a production oriented soil conservation measure. It typically consists of a single row, planted on the contour, of a woody perennial or a grass. Its primary soil and water conservation functions are to reduce runoff velocity, encourage infiltration and trap soil on the uphill side. As such hedgerows, like all physical conservation structures, do not stop erosion. Splash and sheet erosion and to some extent rill erosion will continue to take place in the alley between the hedgerows unless they are backed up with a mix of conservation effective crop, soil and rainwater management practices. All the hedgerow does is stop the soil from moving further downslope. Hedgerows are also expected to contribute to the productivity of the farm household system by providing such benefits as green manure, fodder, food, fuelwood and/or poles.

The most common species in these hedgerows is leucaena (*Leucaena leucocephala*) which is established by direct seeding. This species has been recommended by the project for use in hedgerows because of it's nitrogen fixing capability and its potential to use its leaves and fine stems as a green manure for increasing yields of annual crops in the inter-row area. The expectation was that farmers would regularly prune their hedgerows and apply the prunings as a mulch to provide surface protection against splash erosion, to raise the organic matter content of the topsoil and improve soil nutrient levels. The 1993 farmer needs assessment exploratory surveys and the 1994 design assessment of PLUS report that there is very little evidence of farmers managing their hedgerows in this way.

During the team's field visits it was only in the PADF Les Cayes region 1 that a few farmers in Banatte were found to have adopted the full hedgerow/crop production package. A very recent special study of hedgerow management in 3 PADF/PLUS watersheds near Camp Perrin (Les Cayes Region 1) reports that farmers estimate the increase in production due to the presence of hedgerows on their fields to be in the order of 25-50%. It would appear that this yield increase is largely due to the beneficial impact of the hedgerow on soil moisture conservation (increased infiltration of rainwater) rather than its regular use as a source of green manure.

In areas where there is a shortage of dry season forage it would appear that farmers value the hedgerows as a source of livestock feed at a critical time for the survival of their animals. It was observed that farmers would tether their animals to the hedgerow and allow them to browse directly rather than harvesting the forage on a cut and carry basis. In some places this has led to the hedgerows being grazed out and in others certainly reducing their effectiveness

as a soil conservation measure. This is typically taken as a sign of poor management and evidence of farmer indifference to the intervention. An alternative view point (one shared by the team) is that this so called misuse of the hedgerows demonstrates that the project has not adequately addressed the farmers need for a reliable supply of forage.

Instead this use of the hedgerows should be seen as an opportunity for developing a mixed forage production intervention strategy combining forage hedgerows (shrubs and/or grasses) with pasture grasses and herbaceous legumes in between. For many of the most steeply sloping hillsides within the PLUS project area this would appear to be the most conservation effective use of the land, while offering a productive return to the farmer. Soil and water conservation would derive from the barrier effect of the hedgerow and the groundcover from the pasture in between.

It was reported to the team that trials of such a system were conducted under the auspices of the *Pwoje Sove Te* - the USAID funded Targeted Watershed Management Project in S.W. Haiti. It would therefore appear that information already exists as to the most suitable species to use, and on their establishment and management requirements. This should be sufficient to be able to initiate a participatory forage technology development programme in which PLUS assists farmers to conduct their own trials. The PLUS role would be to assist with the supply of planting material (seed, cuttings and/or slips) and to provide initial guidance on alternative field layout and management practices that farmers could test. PLUS would also facilitate the dissemination of the results to farmers in other areas through its existing strategy of farmer to farmer visits.

The 1993 farmer needs assessment exploratory survey report mentions that some of the leucaena hedgerows planted under the USAID funded ADS-II project on 70-90% slopes had become small forests with the woody stems being harvested for poles and charcoal production, and the leaves and fine stems for fodder. Typically this was on land that had become degraded and was no longer any good for crop production so had been 'abandoned' to the leucaena. Again what at first sight would appear to be evidence of farmers' lack of interest in hedgerows should be seen as an opportunity for the development of an alternative productive and sustainable land use system for steep hillsides. The aim would be to produce charcoal, poles and fodder from closely spaced hedgerows in hillside woodlots. The hedgerows would act as a runoff control barrier while the surface litter, herbaceous undergrowth and tree canopy would provide protective ground cover.

Soil conservation projects such as PLUS typically judge the success of a hedgerow intervention on the basis of the total length initially planted by farmers. The underlying assumption appears to be that once the hedgerow has been "put in, the job is done, the land saved, and it is up to the farmers to maintain and manage them as they have been shown to do"[5]. Estimates of the quantity of soil saved project wide have been made on the assumption that all of the hedgerows are functioning as designed. Visual evidence of degraded hedgerows suggests that this is far from true hence monitoring needs to be able to rate the conservation effectiveness of individual hedgerows in order to arrive at a more accurate overall assessment. The following are some of the criteria that should be used in the context of the better land husbandry approach to determine their conservation effectiveness:

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[5]Swanson R.A., Gustave W. & Jean Y. 1993. *Farmer needs assessment exploratory surveys. Executive summary and recommendations.* SECID Auburn PLUS Report No. 7

- Does the hedgerow alignment closely follow the contour?
- Are the stems spaced close enough together (at most 10-15 cms apart) to function as an effective cross slope runoff control barrier?
- Are there gaps within the rows which lead to the concentration of runoff?
- Is there evidence of sheet and rill erosion immediately below individual rows?
- Is there evidence of terrace formation with the accumulation of soil above the hedgerows?
- Have the hedgerows led to a reduction in the effective slope length and angle within the field as a whole?
- How conservation effective are the crop husbandry practices in the alleys between the hedgerows (ie. is there contour cultivation, minimum tillage/disturbance of soil surface, minimum 40% ground cover provided by the crops)?
- Is the hedgerow's runoff control barrier function adversely affected by browsing?
- Is the coppice regrowth adversely affected by the pruning regime followed?

On moderate slopes (up to 30%) with relatively good soils it would appear that well maintained hedgerows are effective as a soil conservation measure for the sustainable production of annual crops. In several places gentler sloping terraces of up to 45 cms in height had formed since the hedgerows were put in. On steeper slopes, whereas they would trap some soil, they were less effective in stopping the erosion process. They can thus limit the rate at which soil degradation takes place but not stop it completely. Certainly once the slope angle exceeds 45% severe loss of soil can be expected under annual crop production in an alley cropping/hedgerow land use system. Above 30% slope there has to be an increasing proportion of the alleys between the hedgerows planted to good ground cover perennial crops. Above 60% slope the alleys between the hedgerows should be under permanent pasture preferably used on a cut and carry basis rather than direct grazing. PLUS is kidding itself, and farmers, if it expects the alley cropping of crops such as maize, sorghum and cassava between contour hedgerows on very steep slopes, to achieve the projects goal and purpose of producing short term productive benefits while ensuring long term sustainability.

In Banatte one farmer was observed to be assiduous in plugging any gaps in his leucaena hedgerows. Some of these he plugged by driving live gliricidia stakes (*Gliricidia sepium*) into the gap, once they had taken root he managed them in the same way as the leucaena. Other gaps, particularly the wider ones, he closed by building small rock walls just behind the remaining woody stems. Both of these practices appeared to be effective as distinct terraces had formed behind each hedgerow/rock wall barrier. In common with a few other farmers he also planted a range of timber and pole wood species at 2-5 metre intervals within, or just behind, the hedgerow.

In a few places gliricidia was used as the preferred hedgerow species however a shortage of planting material (seeds and live stakes) limited its widespread adoption. It was reported that elephant grass (*Pennisetum purperum*), sugar cane and pineapples were used as hedgerow species however no examples of these were seen except as part of a *bann manje* intervention. In other countries in the Caribbean and Central America lemon grass (*Cymbopogon citratus)* and vetiver (*Vetiveria zizanioides*) have been reported used as hedgerow species however these have not proved successful in Haiti. In Haiti vetiver is regarded as distinctly conservation negative. The widespread cultivation of vetiver as a cash crop (an essential perfume oil is distilled from the roots) in the south west has been a major cause of soil degradation. Examples were seen in Les Cayes of hillsides where whole scale uprooting of the vetiver had

loosened the soil over a wide area resulting in severe sheet, rill and gully erosion. In Haiti vetiver does not conform to the World Banks perception that it is the wonder solution to soil and water conservation problems.

Bann Manje

Bann manje or crop contour bands are defined as combinations of perennial and annual food crops planted as permanent soil conservation and food-producing structures on the contour[6]. The technique is perceived as responding to farmer's need for year round food production on sites having better soils, but which require soil conservation measures because of the steep slope. The promotion of this technique as a project intervention began following a farmer innovation in PADF Region 3 with the planting of pineapple hedgerows. The technique was endorsed, and recommendations made for its further development, in the 1993 farmer needs assessment exploratory survey report. PADF reported that by the end of 1994 *bann manje* represented some 4.5% of the hedgerows planted to date but that interest was growing with many secondary adopters near the on-farm trial sites in Plaisance.

Several examples of *bann manjes* were seen in the Mirebalais and Les Cayes areas. Whereas the individual vegetative components differed the basic structure was the same. Typically it would start with a traditional *ramp pay* trash line of crop residues and weeds laid out on a contour alignment. A shallow ditch (30-40 cms deep) would then be dug on the uphill side and the excavated earth used to bury the trash line and form a raised earth ridge. On steeper slopes the trash lines might be held in place by wattling (formed from vertical wooden stakes interwoven with maize/sorghum stalks) before being buried with earth.

Commonly cassava and sweet potatoes would be planted on the ridge to take advantage of nutrients from the decomposing residues. In discussions with some PADF staff it would appear that both sweet potatoes and cassava are considered as perennial crops. Whereas cassava may remain in the ground for 2 years and sweet potatoes bridge the period between two cropping seasons neither can be considered from a better land husbandry perspective as perennial. Particularly as at the time of harvest digging up the roots will destroy the earth ridge.

Truly perennial crops such as pineapple, plantain/bananas, sugar cane and elephant grass were planted in parallel contour rows as a key component of the intervention. Typically one row would be found below, or on the outward facing side of, the earth ridge (pineapple, sugar cane and elephant grass were seen in such a position) with usually 2 more rows uphill with either both in the ditch, or one on the inward facing side of the ridge (mostly pineapple and plantain/banana). Sugar cane and elephant grass when properly established can form a continuous vegetative strip with individual stems being close enough together to form an effective cross slope barrier. However the planting distance between individual pineapple and plantain/banana plants is too wide for single rows to serve as a vegetative runoff control measure. Whereas over time shoots from the original plants may help to fill the gaps managing them from a production, rather than soil conservation perspective, would require that they be regularly thinned. For pineapples to be conservative effective a minimum of 3 adjacent rows would be required with staggered planting positions in alternate rows and preferably a surface mulch between them.

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[6]PADF PLUS 1994 Annual Report.

On the basis of the *bann manje* seen during the field visits it would appear that it is the contour ditch and raised ridge which are acting as the effective runoff and erosion control measures not the contour bands of perennial crops. A major disadvantage of this ditch and ridge form of soil conservation measure is that as a result of continuing sheet and rill erosion, in the area used upslope for annual crops, the ditch can be expected to fill up with soil quickly during the rains. Unless the ditch is regularly cleaned out, its capacity to trap runoff will decrease, thereby increasing the risk of the earth ridge being breached during a heavy storm.

An alternative would be to construct the ditch on the down hill side of the trash line with the soil thrown up hill to form the earth ridge. This would correspond to the Kenyan style of terrace known in Swahili as a *fanya juu*. With the fanya juu the contour earth ridge is designed to trap sediment on its uphill side so as to lead to the gradual formation of a terrace and reduction in slope angle of the cropland. Should the ridge breach then runoff is first trapped in the ditch below thus reducing the risk of gullying. Typically in Kenya farmers would plant fodder grasses on the ridge and bananas or trees in the ditch. Periodically cleaning soil from the ditch and throwing it up onto the ridge helps to maintain ridge height and effectiveness at trapping soil. It is suggested that some of the existing *bann manje* trials be modified to see what difference it would make, in both production and soil conservation terms, if the ditch was to be placed on the down hill side of the earth ridge.

In some sites visited the earth ridge of the *bann manje* was seen as a temporary soil conservation measure which would be replaced in 2-3 years time by a leucaena or gliricidia hedgerow. In such a situation the concerns expressed above over the runoff control effectiveness of the perennial crop rows would diminish. Where there is no intention of establishing a permanent hedgerow then more attention needs to be given to the specific combination and layout of the different perennial crop rows in order to maximise the runoff control potential and therefore the conservation effectiveness of the intervention. Weaving the crop residues in trash lines between, and above, the perennial crop rows would make them more effective as cross slope vegetative barriers.

The following are some of the criteria that should be used in the context of the better land husbandry approach to determine the conservation effectiveness of different *bann manje*:

- Does the alignment of the earth ridge, ditch and perennial crop rows closely follow the contour?
- Are the stems of the perennial crops spaced close enough together (at most 10-15 cms apart) to function as an effective cross slope runoff control barrier?
- Is the earth ridge and ditch a permanent or temporary feature?
- How does the relative proportion and planting layout of the different perennial (eg. pineapple and banana) and seasonal (eg. cassava and sweet potato) crop components affect the conservation effectiveness of the measure?
- Does the vegetative/perennial crop component add to or subtract from the conservation effectiveness of the measure?
- Are there any gaps within the perennial crop rows or obvious low points/signs of breaching of the earth ridge which have led to the concentration of runoff?
- Is there evidence of sheet and rill erosion immediately below individual bann manje?
- Is there evidence of terrace formation with the accumulation of soil above the bann manje?
- Have the bann manje led to a reduction in the effective slope length and angle within the field as a whole?

- How conservation effective are the crop husbandry practices in the alleys between the bann manje (ie. is there contour cultivation, minimum tillage/disturbance of soil surface, minimum 40% ground cover provided by the crops)?

Trash Lines

CARE has promoted the use of trash lines as a PLUS project intervention which it regards as the simplest of its soil conservation techniques. Farmers make the trash lines during land preparation immediately before the start of each cropping season. What is being promoted is basically an adaptive improvement of the traditional *ramp pay* and *sakle en woulo*. The first way the indigenous technology has been improved is to have them laid out on the contour with the help of a simple A' frame level. Secondly farmers are advised to cover the trash lines with soil to avoid rodents and insect pest build up, the resulting contour earth ridge is expected to improve the effectiveness of the barrier as a soil conservation measure.

Unburied contour trash lines of maize and sorghum stalks have been used successfully in Kenya, on up to 10% slopes, as permeable barriers for reducing runoff velocity, increasing infiltration and trapping soil. They are therefore an appropriate technology for gently sloping areas, but as part of a better land husbandry package rather than the farmer's only soil and water conservation measure.

Trash lines are considered to be ephemeral structures because they rarely last as a feature in the field for more than one growing season. Whereas this may at first sight appear to be a disadvantage of the technology, in practice it offers potential conservation effective benefits within a better land husbandry context. Specifically related to the issue of improved soil management. Given that no two trash lines are likely to be constructed on exactly the same part of the field in consecutive years, the benefits to the soil, in terms of returning organic matter, will be spread over the field. In this respect were they to be permanent trash lines the end result would be to concentrate the organic matter and nutrients in only a part of the field.

Overlaps between the hedgerow, bann manjes and trash line interventions

CARE has begun to recommend the growing of perennial crops such as sugar cane on top of the buried trash lines to improve their performance as conservation measures (see earlier comments under the section on *bann manjes*) and to make them more productive from the farmers perspective. CARE is also advocating the use of pineapples and sugar cane as hedgerows on farmers' good lands (plots with gentle to moderate slopes and relatively deep fertile soils). There is thus some potential for confusion over the definition of what constitutes a hedgerow, *bann manje* or trash line depending on which agency is reporting and what modifications farmers and field agents have made to the original intervention once it gets onto the ground. The latter point is not one for concern more an opportunity to learn from innovative farmers as to how and why they adapt particular interventions.

Rock Walls

Rock walls are dry walls of stones constructed on the contour. Their soil and water conservation functions are to reduce runoff velocity, encourage infiltration and trap soil on the uphill side. Depending on the construction method rock walls may be either permeable or impermeable barriers. In areas where stones are abundant rock walls have been constructed entirely from stones and are therefore permeable structures allowing some runoff to flow

slowly through the gaps in the drystone wall. Where stones are less abundant rock wall construction involves initially building a contour earth ridge (an impermeable barrier) and placing stones on the uphill side to protect it. Such impermeable rock walls are more vulnerable to breaching during severe storms (eg. hurricane events).

SECID case studies have shown a 40% increase in sorghum production behind rock walls, this it is believed can be primarily attributed to the improved soil moisture conditions behind the walls. PADF reports that farmers like rock walls because they produce a faster improvement in crop yields than is the case with hedgerows. However they require more labour and expertise to build.

CARE reports that where rocks are available, farmers readily build rock walls on their plots. Given that the area they are currently working in (NW Haiti) is more drought prone than the PADF areas the moisture conservation benefits of such structures are likely to figure highly amongst the farmers reasons for adoption. CARE does note that the labour intensive nature of the activity is a constraint. Of particular concern in their area is that rock wall construction is a dry season activity when the low productivity of the farming systems require many farmers to migrate to other regions in search of employment. There may thus be a distinct opportunity cost associated with rock wall construction in the CARE areas. Despite the constraints, the number of linear metres of rock wall has shown a steady increase. Both CARE and PADF encourage farmers to raise vegetative materials (grasses, shrubs and trees) behind the rock walls.

As with the hedgerows rock walls are most successful at trapping soil and moisture on gentle to moderate slopes (ie. below 30%). On steeper slopes, whereas they will trap some soil, they will be less effective in stopping the erosion process. They can thus limit the rate at which soil degradation takes place on steep slopes but not stop it completely. Short of undertaking intensive micro terracing with rock walls (ie bench terracing the slope) once the slope angle exceeds 45% severe loss of soil can be expected under any form of annual crop production. Above 30% slope there has to be an increasing proportion of good ground cover perennial crops integrated into the production system. Where slopes exceed 60% the hillside should be under permanent pasture preferably used on a cut and carry basis rather than direct grazing, or planted to trees. In the latter case the use of micro basins or orchard terraces protected by rock walls would only be worth the effort for the production of high value fruit trees and preferably these should be on hillsides with reasonable soil depth and a slope of less than 60%. As with hedgerows PLUS is kidding itself, and farmers, if it expects the use of rock walls alone to sustain the cultivation of annual crops such as maize, sorghum and cassava on very steep slopes.

The following are some of the criteria that should be used in the context of the better land husbandry approach to determine the conservation effectiveness of rock walls:

- Does the rock wall alignment closely follow the contour?
- Are there any low points or signs of breaching along the rock wall which could lead to the concentration of runoff?
- Is there evidence of sheet and rill erosion immediately below individual rock walls?
- Is the rock wall a permeable or impermeable structure?
- How much care has been taken when building up the stones in the rock wall to ensure a stable structure?

- Is there evidence of terrace formation with the accumulation of soil above the rock wall?
- Has the rock wall been raised to keep pace with the accumulation of soil on the uphill side?
- Have the rock walls led to a reduction in the effective slope length and angle within the field as a whole?
- How conservation effective are the crop husbandry practices in the inter-rock wall area (ie. is there contour cultivation, minimum tillage/disturbance of soil surface, minimum 40% ground cover provided by the crops)?

Gully Plugs/Check Dams

Gully plugs or check dams are physical soil conservation structures built across small gullies. Their primary soil conservation function is to obstruct the flow of water through the gully, thereby decreasing its velocity and encouraging the deposition of sediment upstream of the structures, leading to a local flattening out of the gully floor gradient. The project recommends that they are either built with stones or with wooden stakes, preferably green and using species that will take root from large cuttings.

CARE reports that gully plugs are one of the most highly adopted techniques used by farmers for the creation of what are referred to as opportunity areas. Ravines crossing farm lands are a common feature of the landscape in the Northwest. Farmers have noticed that the areas behind the gully plugs within the ravines are usually more productive than the rest of their farm holding. The high moisture, the depth of soil and very often the good physical and chemical characteristics of these plots make them far more valuable than the adjacent hillsides. Most farmers exploit their treated ravines by planting perennials, particularly high value crops such as plantains and sugar cane, mixed with annual crops the first season. Fruit trees (mangos and breadfruit in particular) may also be planted in such sites. The gully plugs are effectively soil harvesting techniques and rely on continuing soil erosion upstream. In that sense success in creating 'new land' behind the structures is evidence that the project has failed to conserve other parts of the farmer's land.

Both CARE and PADF report great interest from farmers in plugging their gullies and then exploiting the enriched area for productive purposes. However it is reported that there is a lack of construction materials in many locations that handicaps the extension of the gully plugging technology. Rocks are the preferred material for the check dams but are not always available. Wooden materials for stakes are becoming scarce, and have at times been stolen from newly built gully plugs. In some areas farmers are attempting to overcome this shortage by using palm fronds, branches and plantain stems to build low barriers across the gullies. Such structures, as applies to many of those built with wooden stakes, have a limited life and risk collapsing when the construction materials start to decompose. To provide some structural stability, and to extend the effective life of such gully plugs, both CARE and PADF are recommending the planting of perennial vegetative material just above or below the structure - notably elephant grass, and fast growing tree and shrub species such as gliricidia, leucaena and moringa.

Euphorbia tirucalli and sisal were both successfully used in a semi arid eroded area of Central Tanzania as vegetative means for plugging gullies. Both are common hedging species in Haiti and would be worth testing for gully plugging purposes given the reported shortage of alternative materials. Bamboo is another plant that has been used elsewhere for gully plugging and the canes can be used by rural households for a multitude of different purposes. Bamboo

is not commonly grown in Haiti but could be a useful species to propagate and disseminate within the PLUS project area.

The following are some of the criteria that should be used in the context of the better land husbandry approach to determine the conservation effectiveness of the gully plugs/check dams:

- Is the top of the structure relatively level across the gully?
- Is there adequate provision for controlled overtopping (spillway) during peak stream flows?
- Do stone and rock gully plugs have the appropriate trapezoidal cross section and base width needed to better withstand heavy storms?
- Have wooden gully plugs been reinforced and stabilised with perennial vegetation?
- Are the structures effective in trapping soil and moisture immediately upstream?
- Has the wall of the gully plug been raised to keep pace with the amount of soil being deposited upstream?
- Has there been any reduction in the gully bed gradient?
- Are there signs of active gully erosion immediately below the gully plug?
- How conservation effective is the vegetative cover and land use within the immediate catchment area and along the gully sides?
- How large is the catchment area of the gully plug in relation to its size?

Bio-intensive Gardens

Bio-intensive gardens (BIGs) or vegetable gardens have been important production oriented project interventions for both CARE and PADF. BIGs are promoted as a form of low external input sustainable agriculture that enables a household to concentrate limited resources of labour, organic manures and water in a small area to produce a diversity of high value (in both financial and nutritional terms) vegetable crops such as cabbage, eggplant, tomatoes, peppers, amaranth and carrots. CARE distinguishes 3 different categories of BIGs:

- commercial gardens - vegetables grown primarily for sale;
- consumption only gardens - vegetables grown solely for home consumption;
- mixed gardens - vegetables grown for both sale and home consumption.

Most BIGs are mixed gardens (over 50%). Commercial gardens are least common and only found near to a market. Consumption only gardens are found in the more remote areas and furthest away from the regional markets.

Integrated pest management (IPM) and organic matter management (OMM) techniques are used to maintain and enhance the productivity of the BIGs. Farmers are encouraged to plant on raised beds which have been deep dug and into which has been incorporated large quantities of organic matter - compost, crop residues, animal manure and leucaena leaf and other green manures. IPM relies on home made organic pesticides and farmers are advised on how to make their own for instance from the leaves and fruits of the neem tree (*Azadirachta indica*) - one of the species promoted by the tree planting component of the project.

The practice of deep digging and the application of large quantities of organic matter will have a marked impact on improving soil fertility and structure at the micro vegetable plot level.

Some farmers recognise this and will rotate the BIG plots with part of their maize and bean fields in order to take advantage of the improved soil productivity. Whether they have a wider impact from a better land husbandry perspective is less clear. By encouraging farmers to intensively manage their BIGs for the production of high value crops it is hoped that this will reduce the need to expand production on more fragile areas and ultimately lead to a degrease in cultivation on those hillsides with shallow soils and steep slopes. BIGs thus have the potential to make a significant secondary impact on land degradation within the PLUS project areas. For this reason it is important to monitor land use changes, on a land management unit basis (see appendices 7&9), within the vicinity of the BIGs to determine whether such a positive impact has been achieved. Note similar secondary beneficial impacts could be realised from the more intensive use of the soil trapped behind the gully plugs.

Deep Tillage

Until recently CARE had promoted deep tillage in association with the incorporation of organic materials as one of its improved land management interventions. The aim was to raise soil productivity through improving fertility and soil structure. Although farmers who tried the technique found that it resulted in a significant increase in yield the adoption rate has been low. The principal reasons for the low adoption rate are the intense labour requirement and the lack of suitable tools - it is hard to deep dig with a machete. For these reasons CARE no longer promotes this technique for field crops, limiting its use to the BIGs.

Cover Cropping

In the past cover cropping with a herbaceous legume was promoted as a source of green manure and to provide protective ground cover. Typically velvet bean (*Mucuna pruriens*) was the recommended species however the experience of farmers was that it competed too aggressively with their field crops - notably maize, sorghum and beans - and they have apparently rejected the technology. As a result cover cropping no longer appears on the portfolio of PLUS interventions.

It was reported to the team that cover cropping trials with alternative perennial herbaceous legumes (Siratro *Macroptilium atropurpureum* and Rabbit vine *Teramnus labialis*) were conducted under the auspices of the *Pwoje Sove Te* - the USAID funded Targeted Watershed Management Project in S.W. Haiti. The conclusion from these trials[7] was that "the incorporation of perennial herbaceous leguminous plants into hillside conservation farming systems appears to be an exceptionally promising technique". Particular findings reported of value from a better land husbandry perspective were:

- contour legume strips provided an effective soil conservation barrier on slopes up to 25%;
- 70% ground cover could be ahieved within one cropping season;
- the herbaceous legumes out competed weeds and therefore reduced weeding requirements;
- maize yields were increased by 100-150%, bean yields by 65%; and
- on a per linear metre basis the pasture legumes produced 30% more biomass than Leucaena.

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[7]Treadwell B.D., and Cunard A.C. 1992. *Perennial herbaceous leguminous plants as permanent contour land improvements for Haitian hillside farms*. PWOJE SOVE TE - Livestock Working Document No. 14.

The above findings would suggest that PLUS should reconsider its decision to drop cover cropping as a potential intervention. Bad experience with one cover crop should not be grounds for total rejection of the practice. Instead further work should be done with farmers to identify alternative species and develop appropriate management practices for their incorporation into mixed crop/livestock hillside farming systems.

Tree Planting

Tree planting was the primary activity of the fore runners to PLUS (AOP and AFII) and is still seen as one of the most important activities promoted by the project. A wide range of tree species have been produced in both PLUS and farmer/NGO managed nurseries for fuelwood, timber, poles, fodder and food. During the field trips it was noticeable how many trees had been planted as a result of past efforts within all the project areas visited. Typically trees were planted around the homestead, along the field boundaries, in association with hedgerows or scattered through the plot.

There is a commonly held belief amongst many environmentalists that erosion can be stopped by planting trees. Regrettably it is not as simple as that. It all depends on the way the trees are planted and managed, as benefits in soil and water protection do not accrue automatically by having trees on the land. Tree planting alone, in anything other than closely spaced hedgerows, does not significantly reduce surface runoff volume and velocity nor increase infiltration. In natural forests or well managed woodlots it is the litter and herbaceous undergrowth that does this. Widely spaced trees in crop lands cannot do this. There have been environmental benefits from the tree planting but they are limited. There will be a local impact on soil properties through tree root activities and some addition of organic matter from the natural leaf fall. The main impact will have been to reduce pressure on the remaining forest resources by increasing on farm production of a variety of tree products.

Fruit Tree Grafting

Both CARE and PADF promote the fruit tree grafting as a production oriented intervention. It involves top grafting of material from improved varieties of mango, avocado, oranges and limes onto farmers existing fruit trees. The aim is to increase the quantity and quality of the fruit and in so doing increase household income through higher yields of a higher value product. On its own this intervention makes no direct contribution to improved soil and water conservation. However by upgrading the value of farmers existing fruit trees it does encourage farmers to retain them in their fields rather than cut them down for charcoal and fuelwood. Also by increasing income generating production within the home gardens and lowland plots it has the potential to reduce the need for farmers to cultivate marginal steep hillsides.

Distribution of improved seeds and planting material

The PLUS project has undertaken some limited trials to identify improved food crop varieties for its different areas. These trials have been the basis for the selection and distribution of improved seeds and planting material for maize, bean, cowpea, sweet potato, cassava, yam and plantain. In the PADF areas only those farmers who have established hedgerows or constructed rock walls in their gardens are eligible to receive the improved seed/planting material. It is reported that many farmers participate in the conservation activities simply as a way of getting the improved varieties. Subsequently they have little interest in maintaining the conservation measures. There is a need to determine more clearly through participatory monitoring and evaluation farmers real reasons for initial adoption of the PLUS hedgerow and

rock wall interventions. The aim would be to modify as necessary the PLUS implementation policy in order to improve the 'selling' of hedgerows and rock walls in their own right in order to improve the quality of their subsequent management and maintenance.

From a better land husbandry perspective there are two potential benefits from the distribution of improved seeds and planting material. Firstly the improved varieties by and large produce more above ground biomass and therefore more leaves to provide protective ground cover. Secondly enabling farmers to increase food crop production on their better plots should reduce the need to cultivate the more marginal steep hillsides.

Improved Crop Husbandry

In addition to the foregoing PLUS extension staff do in the course of their routine extension work make additional recommendations to farmers related to improved crop husbandry. The most important from a better land husbandry perspective is the message about not burning the crop residues. Instead farmers are advised to either use them as a mulch or to incorporate them into the soil. It was reported during the field trips that a significant number of farmers had responded to this message and were no longer burning their residues during land preparation.

Many improved crop management practices are conservation effective. Adopting a more holistic better land husbandry approach would require PLUS to pay more attention than currently to this as a key component. In particular its extension specialists should be able to provide advice related to improving ground cover through timely planting, optimum spacing/plant density, adequate fertilisation etc. (see appendix 8).

In addition more attention could be devoted to alternative tillage and land preparation techniques. In some areas farmers plant crops, usually cassava and sweet potatoes on crop ridges (the indigenous *bit* practice). When such ridges are aligned on the contour and boxed the effect is to reduce slope length to a minimum by the creation of a series of mini-catchments for trapping and infiltrating rainfall and reducing runoff to a minimum. It was noted in the PADF Les Cayes Region 1 on some of the steeper cultivated slopes such traditional cropping on cross slope ridges had result in the formation of almost level mini-bench terraces. There is scope for improving this traditional technique and for exploring the possibilities of growing other annual crops on contour crop ridges, in the plots between the hedgerows or rock walls, as both a moisture and soil conservation practice.

Conclusion

PLUS currently has a range of interventions it is promoting all of which have a role to play in promoting better land husbandry. At present they are largely promoted as separate activities. The need is to integrate them in a holistic fashion to maximise the financial and environmental benefits that farm households can obtain from the development of productive and conservation effective hillside farming systems.

Appendix 6

LAND DEGRADATION DESIGN CONSIDERATIONS WITHIN THE PLUS PROJECT AREAS

Introduction

Haiti has been described as one of the most impoverished and environmentally degraded countries in the western hemisphere. It is a mountainous country and of its land area some 63% exceeds 20% slope, and 40% is over 400 metre in elevation. Although only 32 % of all Haiti's land area is deemed arable by conventional standards, over 60% is currently under agricultural use. Although the limited amount of reliable soil erosion data precludes accurate estimation, most hillsides are highly eroded and approximately one-third of all lands have been reported as in a severely degraded state[1].

Definition of Land Degradation

Land degradation can be defined as the reduction in the capacity of the land to produce benefits from a particular land use under a specified form of land management. Such a definition embraces not only the bio-physical factor of land capability, but also such socio-economic considerations as the way the land is used and the products wanted from the land (the benefits).

Components of Land Degradation

Tackling land degradation involves recognising that there is more to soil degradation than just soil erosion and that land is a broader concept than simply soil. Land encompasses a wider range of natural environmental factors notably climate, topography, hydrology, vegetation as well as soils. All of which will collectively determine the land's bio-physical potential to be used on a sustainable basis for particular purposes.

There are a number of interrelated land degradation components which are believed to have contributed to a decline in the productive potential of the land within the PLUS project areas. The most important are:

Soil degradation - decline in the productive capacity of the soil as a result of changes in the hydrological, biological, chemical and physical properties of the soil and associated soil erosion.

Vegetation degradation - decline in the quantity and/or quality of the natural biomass, decrease in the vegetative ground cover and lowered capacities for self-regeneration.

Water degradation - decline in the quantity and/or quality of both surface and ground water resources, less infiltration of rain and more surface runoff results in an increased risk of flooding and lower dry season stream flows, and a decrease in groundwater recharge.

Climate deterioration - changes in the micro and macro climatic conditions that increase the risk of crop failure.

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[1]USAID 1985. *Haiti country environmental profile: A field study.* U.S. Agency for International Development, Port-au-Prince, Haiti.

In evaluating the environmental impact of the PLUS project it is necessary to consider to what extent it's various activities have been able to reverse one or more of the above land degradation components.

Soil Degradation

A joint FAO, UNEP and UNESCO study[2] has defined soil degradation as a process which lowers the current and/or the potential capability of the soil to produce (quantitatively and/or qualitatively) goods or services. The study recognised six categories of soil degradation processes, namely:

- Water erosion
- Wind erosion
- Waterlogging and excess of salts
- Chemical degradation
- Physical degradation
- Biological degradation

Examples of areas which have been adversely affected by all six processes can be found within Haiti. However in the context of the various PLUS project areas it is believed that the process of waterlogging and excess of salts is not one that requires any significant design consideration.

Water Erosion

The most visible soil degradation in the PLUS project area is water erosion. This includes processes such as splash, sheet, rill and gully erosion and mass movement. This is the form of land degradation that has received the most attention from the PLUS project.

Splash erosion is the process that has commonly initiated water erosion within the PLUS area. It occurs when rain drops fall onto the bare soil surface (bare due to loss of the protective cover resulting from cultivation, over-grazing and deforestation). Rain drop impact can break up the surface soil aggregates and splash particles into the air. On sloping land relatively more of these will fall downslope resulting in a net downhill movement of soil. Some of the soil particles may fall into the voids between the surface aggregates thereby reducing the amount of rain water than can infiltrate into the soil and increasing runoff.

As water runs over the soil surface it has the power to pick up some of the particles released by splash erosion and also has the capacity to detach particles from the soil surface. This may result in **sheet erosion** where soil particles are removed from the whole soil surface on a fairly uniform basis. Where runoff becomes concentrated into channels **rill and gully erosion** may result. Rills are small rivulets of such a size that they can be worked over with hoes and farm implements. Gullies are much deeper (often being several metres deep and wide) and form a physical impediment to cultivation. In the PLUS project areas visited it was clear that sheet and rill erosion is still taking place, even where soil conservation structures (rock walls and hedgerows) have been installed. Active gully erosion can be seen in some areas where either there has been no adoption of the recommended conservation measures, or where due to poor construction and maintenance such measures have failed.

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[1]FAO 1979 *A Provisional Methodology for Soil Degradation Assessment*. FAO Rome.

On sloping land when soil is saturated the weight of the soil may be sufficient to exceed the forces holding the soil in place. Under such circumstances **mass movement** in the form of landslides or mudflows may occur. There is evidence, in the form of visual scarring on a number of denuded steep hillsides, that this has occurred within, or adjacent to, a number of the PLUS project areas.

Whether or not water erosion occurs at a particular site will depend on the erosivity of the rainfall received, the soil's erodibility, slope length and angle, and the amount of ground cover provided by plants.

Rainfall erosivity

Erosivity is a function of the physical characteristics of rainfall. As rainfall intensity increases, so in turn does raindrop size (up to certain high intensities), terminal velocity and kinetic energy. Thus, the higher the rainfall intensity the greater its capacity to cause erosion. There is considerable variation between, and within, the different PLUS project areas with regard to total annual rainfall, which may vary from as low as 600mm in parts of the CARE northwest regions to over 3,500mm in parts of the PADF region 1 near Les Cayes. Much of this annual total is restricted to two relatively short rainy seasons April-July and August-December. Irrespective of the area, total annual precipitation typically comes in the form of short duration high intensity rain storms with maximum intensities associated with individual tropical cyclone events and the occasional hurricane. Within Haiti at least some 40% of the annual rainfall can be expected to be received at erosive intensities[3].

Rainfall erosivity is a factor that cannot be modified by man's actions. Given that rain will fall at erosive intensities it has to be regarded as a fixed constraint for soil and water conservation design purposes within the PLUS project areas. The only options open are to reduce its impact by providing protective ground cover through appropriate crop management and revegetation practices. In an agricultural context the aim should be to ensure the least amount of bare soil at the time the most intensive rainfall can be expected. This could be achieved by such practices as mulching with crop residues and improved crop husbandry designed to provide the maximum crop cover as quickly as possible.

In a reforestation context the aim should be to keep to a minimum the area that has to be kept clear to reduce weed competition during tree seedling establishment. Also it is important to recognise when promoting tree planting as a conservation measure that it is the improved groundcover from litter below the trees rather than the tree canopy itself that provides the bulk of the protection against erosion[4].

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[3]Research work in a number of tropical countries suggests that intensities of less than 30mm per hour are virtually non-erosive, with intensities of 30-60mm per hour, some 10% of rainfall will be erosive, once the intensity reaches 100mm per hour, all rain is erosive. Such conditions can be expected to apply within Haiti.

[4]In a study of an *Acacia auriculiformis* plantation in Java Indonesia, the effects of tree canopy removal, undergrowth and litter on soil erosion were compared. While the canopy alone had little effect on soil erosion, and the undergrowth effect was small, litter reduced erosion by 95% compared to bare ground. A similar result could be expected within Haiti. (Wiersum K.F. 1985. *Effects of Various Vegetation Layers in an Acacia auriculiformis Forest Plantation on Surface Erosion in Java Indonesia.* In S.A. El-Swaify, W.C. Moldenhauer, and A Lo [editors] *Soil Erosion and Conservation.* Soil Conservation Society of America, Ankeny Iowa USA.)

Soil erodibility

Soil erodibility refers to how vulnerable or susceptible the soil is to erosion, specifically how easy it is to detach and transport soil particles. How erodible a particular soil is will depend on its structure and structural stability, texture, organic matter content, porosity, and permeability. During the field visits to both the CARE and PADF areas it was noted that in some cultivated areas the topsoils had retained a good crumb structure suggesting that these soils have a reasonable degree of structural stability and therefore erosion resistance.

Erodibility is initially an inherent property of the soil, but can change through response of the soil to management. A soils erodibility can be increased or decreased by changes in soil organic matter level. In general terms, moderately severe degradation of the soil organic matter content is likely to lower a soil's resistance to erosion by an amount of the order of 10-25%, severe lowering of organic matter to lower resistance by about 50%. Within Haiti land that has been used continuously for the cultivation of annual crops can be expected to have a low soil organic matter content thereby increasing its erodibility. A soils erodibility can be reduced by management practices designed to raise the organic matter content of the topsoil.

Slope length and angle

Slope length and angle in the geomorphological sense are unalterable, but their values with respect to erosion can be modified by conservation measures. Effective slope angle can be altered only by terracing. Where regularly maintained, bench terraces can be effective in controlling erosion on moderate to steep slopes (7° - 25°). However, the cost of terrace construction and maintenance (especially the labour requirement) is high. A shortage of labour within the household can result in low quality terracing which may actually increase soil erosion, should runoff concentrate at low points. It is highly unlikely that a farmer in Haiti would find it a worthwhile return to labour to construct bench terraces to grow the present range of dryland annual crops. However a well maintained contour hedgerow or rock wall has the potential to trap soil on the uphill side producing over time a 'natural' terracing effect thus altering slope angle. This was observed to have happened in a number of places with the best results having been achieved on the relatively good soils on moderate slopes. On steeper slopes the terracing effect was much more limited as the limited height of the rock wall or hedgerow meant that the reduction in the angle of slope through the trapping of eroded soil could only take place on a very small portion of the original land surface.

Effective slope length can be reduced by conservation measures of the barrier type. These may be physical structures (earth banks, rock walls, storm drains and cutoff ditches) or biological barriers (grass strips, contour hedgerows). When considering the use of barriers for erosion control a distinction can be drawn between impermeable and permeable barriers. Impermeable barriers are those, such as ditch and earth bank structures which check all runoff, either by diversion or by retaining it in situ until it can infiltrate into the soil. Permeable barriers are those which allow some proportion of runoff to pass through. Examples of the latter would be contour stone lines, hedges or grass strips. By allowing some runoff to flow through them, at a greatly reduced velocity, permeable barriers have an automatic safety valve for the occasional storms of very high intensity, which would overtop and destroy earth banks. This is an important design consideration for Haiti where the 10 year-return-interval design storm for soil and water conservation structures is a hurricane, when total runoff

control is impractical[5].

The PLUS soil and water conservation interventions contain examples of both permeable and impermeable barriers. Examples of permeable barriers would be the *Leucaena* contour hedgerows, stone check dams and wattle fence gully plugs. The improved *ramp pay* (cross slope trash barrier) which involves burying the trash under an earthmound with a ditch on the uphill side is an example of an impermeable barrier that is easily overtopped and breached when, during a severe storm, rainfall intensity greatly exceeds soil infiltration rates resulting in excessive runoff. Depending on the construction method rock walls may be either permeable or impermeable barriers. In areas where stones are abundant rock walls have been constructed entirely from stones and are therefore permeable structures allowing some runoff to flow slowly through the gaps in the drystone wall. Where stones are less abundant rock wall construction involved initially building a contour earth ridge (an impermeable barrier) and placing stones on the uphill side to protect it.

Whether impermeable or permeable all the PLUS recommended interventions require good initial construction/establishment and regular subsequent maintenance if they are to function effectively as runoff reduction and control barriers. Failure to do so can lead to increased erosion where hedgerows, rock walls and gully plugs have been breached, or runoff has spilled round the ends during heavy storms. Examples of such failures were seen in all of the PLUS project areas visited.

There are disadvantages to relying on structures alone to solve soil degradation problems because:

- conservation structures have high direct costs for both initial construction and annual maintenance (notably in terms of mandays);
- they may involve foregone costs by taking strips of land - each the width of the hedgerow or rock wall - out of crop production, without necessarily producing any immediate benefit to compensate for the reduction in cropped area;
- they can counter only the effects of runoff - they have no effect against rainfall itself (raindrop impact);
- they catch water, and soil, in bands along their uphill sides - but they do not prevent surface soil movement (sheet and rill erosion) nor promote rainwater infiltration in the interbank areas where the crops are grown;
- they can prevent the formation of gullies - but they have no effect on declining soil fertility as a result of continuous cropping in the inter-bank areas[6].

Conservation banks provide a means of dealing with the problem of excess runoff, from unusually large storms, but on their own cannot substitute for improved conditions of soil structure and cover in the inter-bank areas. They can be used safely and effectively only in support of better crop and livestock husbandry. Within the PLUS project areas the approach has been to advocate the use of cross slope physical barriers (hedgerows, rock walls or gully plugs) and only later, if at all, to consider supporting these through the use of conservation effective crop and animal husbandry practices in the rest of the 'treated' plot.

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[5]Paskett C.J. & Philoctete C.E. 1990. *Soil Conservation in Haiti*. J. of Soil and Water Conservation.

[6]The exception to this being where the prunnings from Leucaena hedgerows are used as a green manure. Although this is advocated by the PLUS project only a few farmers (primarily in PADF Les Cayes Region 1) are actually managing their hedgerows in this manner.

In some areas farmers plant crops, usually cassava and sweet potatoes on crop ridges. When such ridges are aligned on the contour and boxed the effect is to reduce slope length to a minimum by the creation of a series of mini-catchments for trapping and infiltrating rainfall and reducing runoff to a minimum. It was noted in the PADF Les Cayes Region 1 on some of the steeper cultivated slopes such traditional cropping on cross slope ridges had result in the formation of almost level mini-bench terraces.

Ground cover

Ground cover is the factor that has the greatest impact on the rate of erosion. It is also a factor that can be easily modified by changes in land and crop management practice. Ground cover can prevent splash erosion by protecting the soil surface from the impact of erosive rains. The cover may be provided by the leaves and other parts of plants growing above the surface (the canopy) or the dead materials deposited on the soil surface below the plants (litter). In a natural system the litter would be composed of leaves, stems, twigs, branches, seeds, fruits etc. In cropping and agroforestry systems the canopy will be provided by the growing crop and the leaves of any woody perennials, while the litter may consist of deliberately applied mulch and/or crop residues. Leaf litter, crop residues (eg. maize stalks) and a continuous sward of natural or improved pastures on gentle to moderately sloping land will produce a sufficiently rough surface to reduce runoff velocity and increase infiltration, thereby increasing protection against rill and gully erosion.

On the basis of experimental work in Zimbabwe[7] (for croplands) and Kenya[8] (for range lands) it has been found that because of the curvilinear relationship between erosion and cover, provided that mean cover exceeds 40%, erosion is low (less than 10% of that on a bare plot). It is believed that this figure should be applicable to conditions in Haiti. This means that it is not necessary to strive to achieve 100% ground cover in order to significantly reduce soil erosion, something which would be difficult for farmers in Haiti to achieve given the realities of crop and livestock production in a mountainous environment.

Any farm or range management system in which a substantial soil cover can be maintained during the period of the year when erosive rains can be expected has the capacity to reduce erosion to between a tenth and a hundredth of its value on bare soil. Haitian farmers traditionally practise intensive intercropping of cereals (maize and sorghum) and root crops (cassava and sweet potatoes) with pumpkins, beans, cowpeas and pigeon peas. Such intercropping mixtures can achieve this critical figure of 40% groundcover. There is thus considerable scope to combine such traditional practices with other improved crop husbandry practices (correct plant populations, manuring, etc) to quickly provide the requisite percentage ground cover with the leaves of well grown crops.

There is a commonly held belief amongst many environmentalists that erosion can be stopped by planting trees. From a review of various project documents and discussions with PLUS staff it would appear that this view underlay much of the previous project efforts (AOP, AFII) to promote tree planting. Regrettably it is not as simple as that. It all depends on the way the

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[7]Elwell H.A 1980. *Design of Safe Rotational Systems.* Department of Conservation and Extension, Harare, Zimbabwe.

[8]Zobisch M.A. 1992. *Erosion Susceptibility and Soil Loss on Grazing Lands in a Semi-Arid Location of Eastern Kenya.* Paper presented at the British Society of Soil Science meeting on *Sustainable Land Management in the Tropics: What Role for Soil Science?* 30 March - 1 April 1992, Univ. of Newcastle Upon Tyne UK.

trees are planted and managed, as benefits in soil and water protection do not accrue automatically by having trees on the land. In reality it is the litter and herbaceous growth below the trees rather than the tree canopy itself that provides the bulk of the protection against erosion. If the litter or herbaceous layer is removed by cultivation, overgrazing, burning or collection for mulch, fodder, fuel etc then the conservation benefits from planting trees are seriously reduced.

Wind Erosion

Wind erosion includes both the removal and deposition of soil particles by wind action and the abrasive effects of moving particles as they are transported. Wind erosion can be expected when the following conditions occur:

- the soil is loose, dry, and finely divided;
- the soil surface is relatively smooth and plant cover is sparse;
- blocks of cultivated land are large and open; and
- the wind velocity is high enough and turbulent enough to move soil particles.

Within the PLUS project areas such conditions are most likely to occur in the semi-arid CARE areas in the North West towards the end of each dry season when the soil surface may be bare of vegetation as a result of cultivation, burning and overgrazing. The conventional way to reduce the risk of wind erosion is through the establishment of parallel lines of trees to serve as shelter belts/windbreaks. In the PLUS project areas this would be difficult to achieve given the mountainous nature of the terrain and the fragmentation of individual land holdings. However it is possible to achieve a regular decrease in wind velocity by spreading trees and bushes evenly and in small groups, over the country. Such a tree planting, or protection, strategy would result in an increasing surface roughness and, consequently, a decrease in wind velocity. The past efforts of the AOP and AFII projects as well as the current PLUS activities can expect to have contributed to such a reduction in wind velocity, and therefore reduced the risk of wind erosion, through the trees that have been planted along farm boundaries, in rows in farmers fields as well as scattered individual trees planted or retained within the farm holding.

Waterlogging and Excess of Salts

If topsoil becomes too saline or too alkaline its productivity falls. The processes of salinization and alkalinization may occur in semi-arid environments as a result of inappropriate irrigation practices. Soils with salinity problems can be found in some coastal and lowland areas of Haiti. However the processes of salinization and alkalinization are not known to have contributed to soil degradation within any of the PLUS project areas.

Chemical Degradation

In addition to salinization and alkalinization other processes may adversely affect the chemical properties of soil. Of particular concern for sustainable agricultural production within the PLUS project areas is the continuing decline in reserves of soil nutrients within farmers fields. When soils are used for agricultural purposes significant quantities of nutrients are removed in the harvested products. If nutrients removed are not replaced, in the form of chemical fertilizers, organic manures, by natural fixation from the air or by weathering of rock minerals, then there will be a net decline in soil nutrient levels.

When land is used continuously for low input cereal monoculture there is a rapid decline in the soils humus and nutrient levels. Providing soil erosion does not physically destroy the resource, soil cultivated in this way would ultimately reach a low-level equilibrium in which humus and nutrient levels remain constant whereupon crop yields stabilize but at a low level. This situation is believed to have been reached in many of the PLUS project areas. Although many farmers practice some form of intercropping rather than cereal monocropping the quantity of intercropped legumes is small in relation to the amount that would be needed to significantly raise nutrient levels and cereal yields.

Due to the expense and difficulties with supply very little chemical fertilizer is currently used by Haitian hill farmers. The agro-forestry practices advocated by the project, and adopted on a very limited scale by farmers, are currently unable to compensate for the soil nutrients lost through cultivation, leaching and sheet erosion. It is believed that chemical degradation in the form of nutrient depletion is a serious and growing problem within the PLUS project areas.

Physical Degradation

Both crop and livestock production can lead to a deterioration in the physical condition of the soil. This degradation can take many forms, and has a variety of consequences. It is usually described as a deterioration of soil structure with the term structure being used to cover a wide range of soil physical properties. Physical degradation is of concern because soil structure and its stability governs soil-water relationships, aeration, crusting, infiltration, permeability, runoff, interflow, root penetration, leaching losses of plant nutrients and therefore ultimately the productive potential of a soil.

Topsoil degradation may occur when an open structure of soil aggregates is broken down by excessive tillage. Also the impact of raindrops and/or livestock hooves may produce a continuous compacted layer or crust at the surface. Reduction in topsoil porosity, and particularly surface crusting, will result in decreased water infiltration, increased runoff, poorer seedling emergence and often increased erosion. Hand cultivation with a hoe or machete is the norm in the mountain areas of Haiti. In some of the PLUS sites visited the soil was generally not turned over, with cultivation limited to the planting hole. This form of minimum tillage would reduce the risk of topsoil structural degradation. Any programme to intensify crop production would need to consider its recommendations with regard to improved tillage practices to ensure that these would not increase the risk of physical degradation.

Biological Degradation

Soils that have been used for agricultural purposes are often deficient in the biological processes which both maintain their physical structure and their ability to supply essential chemical elements to plants. Of particular concern is the decline in organic matter or humus content of the soil following cultivation. In part this is because large amounts of bio-mass are harvested and removed from the site but also the actual humus mineralisation rates may increase due to soil temperature changes following the removal of a protective vegetative cover.

The agricultural significance of organic matter for Haitian soils is greater than that of any other property with the exception of soil moisture. Its functions are to improve soil structure, and thereby root penetration and erosion resistance; to augment cation exchange capacity; and to act as a store of nutrients, slowly converted to forms available to plants. It is possible to obtain an overall balance of soil organic matter with shifting cultivation under conditions of

low population density. However shortage of suitable land means that shifting cultivation is no longer a viable option in Haiti. As a result most of the cultivated land is cultivated each year. With the imposition of such a permanent agricultural system, decline in organic matter can be expected to be severe and rapid. Typical values of the organic matter status of tropical soils that have been under cultivation for two or more years are 30-60% of the corresponding values under natural vegetation. To sustain the productive potential of soils used for agriculture soil organic matter levels should be maintained at a level of at least 50-75% of that under natural vegetation. Values below 50% are considered to represent an undesirable situation calling for remedial measures[9].

The actual quantities of plant residues that need to be added to the soil, to maintain adequate soil organic matter levels will vary according to the climatic zone. In the semi-arid PLUS project regions this could be in the order of 2,000 kg DM/ha/yr rising to some 10,000 kg DM/ha/yr for the more humid regions[10]. In natural ecosystems this is no problem as the net annual primary production of above ground biomass is more than adequate. However the amount of organic material available may be below what is required when the land is used for agricultural purposes, particularly annual crops. Not only may the total annual biomass production be reduced but much of it will be removed in the form of harvested products.

Under traditional shifting cultivation systems the deficit in available organic material, during the cropping period, is compensated for by the ultimate surplus accumulated during the long bush fallow period. Given that long bush fallow systems are no longer an option within the PLUS project areas, there is a need for alternative means of supplying the necessary plant materials required to sustain soil organic matter levels.

One option is for shorter fallows in which the natural bush fallow is 'enriched' with the introduction of faster growing tree species and herbaceous legumes. As this still involves leaving land idle and 'unproductive' this is not an option where farm family holdings are small in size and alternative land is unavailable. A form of such enriched fallowing has taken place in some PLUS project areas when farmers have established *Leucaena* hedgerows in marginal plots and left them to grow unchecked. In the PADF Les Cayes Region 1 it was reported that farmers will practice a form of natural fallow on some of their hillside plots with land being left uncultivated (and used for rough grazing) for up to two years following the harvesting of a sorghum crop. There is thus scope for developing an enriched fallow/pasture system in such areas as part of a strategy for maintaining soil productivity.

Ensuring that all crop residues are returned to the land can make a significant contribution to sustaining soil productivity. However returning all the residues from a maize or sorghum crop would only restore half the organic matter lost during one year of cultivation. Thus slowing down, but not reversing the process. When a field was previously planted with cereals or fallowed most farmers in the PLUS project areas traditionally would burn off the field to destroy weeds and the crop residues before planting again. This seriously reduces the quantity of organic matter returned to the soil let alone the quantities of nutrients. As a result of technical advice from PLUS project staff a number of farmers have stopped this burning and are either directly incorporating the residues into their fields or burying them in improved *ramp pay* on top of which a higher value crop is planted.

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[9]Young A. 1976. *Tropical Soils and Soil Survey*. Cambridge University Press.

[10]Young A. 1989. *Agroforestry for Soil Conservation.* Science and Practice of Agroforestry No 4. ICRAF Nairobi Kenya/CAB International Wallingford UK.

Another option is to grow specific plants as a source of 'green manure'. In the case of agroforestry systems this usually involves taking the prunings from nitrogen fixing trees or shrubs and either applying them as a mulch or digging them into the topsoil. Although the PLUS project has advocated using the *Leucaena* hedgerows in this way it would appear to be a minority of the farmers with established hedgerows that have adopted this as a crop production strategy. An alternative option is to grow a herbaceous crop, usually a legume, specifically for the purpose of hoeing or ploughing it into the soil. This would have the effect of very short 'enriched' fallow with the crop typically occupying the land for no more than 12 months. CARE staff mentioned that they had tried promoting the use of such cover crops but had limited success with getting farmers to adopt the practice. This option should be reconsidered and a wider range of cover crops reviewed to see if more farmer acceptable varieties and management practices could be developed.

The planting of a grass ley as part of a crop/livestock production system has economic value with proven capabilities of improving the properties of agricultural soils. Organic matter levels are raised by means of root exudation and the incorporation of the grass at the end of the ley. Grass roots also have a marked and beneficial effect on soil structure. The inclusion of a pasture legume with the grass seed, while not only improving the quality of the ley for livestock production, will also improve the soil's nitrogen status. So far the PLUS project has failed to exploit the potential for integrating livestock feed production strategies into the development of conservation effective farming systems.

Vegetation Degradation

Vegetation degradation is usually regarded as a reduction in the available biomass, and decline in the vegetative ground cover, as a result of deforestation and overgrazing. Such degradation is thought to be a major contributory factor to soil degradation within Haiti, particularly with regard to soil erosion and loss of soil organic matter. These, and other forms of land degradation that follow the loss of the vegetative cover, may reinforce the process of vegetation degradation by lowering the capacity for self-regeneration.

The term also applies in situations where there may be no actual reduction in the quantity of biomass but a reduction in the quality. For instance bush encroachment into grazing lands, and the loss of palatable pasture grasses and their replacement with non palatable species. In such a situation the value of the land will have declined from an agricultural point of view with a decline in its livestock carrying capacity. However the degraded vegetation may still be making a positive contribution to the soil in terms of ground cover and organic matter.

Trees are a significant part of the farming landscape in all the PLUS project sites visited. Some notably the mangoes, breadfruit and palm trees have been planted by farmers at their own initiative (or retained in the case of volunteer seedlings) in their fields. In addition many other trees have been planted around the homestead, along field boundaries and scattered in the fields as a result of the distribution of seedlings and planting material from AOP, AFII and PLUS project nurseries. Although there has been a significant increase in the number of trees in the area this has had only a very local effect on improving the vegetative ground cover. There are still extensive areas of poorly vegetated hillsides in need of revegetation. This could take a proactive form with the PLUS project promoting intensive reforestation efforts (eg. managed woodlots for charcoal production) or by encouraging communities to protect such areas from burning, grazing and other forms of exploitation thereby allowing natural regrowth to restore a protective vegetative ground cover.

Water Degradation

Land degradation, and particularly soil and vegetation degradation, can be expected to have resulted in a deterioration in the quantity and quality of both surface and ground water resources within the PLUS project areas. With less vegetative cover to protect against the impact of raindrops causing surface sealing, a decline in pore spaces resulting from loss of organic matter and loss of structural stability following cultivation, the end result is less rain infiltrating the soil. Runoff increases, stream flows fluctuate more than before (in particular stream flow storm hydrographs are likely to have sharper and greater peaks), flooding becomes more frequent and extensive. Groundwater recharge decreases, streams and springs may cease and the water table is likely to drop so that wells and boreholes may dry up. Increased runoff encourages hillside erosion while an increase in severity of flash flooding encourages stream bank erosion. The end result is an increase in river sediment loads and downstream sedimentation problems.

The implications of water degradation for sustainable agriculture are serious. With less water entering the soil and being stored for use during dry periods, crop yields will fall. In the semi-arid regions of Haiti this may mean the difference between success or failure in producing a worthwhile crop. The distribution of rainfall within individual cropping seasons in Haiti is commonly erratic and in such a situation plant yields will be reduced more by a shortage of soil moisture than they are by loss of soil. The yield benefits realised by farmers as a result of installing hedgerows, rock walls and gully plugs can be attributed to improved rain water management, notably water conservation, rather than on soil conservation per se.

Climate Deterioration

Although the short-term effects of land degradation in Haiti are serious, it has been suggested that loss of vegetative cover and soil degradation may also be disrupting long-term rainfall patterns and increasing the likelihood of drought. Given the climatic fluctuations that occur naturally, and a shortage of reliable meteorological records within the PLUS project areas, it is not possible to say what if any climatic changes may have occurred as a result of project activities.

Computer models suggest there are three ways in which deforestation and soil degradation may reduce rainfall:

- Firstly overcultivation, overgrazing and deforestation can all strip soil of vegetation. Bare soil and rock reflect more solar radiation back into the atmosphere than do grass, shrubs and trees. Increased reflectivity (albedo) keeps the atmosphere warmer, disperses cloud and reduces rain.
- Secondly a general lowering of soil moisture could itself suppress rainfall. Much of the rain in tropical moist forests comes from water evaporated off the vegetation, and not from outside. Wholesale clearing of rain forest breaks this hydrological cycle and may well produce a drier local climate.
- Thirdly deforestation and loss of topsoil structure allows the wind to throw more dust into the air. This dust reduces the amount of sunshine reaching the earth's surface, which would have the same rain-reducing effect as bouncing more solar radiation back off the earth's surface.

It is therefore theoretically possible that, by tackling the problems of deforestation and soil degradation, PLUS could have a positive impact on the local climate. Irrespective of possible

macro climatic changes project activities may help in places to ameliorate microclimatic conditions thus improving soil conditions for the benefit of crop production. For instance the windbreak and shading effect of trees in the farmlands, and mulching with crop residues and leaves will have helped to reduce soil surface temperatures and conserve moisture.

Soil Productivity

There has been a tendency in the past to place too much emphasis on assessing soil degradation on the basis of the weight (or volume) of soil lost, expressed in tonnes of soil lost per hectare, or millions of tonnes of sediment carried by rivers. The real issue is not the amount of soil lost or the area of land degraded, but the effect of this loss on the productivity of the land. Around the world innumerable experiments have sought to quantify erosion, but only a handful have measured the loss of plant nutrients, and even fewer have attempted to correlate the nutrient loss with productivity.

In the context of agricultural soils, productivity can be defined as the productive potential of the soil system that allows accumulation of energy in the form of vegetation (crops, pastures, trees and shrubs) of value to farmers. Soil productivity is a function of many factors including individual soil parameters, climate, vegetation, slope and management. It is a central element to any discussion on sustainable soil use because productivity implies the potential for future agricultural production.

Soil productivity, like soil fertility, is a real property of the soil, but is incapable of direct physical measurement. Crop yield is therefore commonly taken as a useful proxy indicator of soil productivity because of its measurability, its relevance to farmers and planners, and the possibility to quantify it in monetary terms.

There is no single parameter that will consistently explain the loss of yield potential following soil degradation. The most important factors within the PLUS project areas would appear to be:

- adverse changes in the chemical and biological status of the soil, eg. depletion of nutrients, loss of organic matter;
- reduction in the water available to plants due to a) reduced soil depth as erosion brings limiting horizons (those that provide a lower limit to rooting depth) progressively nearer to the surface, and b) reduced water capacity of the remaining soil, as the coarser particles, that remain following selective removal, by erosion, of the organic matter and fines have a lower ability to retain water;
- decline in structural stability and increase in bulk density eg. crusting, compaction and decrease in porosity will influence seedling emergence and root development.

It has long been accepted that the productivity, or yield potential of soils is reduced by erosion[11]. However past erosion research has focused mainly on rates of soil loss, the detailed processes, and the variables which might be used to estimate rates. Research is still

[11]For reviews of the evidence see: Stocking M.A. 1984. *Erosion and Soil Productivity: A Review.* Consultants' Working Paper No. 1. AGLS FAO Rome. Stocking M.A. & Peake L. 1985. *Erosion-induced Loss of Soil Productivity: Trends in Research and International Cooperation.* In Pla Sentis I. [editor] *Soil Conservation and Productivity.* Paper to 4th International Soil Conservation Conference, Venezuela. FAO/Overseas Development Group, Norwich.

largely focused on the causes and description of erosion, with as yet far less attention given to the consequences. Despite this there is an emerging consensus[12] that:

- erosion rate is a poor indicator of impact as measured by crop yield;
- erosion can have a large impact even when rates of erosion are low (applies particularly in the tropics); and
- assessments of soil erosion need to be quantified in order to generate data which can allow an economic value to be calculated.

It is clear from the work undertaken so far that there is no simple equation that can be used to calculate that a soil loss of 'x' mm (or tonnes/ha) will result in a 'y' kg/ha reduction in crop yield. In this regard the SPIs that monitor yield changes within farmers fields are a better indicator of the PLUS project's impact on soil productivity than those that seek to measure the volume of soil caught behind individual hedgerows, rock walls or gully plugs.

Whereas there is a clear link between soil erosion and yield decline there is more to the maintenance of soil productivity than simply the installation of runoff control measures. In the past such sayings as 'soil conservation must be done before yields can rise', and 'soil conservation raises yields', have been used to justify the instillation of conservation structures in farmers' fields. If a runoff control conservation barrier is all that is recommended in the name of sustaining soil productivity, then farmers are being deceived. Even where land is 'protected' by hedgerows and rock walls mismanagement of the interbank areas, resulting in adverse changes in the chemical, biological and physical properties of the soil (eg. nutrient loss, decline in organic matter, crusting, compaction etc), will see productivity continuing to decline.

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[12]See: Stocking M.A. & Sanders D.W. 1992. *The Impact of Erosion on Soil Productivity.* Proceedings of the 7th International Soil Conservation Conference, Sydney.

Appendix 7

Capturing the Bio-physical Dimension of PLUS

It is essential that the PLUS M&E system should capture the bio-physical dimension of the project. It is believed that bio-physical data is needed for two major purposes within the PLUS M&E system. Firstly to determine the extent to which project performance is influenced by the bio-physical factors at play within the different project areas (eg seasonal and spatial variations in climate, as well as differences in slope and soil type will all affect the impact of specific project interventions). Secondly to monitor and evaluate changes in some of those factors (eg. soil biological, chemical and physical properties, soil erosion) as a result of the project's activities.

In addition a knowledge of the bio-physical conditions within the different PLUS project concentration areas is essential for M&E purposes in order to determine the extent to which project performance is influenced by the beneficiaries natural, as opposed to socio-economic, circumstances. A failure to achieve target outputs may not be because the project staff failed to organise their work programme in an optimal manner. Instead it may be that specific technical recommendations (eg. hedgerows and rock walls on steep slopes) were unsuited to the prevailing bio-physical conditions of particular project localities.

It is recommended that the existing baseline data sets should be expanded to include basic information on the bio-physical conditions within each of the localities where the project has field activities (the CARE and PADF concentration areas). A separate bio-physical database should be compiled for each discrete project area.

CARE and PADF have already recognised the need to target interventions according to the constraints and opportunities of the different agro-ecological niches[1] currently exploited by participating farmers within their project concentration areas. This agro-ecological dimension needs to be incorporated into the monitoring of the PLUS project. It is therefore recommended that, as part of the base line bio-physical studies, each geographic area in which project activities are located should be subdivided into separate land management units (LMUs). This will enable any land use changes detected as a result of regular monitoring to be stratified according to the LMU in which they occur. The information in the bio-physical database should form the basis for defining, and demarcating onto a topographic base map, the individual land management units within each project area.

Individual LMUs can be defined as discrete geographic areas[2] in which the bio-physical conditions (eg. climate, soil type and topography) are regarded as sufficiently similar that for practical land use management purposes they can be treated as uniform. Within each unit there may be a certain amount of variation especially concerning soil properties and slope, but any such differences will be either minor or restricted to small areas of an otherwise uniform unit for which it is impractical to develop separate land management recommendations. Different land units would be recognised where it is thought the bio-physical properties are sufficiently different to affect the choice of, or management practices associated with, specific project interventions.

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[1]Different niches arising due to micro level differences in slope, soil type, climate etc.

[2]ie. land units whose boundaries can be recognised on the ground and delineated on a topographic map. They are broader that agro-ecological units in recognising differences in management requirements for sustainable land use as a key factor in their definition.

Basic guidelines for defining such land management units are:

- they should conform to the farmers traditional criteria for classifying differences in their local bio-physical environment[3];
- they should be as homogenous as possible, ie. any variation in the bio-physical conditions within a unit should be within defined limits, hence not require different land use management recommendations according to local differences in, for instance, soil type or slope;
- they should be of practical value, ie separate areas where differences in the natural conditions are such as to affect the choice of land use enterprise and/or require the adoption of different land management practices;
- differences between units should be based on features that the field agents and agronomes could recognise in the field when advised what to look for, eg. differences in soil colour, texture, drainage, slope, vegetation, etc.

The attached worksheets can be used for documenting the baseline bio-physical characteristics of each of the CARE and PADF concentration areas. The data would be expected to come from existing secondary sources (eg. meteorological reports, natural resource surveys), analysis of the topographic maps (for slope and landforms), the knowledge of local key informants (farmers and PLUS field staff) and focused participatory mapping and transect exercises. It is estimated that at most the compilation of the baseline bio-physical database using these worksheets would require 5 mandays per concentration area. This work should be done as a priority activity in 1995. The work to be undertaken by PADF and CARE technical staff at the regional level with the support as required of SECID and headquarters technical staff in accessing secondary data and information from the USAID GIS.

Note these worksheets contain sections for compiling an ideal bio-physical data set. It is recognised that not all of the data may be available from secondary sources. If not then, an effort should be made to fill the gaps by collecting additional data. However this work should be restricted to the type of data that can be readily recorded, measured or estimated during the course of a rapid participatory field survey. The final contents of the baseline data set will be a pragmatic compromise between the ideal and what is practical. That means working with the available data while being aware of its limitations.

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[3]This requires the use of participatory appraisal techniques to tap into and document farmers own criteria for classifying differences in the bio-physical factors that affect their farming systems. Different land forms and soil types may be classified by farmers, and given specific names according to their suitability for different land uses. As far as possible these indigenous classifications should form the basis for recognising and defining the different land management units in the baseline bio-physical survey.

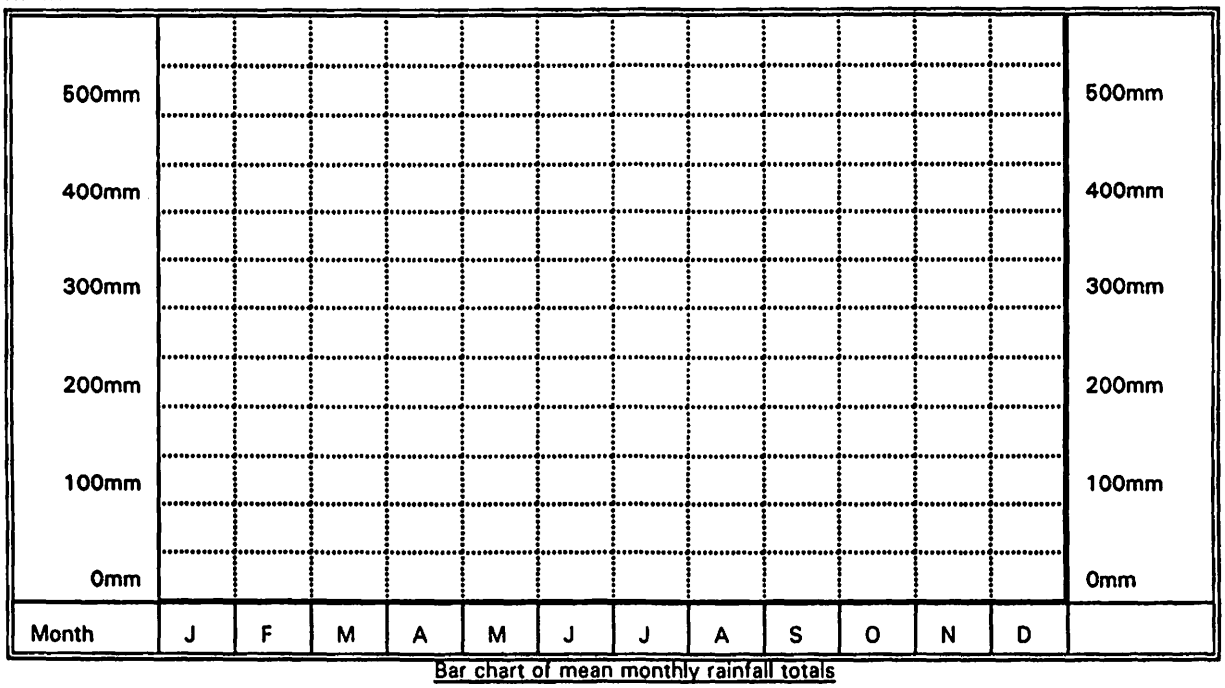
BIO-PHYSICAL DATA BASE

Location (PLUS Project concentration area):	
Total area:	

Climate Characteristics

Data source (recording station used)	Rainfall		Reliability	
	Temperature		Reliability	

Rainfall



Bar chart of mean monthly rainfall totals

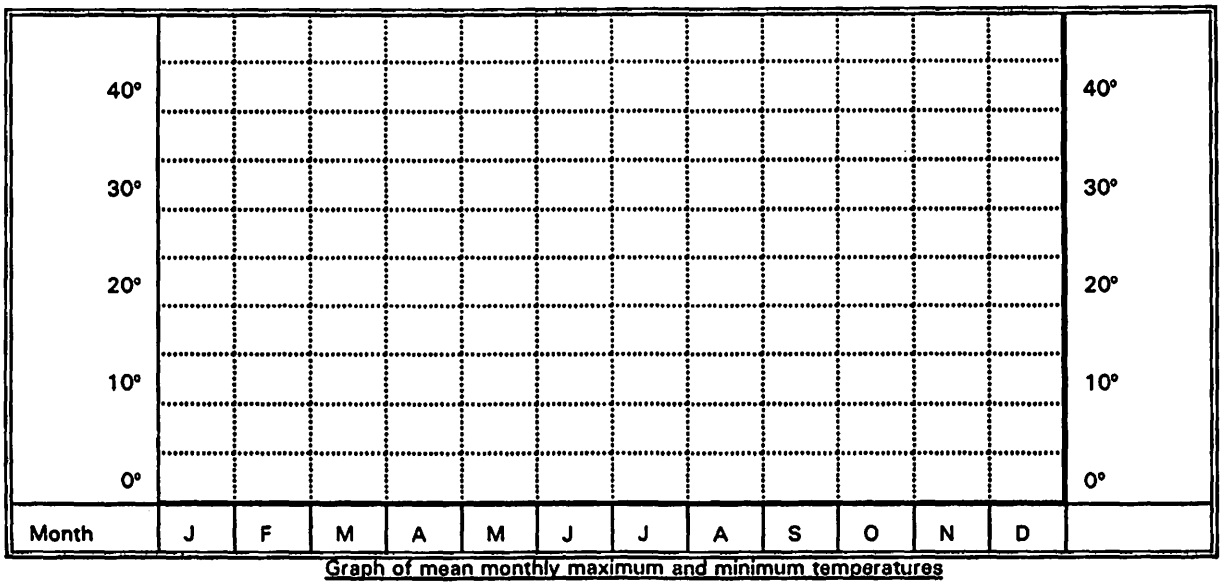
Mean annual rainfall total		
	First cropping season	Second cropping season
Total seasonal rainfall		
Normal onset of rains		
Normal end of rains		
Average length of growing season		
Rainfall reliability and distribution within season		
Likely variation between seasons		
Months when rainfall occurs at erosive intensities[1]	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....	
Mean monthly evaporation	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....	
Mean monthly potential evapotranspiration	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....	
Mean monthly relative humidity	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....	

[1] A qualitative proxy indicator would be the months when daily rainfall totals exceeding 25mm can be expected to occur.

Bio-physical Data Base

Worksheet 2

Temperature



Graph of mean monthly maximum and minimum temperatures

Mean annual temperature			
Mean monthly maximum temperature	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....		
Mean monthly minimum temperature	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....		
Mean monthly day time temperature	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....		
Mean monthly night time temperature	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....		
Mean highest extreme temperature		Time of year expected	
Mean lowest extreme temperature		Time of year expected	

Other Climatic Variables & Hazards

Average windspeed (m/s)	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....
Annual maximum potential wind speeds	
Wind direction	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....
Incidence of tropical cyclones & hurricanes	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....
Incidence of other climatic hazards (eg. hail)	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....

Bio-physical Data Base

Worksheet 3

LAND CHARACTERISTICS

Land Management Unit	Area of LMU	% of total project area
LMU 1		
LMU 2		
LMU 3		
etc		
Grand total		100%

Note a separate set of worksheets should be compiled on the land characteristics of each land management unit within the PLUS project concentration area.

Bio-physical Data Base

Worksheet 4

Land Characteristics

Altitude	
Landforms/topography	
Drainage pattern	
Relative relief	
Prevailing slopes	

Soil Characteristics

Soil type				
Parent material				
Effective depth				
Profile drainage/ permeability				
Texture	Topsoil		Subsoil	
Soil colour				
Structure & consistence				
Surface conditions				
Rooting conditions				
Limiting material				
Chemical properties	pH		O.M. %	
	N %		P ppm	
	K meq		C.E.C	
	Base saturation		Salinity/ toxicity	

Land Capability

Dominant land capability class(es)	
Principle limitations	

Land Use

Major kinds of land use	
Land utilisation types	

Bio-physical Data Base

Worksheet 5

Vegetation

Natural vegetation types	
Current status	
Common exotics	

Water Resources

Perennial surface water resources		Reliability[1]	
Seasonal surface water resources		Reliability[1]	
Groundwater resources		Reliability[1]	

[1] Months of the year when the quantity of water available from this source was adequate to meet local needs.

Pests and Diseases (type and effect)

Pests and diseases of crops	
Pests and diseases of livestock	
Pests and diseases of tree crops	
Human environmental health hazards	

Bio-physical Data Base

Worksheet 6

Land Degradation

Extent and severity of existing soil erosion	Sheet erosion	
	Rill erosion	
	Gully erosion	
	Stream bank erosion	
	Mass movement (type, status & severity)	
Erosion hazards		
Other forms of soil degradation		
Degradation status of forest/ woodland areas		
Degradation status of grassland areas		
Degradation status of water resources		

Appendix 8

Guidelines for the Monitoring & Evaluation of Better Land Husbandry

a) Conservation Effectiveness

The overall conservation effectiveness of farmers land use/management practices should be used as the basic criteria for determining the environmental impact of the PLUS project interventions. Each intervention should be assessed qualitatively, in the context[1] in which it is applied, according to whether it is:

- **conservation effective** - ie. the intervention is believed to have directly or indirectly contributed to the maintenance and enhancement of the soil's productivity and prevented further land degradation;

- **conservation neutral** - ie. the intervention is believed to have had no significant direct or indirect impact (beneficial or negative) on the present and future soil productivity or land degradation; or

- **conservation negative** - ie. the intervention is believed to have directly or indirectly contributed to a decline in soil productivity and further land degradation.

The underlying philosophy of the PLUS project is that it is possible to combat land degradation through the adoption of improved productive land use practices that are both financially attractive and conservation effective. With this aim in mind PLUS is currently promoting the following interventions:

- Alley cropping/hedgerows
- Rock walls
- Gully plugs/check dams
- Fruit tree grafting
- Bio-intensive vegetable gardens
- Tree planting
- Distribution of improved seeds and planting material

To qualify as better land husbandry practices the above must not only be productive (financially viable in the short term) but also environmentally sustainable (conservation effective over the medium to long term). A key assumption of the PLUS project is that environmental impact monitoring would show that none of the above are conservation negative. It is less certain whether all them are truly conservation effective rather than some being merely conservation neutral.

Some of the interventions, most notably the cross slope barriers, if wrongly implemented and poorly maintained, can lead to increased soil erosion by concentrating runoff at low points. Likewise promoting the use of hedgerows and rock walls as soil and water conservation practices for sustainable hillside farming may give farmers the false impression that by using such measures they can grow annual crops on very steep slopes (over 60% slope) without

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[1]For runoff control and soil conservation measures, such as hedgerows, and rock walls, the context means additionally considering how the land between them is used, for gully plugs it means also assessing land use within the catchment area of the gully, for improved seed/planting material and tree planting it means considering how they are planted (ie. crop and silvicultural practices followed) and where planted (ie. in which plot and where/layout within the plot).

causing soil degradation. In both cases environmental monitoring would show the ultimate effect of such interventions to be conservation negative.

To be conservation effective the intervention should have played a positive role in one or more of the following:

- **improved crop management** - the effect of the adoption of the practice(s) should be to increase the protective ground cover provided by the growing crops (eg. intercropping, early planting, use of improved seed and fertilizer);

- **improved soil management** - the effect of the adoption of the practice(s) should be to increase soil organic matter levels and topsoil erosion resistance (eg. use of animal manure, compost, mulches, incorporation of crop residues and green manures, improved tillage techniques); and

- **improved rainwater management** - the effect of the adoption of the practice(s) should be to reduce surface runoff and increase infiltration (eg. contour strip cropping, tied ridges, hedgerows and other cross slope barriers).

It is not possible to prepare a definitive set of guidelines with precise criteria as to what makes a particular intervention or land use practice conservation effective, conservation neutral or conservation negative. The assessment will of necessity be subjective and rely on the personal experience and judgement of the assessor. The following suggestions are given as to some of the key factors that should be considered when seeking to assess the conservation effectiveness of a particular project intervention and its associated land use(s) and management practices. It is believed that the following notes would assist with the monitoring and evaluation of the environmental impact, at both the individual plot (micro) and farm household level, of individual interventions or changes in land use as a result of project interventions.

1. Crop management considerations

Improved crop management indicators	Conservation effective	Conservation neutral	Conservation negative
Change in percentage ground cover provided by the growing crop(s)[1]	Net increase in the groundcover provided by annual crops - at least 40% cover achieved within 30 days of the start of the rainy season	No change in the percentage ground cover provided by annual crops during the cropping season	Decrease in percentage ground cover provided by annual crops - ground cover remains below 40% for most of the cropping season
Intercropping/relay cropping	Change in existing intercropping/relay cropping practices leading to improved groundcover and/or increase in the ratio of legumes (N fixing) to N demanding crops	No change	Change in existing intercropping/relay cropping practices leading to a reduction in groundcover and/or decrease in the ratio of legumes (N fixing) to N demanding crops
Spacing/plant density	Improvement in ground cover through closer crop spacing/increased plant density per unit area	No change	Reduction in ground cover due to wider crop spacing/decrease in plant density per unit area
Improved seed/planting material	Adoption of improved seed/planting material results in the production of more biomass and better ground cover than farmers traditional variety	No change in crop biomass and ground cover	Adoption of improved seed/planting material results in the production of less biomass and inferior ground cover than farmers traditional variety
Fertiliser and/or organic manures	Increase in the quantity of fertiliser and/or organic manures used resulting in the production of more crop biomass and better ground cover	No change in the quantity of fertiliser and/or organic manures used for crop production	Reduction in the quantity of fertiliser and/or organic manures used resulting in the production of less crop biomass and poorer ground cover
Crop residues	Crop residues incorporated into the soil or retained on the soil surface as a protective mulch	Not applicable	Crop residues burnt or fed to livestock

[1] Researchers and field survey organisations in a number of countries have compiled photostandards showing examples of different percentages of ground cover provided by the crop canopy and/or the residues. These photostandards are used in the field to assist in estimating the percentage ground cover in individual plots. For guidelines on how to prepare such photostandards see Molloy J.M. and Moran C.J. 1991 *Compiling a field manual from overhead photographs for estimating crop residues cover.* Soil Use and Management Vol 7 No. 4 pp 177-183. (Published by the British Society of Soil Science). It is recommended that SECID should investigate the possibility of preparing a set of such photostandards for use by PLUS M&E staff.

2. Soil Management Considerations

Improved soil management indicators	Conservation effective	Conservation neutral	Conservation negative
Soil organic matter	Project interventions & good land husbandry practices that enhance soil organic matter levels eg.: a) incorporation of all crop residues; b) application of at least 3 tonnes/ha/yr of compost and/or animal manure; c) application of at least 5 tonnes/ha/yr of fresh green manure (eg. leucaena prunnings)	Project interventions & other land husbandry practices that maintain (but not raise) soil organic matter levels eg.: a) grazing livestock on the crop residues in situ b) application of compost and/or animal manure but a rate below 3 tonnes/ha/yr; c) application of fresh green manure (eg. leucaena prunnings) but at a rate below 5 tonnes/ha/yr.	Poor land husbandry practices associated with specific interventions that continue the reduction in soil organic matter levels eg.: a) removal or burning of all crop residues; b) no application of compost and/or animal manure; c) no application of green manure (all hedgerow biomass removed as fuel and fodder)
Soil chemical properties	Project interventions & good land husbandry practices that replace lost[1] soil nutrients eg.: a) application of compost and/or animal manure; b) use of N fixing species (crop rotation & intercropping with legumes, N rich green manures and hedgerows); c) enriched fallows; d) application of chemical fertilizer (as a supplement to but not replacement for organic manures)	Traditional low input fertility management practices capable of achieving low levels of nutrient replenishment eg.: a) short bush fallow; b) tethered grazing of livestock within farm plots on crop residues and weeds c) retention of a few scattered trees on the croplands	Poor land husbandry practices associated with specific interventions that continue the depletion of soil nutrients eg: a) continuous cultivation of cereal and root crops; b) burning of crop residues c) little if any use of compost, organic manures or chemical fertilizer
Soil physical properties	Project interventions & good land husbandry practices that maintain and enhance topsoil structure eg.: a) minimum tillage b) planted pasture and enriched fallows c) incorporation of crop residues, compost, animal manure, green manures and tree litter	Traditional low input land husbandry practices that neither combat nor promote the physical degradation of the soil eg.: a) partial tillage b) short bush fallow; c) retention of a few scattered trees on the croplands	Poor land husbandry practices associated with specific interventions that continue the physical degradation of the soil eg.: a) excessive tillage b) continuous cultivation c) no incorporation of any organic matter d) surface trampling by people and livestock

[1] Lost by leaching, topsoil erosion and removed in the harvested products.

3. Rainwater Management Considerations

Improved rainwater management indicators	Conservation effective	Conservation neutral	Conservation negative
Reduction of runoff volume and velocity	Project interventions and good land husbandry practices that significantly reduce surface runoff volume and velocity eg: a) contour cultivation; b) increased surface roughness (litter, stone mulch, soil clods); c) in situ entrapment of rainwater (tied crop ridges, pits and micro basins); d) permeable cross slope barriers to slow down but not totally arrest runoff (hedgerows, grass strips, trash barriers, rock walls); e) impermeable cross slope barriers to check all runoff (contour ditches, earth banks).	Project interventions and associated land husbandry practices that neither reduce nor increase runoff eg.: a) tree planting in anything other than closely spaced hedgerows b) Bio-intensive gardens	Poor land husbandry practices associated with specific interventions that concentrate and speed up runoff eg.: a) up & down slope cultivation; b) poor alignment and maintenance of cross slope barriers; c) extensive hillside cultivation with no soil and water conservation to reduce effective slope length.
Infiltration	Project interventions and good land husbandry practices that increase infiltration eg.: a) maintenance of an open structure on the soil surface through appropriate tillage and organic matter management practices; b) in situ entrapment of rainwater (tied crop ridges, pits and micro basins); c) permeable cross slope barriers to slow down but not totally arrest runoff (hedgerows, grass strips, trash barriers, rock walls); d) impermeable cross slope barriers to check all runoff (contour ditches, earth banks).	Project interventions and associated land husbandry practices that neither reduce nor increase infiltration eg.: a) tree planting in anything other than closely spaced hedgerows b) Bio-intensive gardens	Poor land husbandry practices associated with specific interventions that reduce infiltration eg.: a) up & down slope cultivation; b) poor construction and maintenance of infiltration structures leading to filling in of ditches and breaching of cross slope barriers; c) no incorporation of any organic matter; d) surface compaction due to trampling by people and livestock.

b) Use of Qualitative Visual Indicators for Estimating the Status, Type and Severity of Soil Erosion

Monitoring changes in the status, type and severity of erosion within the PLUS project areas will provide a means for evaluating the impact of the project interventions on the bio-physical environment. Such changes can be monitored at:

- the individual plot/micro level;
- the farm household level (total farm holding); and
- the macro geographic area level (based on the topographic boundaries of a mini-watershed or the social/cultural boundaries of a participating community).

It is recommended that erosion changes be monitored, for each level, at the end of each cropping/rainy season (ie. twice a year). The monitoring visits should be combined with those for collecting data for the socio-economic impact M&E. Qualitative estimates would be made during these visits by the use of direct observation in individual farmer's fields and when undertaking representative participatory transects (ie. walking through an area with a group of farmers and discussing with them observable land use changes and visual indicators of land degradation). Note data on changes should be recorded on a land management unit basis rather than just for the total project area.

The following notes provide examples of some visual parameters that it is believed could be used for assessing qualitatively the state and severity of erosion. Such visual parameters call for the observer to make a subjective visual assessment based on his/her past experience and local knowledge. It is not possible to give quantitative or precise definitions of what constitutes slight, moderate or severe erosion. There is therefore an element of imprecision in this approach, in that it is possible for different observers to arrive at different classifications for the same area. However it is believed that a degree of uniformity can be achieved by different observers through shared training and field experience.

State of Erosion

A	*Active*	one or both of the following conditions apply: evidence of sediment movement; sides and/or floors of erosion form(s) [eg. rills, gullies] are relatively bare of vegetation.
B	*Partly Stabilised*	evidence of some active erosion but also some evidence of stabilisation.
C	*Stabilised*	one or both of the following conditions apply: no evidence of sediment movement; sides and/or floors of erosion form(s) are revegetated.

Sheet Erosion

Sheet erosion is the relatively uniform removal of soil from an area without the development of conspicuous channels. Indicators of sheet erosion include pedestalling[1], root exposure, exposure of subsoils, soil deposits against field boundaries, hedge rows and conservation structures down slope.

X	Not apparent	No obvious signs of sheet erosion but evidence of minor sheet erosion may have been masked by for instance recent tillage.
0	No sheet erosion	No visual indicators of sheet erosion.
1	Slight	Some visual evidence of the movement of topsoil particles downslope through surface wash; no evidence of pedestal development; only a few superficial roots exposed.
2	Moderate	Clear signs of the transportation and deposition of topsoil particles downslope through surface wash; some pedestalling but individual pedestals no more than 5 cms in height; some tree and crop roots exposed within the topsoil; evidence of topsoil removal but no subsoil horizons exposed.
3	Severe	Clear evidence of the wholesale transportation and deposition of topsoil particles downslope through surface wash; individual pedestals over 5 cms in height; extensive exposure of tree and crop roots; subsoil horizons exposed at or close to the soil surface.

[1] Pedestalling occurs when an easily eroded soil is protected from splash erosion by a stone or tree root, isolated pedestals capped by the resistant material are left standing up from the surrounding ground. Providing there is little or no undercutting at the base of the pedestal then the removal of the surrounding soil is the result of splash erosion rather than by surface flow.

Rill Erosion

A rill is a small channel less than 300 mm deep which can be completely smoothed out by cultivation with animal or machine drawn implements, although traces (depression lines within the field) may remain where all cultivation is done by hand.

0	No rill erosion	No rills present within the field.
1	Slight	A few shallow (< 100mm depth) rills affecting no more than 5% of the surface area.
2	Moderate	Presence of shallow to moderately deep rills (<200mm depth) and/or rills affecting up to 25% of the surface area.
3	Severe	Presence of deep rills (up to 300mm depth) and/or rills affecting more than 25% of the surface area.

Gully Erosion

A gully is a channel 300 mm or more deep. It will provide a physical impediment to the movement, across the slope, of animal or machine drawn farm implements. It cannot be smoothed out in the course of normal cultivation.

0	No gully erosion	No gullies present within the field.
1	Slight	A few shallow (<0.5m depth) gullies affecting no more than 5% of the surface area.
2	Moderate	Presence of shallow to moderately deep gullies (0.5-1.0 m depth) and/or gullies affecting 5 - 25% of the surface area.
3	Severe	Presence of deep gullies (>1m depth) and/or gullies affecting more than 25% of the surface area.

Stream bank Erosion

Occurs along the side of banks of rivers and streams and contributes directly to the sediment load of the river system. Can be severe during floods when a considerable volume of water is flowing at great speed.

0	No stream bank erosion	Stream bank with close to 100% vegetative cover and no active erosion (rill and/or gully erosion) on the bank. Little if any signs of undercutting on the outer bends of meanders and little active deposition of sediment on the inside.
1	Slight	Limited loss of vegetative cover (>80% cover remaining) and no worse than slight erosion on the mid to upper portion of the stream bank. <5% of the meanders over a 1km stretch with active undercutting of only the lower portion of the bank on the outer bends of meanders and some deposition of sediment on the inside.
2	Moderate	Moderate loss of vegetative cover (50-80% cover remaining) and slight to moderate erosion on the mid to upper portion of the stream bank. 5-15% of the meanders over a 1km stretch with active undercutting that may extend into the mid portion of the bank on the outer bends of meanders and moderate deposition of sediment on the inside.
3	Severe	Severe loss of vegetative cover (<50% cover remaining) and moderate to severe erosion on the mid to upper portion of the stream bank. >15% of the meanders over a 1km stretch with active undercutting extending up to the upper portion of the bank on the outer bends of meanders and heavy deposition of sediment on the inside.

Mass Movement

This includes all relatively large down-slope movement of soil, rock or mixture of both, eg. landslides, slumps, earth flows and debris avalanches. This category of land degradation would be described for relatively large land units, such as watersheds, rather than for individual fields.

Status

A	*Active*	Landslide scars clearly visible with sharp boundaries and less than 10% vegetation cover within the landslide area.
B	*Partly Stabilised*	Landslide scars clearly visible with vegetation cover between 10-50% of the area of landslide.
C	*Stabilised /Inactive*	Landslide scars still detectable but no longer with sharp boundaries and with greater than 50% vegetation cover within the land slide area.

Severity

0	No mass movement	No visible evidence of mass movement.		
P	Present	1	Slight	Isolated examples of mass movement. Individual events small in size and/or affecting less than 0.1% of the total area.
		2	Moderate	A moderate number of mass movement events. Individual events small to moderate in size and/or affecting 0.1-1.0% of the total area.
		3	Severe	Significant number of mass movement events. Individual events may be large in size and/or affecting over 1% of the total area.

c) Better Land Husbandry Rating

The assessments of firstly the conservation effectiveness of particular interventions and secondly the status, type and severity of soil erosion can be used as the basis for arriving at an overall better land husbandry rating. Such a rating would of necessity be subjective but it would enable a qualitative assessment to be made of the overall environmental impact of the project. Its main purpose with regard to the PLUS M&E system would be provide a clear indication as to the extent with which the land use management practices on a particular plot, individual farm holding or over a wider geographic area conform to the principles and practice of better land husbandry. If they do then they would be in line with the projects goal and purpose and could be used as an indicator of success.

The degree to which the land use management practices conform to the principles and practice of better land husbandry would correspond to the following ratings:

Rating	Criteria	Score
Excellent	The land husbandry practices are exemplary	4
Good	The land husbandry practices are of acceptable quality	3
Fair	The land husbandry practices give some cause for concern and require minor corrective action	2
Poor	The land husbandry practices give major cause for concern and require considerable corrective action	1
Very poor	Conforms to none of the requirements for better land husbandry	0

The following tables provide indicative guidelines for determining the specific better land husbandry rating. Note in arriving at an individual rating it would not be necessary for the land use management practices within the area being assessed to conform to every one of the factors listed. Likewise the assessment can be applied to areas in which there are currently no project soil and water conservation interventions. For instance an area of gently sloping land with deep well drained soils used for arable farming could still be rated as excellent even if no hedgerows, rock walls or other soil and water conservation structures had been installed providing all the crop husbandry practices followed conformed to the requirements for better land husbandry.

Rating	Description	Score
Excellent	A. No evidence of active erosion. Gullies - if present - completely stabilized and healed. B. Ground cover provides the best protection against splash erosion that could be expected given the prevailing climate 1. croplands - annual crops achieve at least 40% ground cover within 20 days of the start of the rainy season 2. pasture - grasses are evenly and closely spaced with no bare areas 3. woodland - mature trees, closed canopy and continuous litter layer C. Land management exemplary 1. Crop husbandry a) contour cultivation and minimum tillage b) use of improved varieties c) optimum crop spacing/plant density d) high ratio of legumes (N fixing) to N demanding crops e) optimum plant nutrition (minimum 5 tonnes/ha/yr of compost/animal manure or minimum 10 tonnes/ha/yr green manure from hedgerows supplemented as needed with chemical fertilizer) f) all crop residues returned to the soil g) crop rotation incorporating a 2-3 year pasture ley or enriched fallow h) no annual crop production on land with a slope greater than 30% 2. Pasture a) use of improved pasture management practices (eg. controlled grazing) b) use of improved pasture species (grasses and herbaceous legumes) c) on farm forage production with contour hedgerows and grass strips used on a cut and carry basis (zero grazing) 3. Trees a) Closed canopy multi-storey home garden with a good ground level herbaceous and litter layer b) Minimum of 30 mature trees per ha as scattered or boundary plantings within the cropped lands c) Well managed woodlots/orchards with retention of the litter below the trees 4. Water a) streams run clear during the rains b) springs flow for 12 months of the year D. Project soil and water conservation interventions of exemplary quality 1. Initial construction/establishment a) follow the contour b) all the stems of the shrubs (in the hedgerows) and/or the perennial crops (in the bandes mange) close enough together to function as a cross slope runoff control barrier c) rock walls and gully plugs well constructed and stable d) no gaps or low points 2. Maintenance a) gaps filled and storm damage speedily repaired b) rock walls, gully plugs and earth banks raised in line with the rate at which soil accumulates behind them c) no signs of rill or sheet erosion immediately below individual hedgerows, rock walls and earthbanks, no active gullying within the plugged gullys	4

Rating	Description	Score
Good	A. Evidence of slight sheet and/or rill erosion. No active gullying. B. Ground cover still provides reasonable protection against splash erosion but some scope for improvement 1. croplands - annual crops achieve at least 40% ground cover within 30 days of the start of the rainy season 2. pasture - may be the occasional bare spots in an otherwise continuous grass sward 3. woodland - mature trees, open canopy with an almost continuous ground layer of herbs and leaf litter C. Land management good 1. Crop husbandry a) contour cultivation and minimum tillage b) use of improved varieties c) slightly below optimum crop spacing/plant density d) ratio of legumes (N fixing) to N demanding crops is still good but scope for improvement e) good plant nutrition (minimum 3 tonnes/ha/yr of compost/animal manure or minimum 5 tonnes/ha/yr green manure from hedgerows supplemented as needed with chemical fertilizer) f) all crop residues returned to the soil g) crop rotation incorporating a partially enriched fallow of no more than 2 years h) no annual crop production on land with a slope greater than 30% 2. Pasture a) use of improved pasture management practices (eg. controlled grazing) b) limited use of improved pasture species (grasses and herbaceous legumes) c) on farm forage production with contour hedgerows and grass strips used on a cut and carry basis (zero grazing) 3. Trees a) Partially closed canopy multi-storey home garden with a moderately good ground level herbaceous and litter layer b) Minimum of 20 mature trees per ha as scattered or boundary plantings within the cropped lands c) Moderately well managed woodlots/orchards with retention of most of the litter below the trees 4. Water a) streams run clear in rainy season except during very severe storm events b) springs flow for all but 1-2 months of the year D. Project soil and water conservation interventions of acceptable quality 1. Initial construction/establishment a) follow the contour b) Over 90% of the stems of the shrubs (in the hedgerows) and/or the perennial crops (in the bandes mange) close enough together to function as a cross slope runoff control barrier c) rock walls and gully plugs acceptably constructed and stable d) no major gaps or low points 2. Maintenance a) gaps filled and storm damage repaired within a season b) rock walls, gully plugs and earth banks raised in line with the rate at which soil accumulates behind them c) only slight signs of rill or sheet erosion immediately below individual hedgerows, rock walls and earthbanks, no active gullying within the plugged gullys	3

Rating	Description	Score
Fair	A. Evidence of moderate sheet and/or rill erosion, some slight gully erosion. B. Ground cover provides only fair protection against splash erosion considerable scope for improvement 1. croplands - annual crops achieve at least 40% ground cover but takes more than 30 days from the start of the rainy season 2. pasture - frequent bare spots in patchy grass sward 3. woodland - scrubby regrowth with a fair ground layer of herbs and leaf litter C. Land management fair 1. Crop husbandry a) cultivation approximately on the contour b) limited use of improved varieties c) below optimum crop spacing/plant density d) ratio of legumes (N fixing) to N demanding crops is still good but scope for improvement e) below optimum plant nutrition (animal manure from livestock tethered and grazing in the field, some N from the roots of the hedgerows but no use of prunnings as green manure, no use of chemical fertilizer) f) crop residues burnt with the ashes returned to the soil g) crop rotation incorporating a short bush fallow lasting at most 2 years h) annual crop production may occur on land with steeper slopes (up to 40%) 2. Pasture a) generally uncontrolled grazing on unimproved natural pasture b) very limited on farm forage production from a few contour hedgerows which are generally grazed in situ 3. Trees a) open canopy multi-storey home garden with a patchy ground level herbaceous and litter layer b) between 5-20 trees and shrubs per ha as scattered or boundary plantings within the cropped lands c) no consolidated tree planting in woodlots or orchards 4. Water a) streams are frequently discoloured with silt laden runoff during the rainy season b) springs flow for up to 8 months of the year D. Project soil and water conservation interventions found with minor problems needing correction to improve their conservation effectiveness 1. Initial construction/establishment a) minor problems requiring some corrective action to improve the contour alignment b) 75 - 90% of the stems of the shrubs (in the hedgerows) and/or the perennial crops (in the bandes mange) close enough together to function as a cross slope runoff control barrier c) minor problems requiring some corrective action with regard to the construction of the rock walls and gully plugs d) obvious gaps and low points requiring corrective action 2. Maintenance a) delays in filling gaps and repairing storm damage b) rock walls, gully plugs and earth banks rarely raised to allow for further soil to accumulate behind them c) moderate signs of rill or sheet erosion immediately below individual hedgerows, rock walls and earthbanks, some slight gully erosion still taking place within the plugged gullys	2

Rating	Description	Score
Poor	A. Evidence of moderate sheet and/or rill erosion, with moderate gully erosion. B. Ground cover thin provides little protection against splash erosion and requires improvement 1. croplands - annual crops provide less than 40% ground cover for most of the rainy season 2. pasture - less than 40% cover from a very patchy grass sward 3. woodland - severely degraded with only some scrubby regrowth poor ground layer of herbs and leaf litter C. Land management poor 1. Crop husbandry a) cultivation does not adhere to the contour b) no use of improved varieties c) wide crop spacing/low plant density d) low ratio of legumes (N fixing) to N demanding crops e) no use of animal manure, green manure or chemical fertilizer f) all crop residues burnt or removed from the field for fuel and fodder g) continuous cultivation with only infrequent periods of short bush fallow lasting at most 2 years h) annual crop production commonly on land with steeper slopes (up to 45%) 2. Pasture a) uncontrolled grazing on unimproved natural pasture b) no on farm forage production 3. Trees a) multi-storey home garden comprises only a few trees and shrubs with predominantly annual crops below b) between 1-5 trees and shrubs per ha as scattered or boundary plantings within the cropped lands c) no other tree planting 4. Water a) streams discoloured with silt laden runoff during the rainy season b) springs dry up shortly after the end of each rainy season D. Project soil and water conservation interventions not adopted or found with serious problems needing correction to improve their conservation effectiveness 1. Initial construction/establishment a) serious problems requiring drastic corrective action to improve the contour alignment b) only 50-75% of the stems of the shrubs (in the hedgerows) and/or the perennial crops (in the bandes mange) close enough together to function as a cross slope runoff control barrier c) serious problems requiring major corrective action with regard to the construction of the rock walls and gully plugs d) frequent gaps and low points requiring major corrective action 2. Maintenance a) no attempt to fill gaps and repair storm damage b) rock walls, gully plugs and earth banks very rarely if ever raised to allow for further soil to accumulate behind them c) moderate signs of rill or sheet erosion immediately below individual hedgerows, rock walls and earthbanks, moderate gully erosion still taking place within the plugged gullys	1

Rating	Description	Score
Very poor	A. Evidence of severe sheet and/or rill erosion with moderate to severe gullying. B. Ground cover very thin or absent providing little if any protection against splash erosion 1. croplands - annual crops provide less than 40% ground cover for all of the rainy season 2. pasture - less than 30% cover from a very patchy grass sward 3. woodland - severely degraded with only a few stumps and some scrubby regrowth with little in the way of grass and litter and much bare ground C. Land management very poor 1. Crop husbandry a) cultivation up and down slope b) no use of improved varieties c) very wide crop spacing/low plant density d) very few legumes (N fixing) compared to the quantity of N demanding crops grown e) no use of animal manure, green manure or chemical fertilizer f) all crop residues burnt or removed from the field for fuel and fodder g) continuous cultivation with only infrequent periods of short bush fallow lasting at most 1 year h) annual crop production commonly on land with steeper slopes (over 45%) 2. Pasture a) uncontrolled grazing on unimproved natural pasture b) no on farm forage production 3. Trees a) multi-storey home garden comprises only a few trees and shrubs with predominantly annual crops below b) no trees occurring as scattered or boundary plantings within the cropped lands c) no other tree planting 4. Water a) streams flow intermittently and highly discoloured with silt laden runoff during the rainy season b) springs flow for only short periods during each rainy season D. Project soil and water conservation interventions generally not adopted or in a few cases found with very serious problems needing major correction to improve their conservation effectiveness 1. Initial construction/establishment a) very serious problems requiring replanting or reconstruction to achieve the required contour alignment b) less than 50% of the stems of the shrubs (in the hedgerows) and/or the perennial crops (in the bandes mange) close enough together to function as a cross slope runoff control barrier c) very serious problems requiring the reconstruction of the rock walls and gully plugs d) large gaps and low points requiring major corrective action 2. Maintenance a) no attempt to fill gaps and repair storm damage b) rock walls, gully plugs and earth banks have never been raised to allow for further soil to accumulate behind them c) severe signs of rill or sheet erosion immediately below individual hedgerows, rock walls and earthbanks, moderate to severe gully erosion still taking place within the plugged gullys	0

Training and Consensus Building

The foregoing guideline notes need to be reviewed by SECID, CARE and PADF and as appropriate fine tuned to make them more specific to conditions within the PLUS areas. In order to familiarise project staff with these guidelines it is recommended that PADF and CARE should each organise a two day field meeting for training and consensus building on their use for M&E purposes. Participants in these initial meetings should be the regional managers/team leaders, and regional level M&E and extension (agronomes). During the meeting the participants would be expected to 'field test' the guidelines. This would involve:

- visiting different farm plots and for each plot seeking to review the crop, soil and rainwater management practices used according to their conservation effectiveness;
- to identify at different field locations the current status, type and severity of erosion using the visual indicator guideline notes; and
- finally seeking to determine a better land husbandry rating for both individual fields and broader geographic areas (eg a hillside, watershed or village area).

A major purpose of the field meeting would be to arrive at a consensus understanding as to the qualitative methods and terminology what is meant when such terms as conservation effective they mean by these terms.

These field meetings should be used by SECID, PADF and CARE as an opportunity to review and refine the foregoing notes on the basis of the participants knowledge of conditions within their respective areas. The aim should be to arrive at a consensus on the definition of the terms conservation effective, conservation neutral and conservation negative. Likewise to have degree of uniformity amongst the participants as to how to classify the status, type and severity of erosion in the field. Finally at the conclusion of each meeting there should be a written consensus as to the key factors to be considered when arriving at a better land husbandry rating and how to incorporate this assessment into their M&E work.

Note these two day field meetings should be used to review and field test the suggested worksheets for the project concentration area land husbandry status/monitoring report.

Bio-physical Monitoring and Evaluation Implementation schedule

Year	CARE	PADF	SECID	Special study
1995	2 day field meeting for consensus building and training for regional managers, M&E and extension staff on the better land husbandry rating criteria. Compilation of baseline bio-physical data bases for each project concentration area (5 man days per area - primarily desk top exercise supplemented with 1-2 days of field ground truthing). Pilot exercise to prepare first project area land husbandry status reports (5 man days per area) minimum 3 areas.	2 day field meeting for consensus building and training for regional managers, M&E and extension staff on the better land husbandry rating criteria. Compilation of baseline bio-physical data bases for each project concentration area (5 man days per area primarily desk top exercise supplemented with 1-2 days of field ground truthing). Pilot exercise to prepare first project area land husbandry status reports (5 man days per area) minimum 3 areas.	Develop with CARE and PADF farm household and project area land husbandry status reporting formats (3 man days). Consolidate baseline bio-physical data for whole PLUS project area (2 man days).	Study on use of reconnaissance methods for measuring soil loss and runoff on case study plots. Preparation of photostandards and/or diagrams for estimating ground cover and determining status, type and severity of erosion. Study on participatory methods for farm household/micro level environmental M&E
1996	Preparation of land husbandry status reports for all project areas initially separate from the PD surveys (5 man days per area)	Preparation of land husbandry status reports for all project areas initially separate from the PD surveys (5 man days per area)	Preparation of a consolidated land husbandry status reports for whole PLUS project area (2 man days)	
1997	Preparation of land husbandry status reports for all project areas to be undertaken in association with the PD updates (additional 2 man days per area)	Preparation of land husbandry status reports for all project areas to be undertaken in association with the PD updates (additional 2 man days per area)	SECID prepares exit reports on impact of project interventions on promoting better land husbandry and areal changes in land degradation status	
1998	Continued preparation of land husbandry status reports for all project areas in association with the PD updates (additional 2 man days per area)	Continued preparation of land husbandry status reports for all project areas in association with the PD updates (additional 2 man days per area)		
1999	Preparation of final land husbandry status reports for all project areas (5 man days per area)	Preparation of final land husbandry status reports for all project areas (5 man days per area)		Study of time series yield data as a proxy indicator of changes in soil productivity

Appendix 9

Land Husbandry Status/Monitoring Report

The following worksheets should be used to document the land husbandry status of individual PLUS project concentration areas. They should be completed annually by the M&E and extension staff located at the regional level, in participatory consultation with the local field agents and farmers.

Climatic data should come from the daily rainfall and temperature records collected by the field offices. Data on the conservation effectiveness of farmers land use practices, erosion status and better land husbandry rating should be derived from a range of sources notably the farmer dossiers, case study and household monitoring surveys, as well as from direct observation with the aid of participatory mapping and transects. Information on the status of the areas water resources should come from participatory key informant and group interviews.

Guidelines on conservation effectiveness, the use of visual indicators of erosion and criteria for determining the better land husbandry rating are outlined in appendix 8.

A draft of the status report should be presented for discussion at the annual regional level staff review meeting to enable both extension and M&E staff to comment on the findings and consider the implications for future project activities.

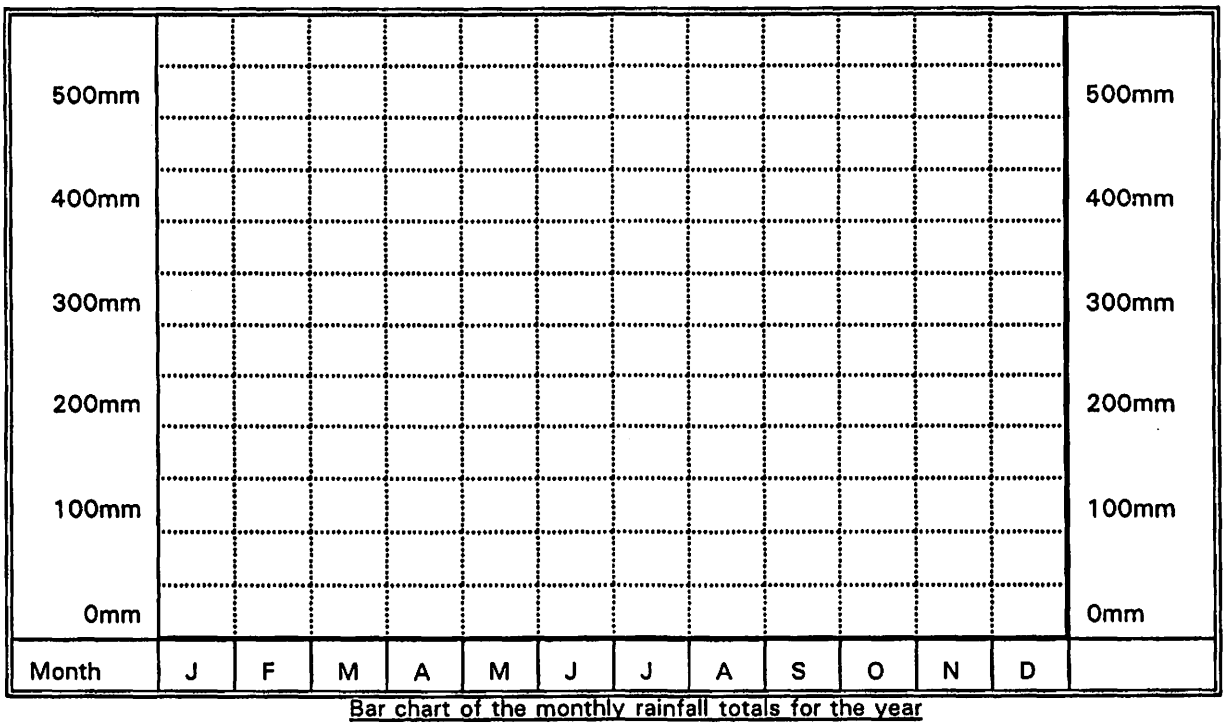
Land Husbandry Status/Monitoring Report

Location[1]	
Year	
Recorder	

[1] The geographic area of the status report ie. name of the specific PLUS project concentration area being monitored.

CLIMATE

Rainfall

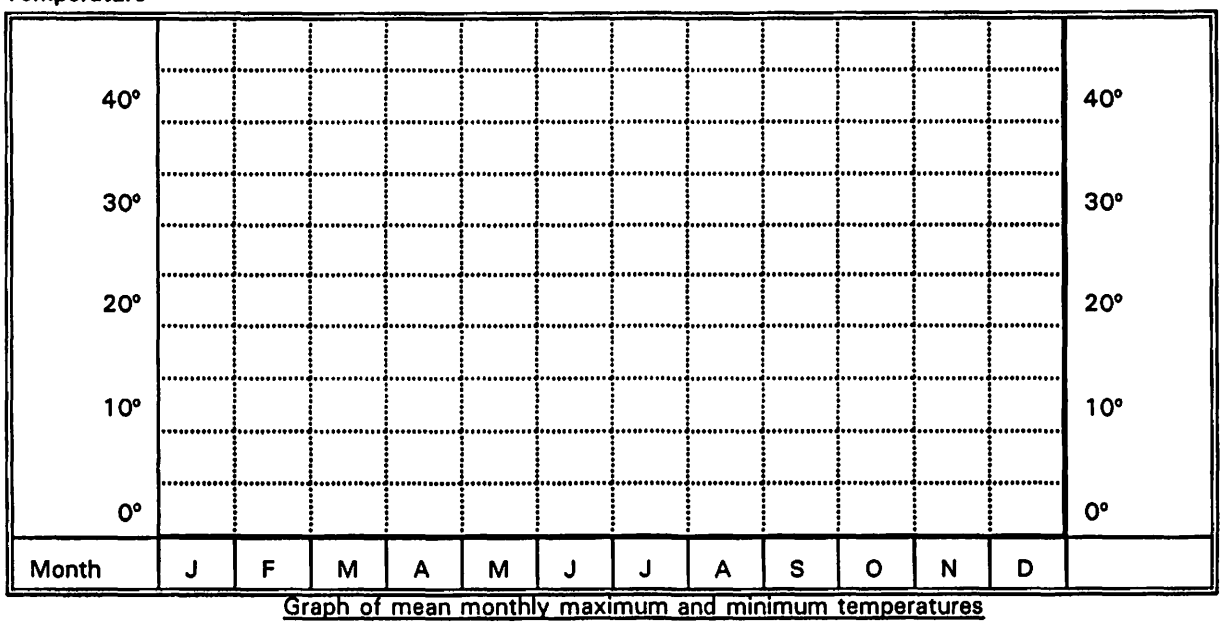


Bar chart of the monthly rainfall totals for the year

	First cropping season	Second cropping season
Total seasonal rainfall		
Date of onset of rains		
Date of end of the rains		
Effective length of growing season		
Number of storm events (No. of days with 25mm or more of rainfall)		
Duration and total rainfall of individual tropical cyclones /hurricane events		
Quality of the growing season[1]		

[1] Quality refers to the reliability and distribution of the rainfall within the season.

Temperature



Graph of mean monthly maximum and minimum temperatures

Mean annual temperature			
Mean monthly maximum temperature	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....		
Mean monthly minimum temperature	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....		
Mean monthly day time temperature	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....		
Mean monthly night time temperature	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D.....		
Mean highest extreme temperature		Date occurred	
Mean lowest extreme temperature		Date occurred	

Overall climatic assessment[1]

[1] A qualitative assessment to be made as to the impact on agricultural production of the climatic conditions experienced during the year, notably with regard to the amount and distribution of the rainfall within the two seasons and temperature conditions at critical times in the crop and livestock production cycles.

WATER RESOURCES

The table below should be used to document the seasonal availability of water from the different sources used for domestic, livestock and irrigation purposes within the PLUS project concentration area:

Named water source	J	F	M	A	M	J	J	A	S	O	N	D
Springs												
Wells												
Rivers/streams												
Dams and other water storage structures												

The seasonal availability of water from the different sources to be monitored by shading out each of the months during the last year when the quantity of water available was adequate to meet local needs.

LAND HUSBANDRY ASSESSMENT[1]

a) Conservation Effectiveness

The following information on conservation effectiveness of farmers management practices within their individual farm holdings to be estimated for each land management unit:

Practices within individual farm holdings related to:	Conservation effective		Conservation neutral		Conservation negative	
	Type of practice	% of farmers using it	Type of practice	% of farmers using it	Type	% of farmers using it
Crop management						
Soil management						
Rainwater management						

Woodland/Forest land	% of LMU		% of land use type	Area
	Closed canopy mature trees with continuous litter layer			
	Open canopy mature trees & shrubs with reasonable litter layer			
	Scrubby regrowth with moderate ground cover			
	Degraded scrubby regrowth with poor ground cover			
	Severely degraded, little regrowth, poor ground cover			
Total			100%	
Grassland	% of LMU		% of land use type	Area
	Improved with excellent ground cover			
	Improved/unimproved with good cover			
	Unimproved moderate cover			
	Unimproved patch cover			
	Unimproved/overgrazed with very poor cover			
Total			100%	

[1]A separate assessment of conservation effectiveness, erosion and better land husbandry rating should be made for the area of each land management unit within the PLUS project concentration area.

b) Current extent and severity of soil erosion.

Type of erosion	None		Slight		Moderate		Severe	
	%	Area	%	Area	%	Area	%	Area
Sheet erosion								
Rill erosion								
Gully erosion								
Stream bank erosion								
Mass movement								

c) Better Land Husbandry Rating

The assessment of the conservation effectiveness of actual land use and management practices and the estimate of current extent and severity of soil erosion should be used to categorise individual land management units according to the following better land husbandry ratings:

Rating	Criteria	Score	% of LMU	Area
Excellent	The land husbandry practices are exemplary	4		
Good	The land husbandry practices are of acceptable quality	3		
Fair	The land husbandry practices give some cause for concern and require minor corrective action	2		
Poor	The land husbandry practices give major cause for concern and require considerable corrective action	1		
Very poor	Conforms to none of the requirements for better land husbandry	0		

Overall Assessment of the Land Husbandry Status of the PLUS Project Concentration Area

Better Land Husbandry Rating	% of total project concentration area	Trend since previous year		
		Better	Worse	No Change
Excellent				
Good				
Fair				
Poor				
Very poor				

Positive signs of better land husbandry[1]		
Negative signs of better land husbandry[2]		
Areas where there has been a change in land husbandry status compared to previous year		
Reasons why there has been a change in land husbandry status		
Is the overall land husbandry status of the project concentration area getting:	Worse Why?	Better Why?

[1] Improved land use and farm management activities making or expected to make a positive contribution to better land husbandry within the area hence activities worth promoting further.

[2] Land use and farm management activities that are cause for concern from a better land husbandry perspective hence require greater attention from the project in the coming year.

Appendix 10. Quantitative Methodologies for Recommended M&E Impact Estimates

We recommend using three survey data sets for monitoring impact, in addition to the participatory methods described elsewhere in this report.

Counts from Participating Farmer Listing. The first dataset is a 100% listing of participating farmers, based on farmer dossiers and lists of farmers that are gathered by the implementing organizations. This listing would be made with or without the M&E effort since it is a management tool. The dossiers will have information on interventions used by the farmer. If it is feasible, they should also have information on the size of the farm, the fields, and the location of the interventions in the fields. If that is not feasible, then those data elements should be included in the extensive farmer survey. The farmer listings have to be checked and updated in a timely fasion.

Extensive Survey Sample. The second listing is a subset of the farmer listing for an extensive sample. The extensive survey is to gather information on quality of the interventions, use of the interventins, and gross impact. Because this data is to be gathered by field agents who would in any case have to visit the farms, and because the interview is short, a substantial sample is possible.

The size of the sample depends on what the agencies and SECID want from the analysis. If they think that geographic factors like precipitation determine the utility of interventions, then the project needs estimates of impact from each and every area. Thus, if "between-area" variation is large, the sample has to be able to estimate impact in each area. This appears to be the case.

If we assume that the implementing agencies require impact data on each project area and that most areas consists of two kinds of environment different enough to call recommendation domains, then the survey would need data on between 20 and 40 sub-areas.

Examination of the variance in the case studies suggests that the minimal sample size is 50 farmers for a reliable estimate of gross income. If there are 30 distinct sub-areas, and each sub-area were represented by 50 farmers, then the sample size would be 1,500. Let us take this as a norm for the extensive survey sample.

The extensive survey will give the basic information required for impact analysis: gross income gains, quality of implementation, apparent environmental effectiveness and more.

Care should be taken to assign expansion factors or weights for each farmer that reflect sampling and non-response rates.

Intensive survey sample. The intensive survey is an option for exporing topics in

depth or discovering kinds of impact not reported by the extensive survey. In such a diverse environment as that in which PLUS works, a sample size of 400 or more is recommended.

Both the extensive and the intensive survey data sets may be coded for environmental and socio-cultural variables using low-cost methods: GIS where feasible, PRA/RRA/locality surveys, data provided by extension agents on factors that are generally known in the community, etc.

How should the project capture secondary adopters?

Secondary adopters are farmers who get PLUS technology without being officially contacted by an extension agent. They may, for example, be friends or relatives of a primary adopter. They might obtain seed indirectly. The small study that was done suggests that there are substantial numbers of secondary adopters, and farmers told us of friends and relatives who had adopted practices.

The project should capture these adopters to tell its story well and to better judge the impact of the different interventions.

But how? We note three possibilities.

1. Census the project areas, amply defined. PADF defines its project areas in this broad sense. To census them would require generating lists of perhaps 20,000 farmers in each area. While this seems a large number, it can be done quickly by using key informants; it would not be necessary to visit the farmers. CARE already censuses the areas where its extension agents work, but those areas are small. To capture the numbers and ratios of secondary adopters, these areas would have to be expanded considerably.

What are the payoffs to justify this level of effort? 1. useable figures for rates of primary adoption (as opposed to numbers of primary adopters), 2. a sampling frame to capture secondary adopters, 3. a list of potential participants for the projects -- if the projects seek to expand impact, such a list is an excellent resource.

2. Use the network approach. Ask a sample of participating farmers about people who have obtained technology from them; then have an extension agent follow up to verify a sample. This would give the data needed for the SPI, which is ratio of secondary to primary adopters. The design is more complex than a census.

3. Sample. Take a random sample of localities in and around the project areas. Census the sampled localities. Then take a sample of farmers.

In general, we recommend that secondary adopters (those not directly assisted by the project) be counted and their contribution to project impact be counted.

Analysis Staff Issues and the Ministry of Agriculture.

SECID will support the recommended surveys with data management staff and with professional staff. CARE has hired an analyst. As a rule of thumb, it takes six weeks to analyze a survey properly if statistical analysis beyond descriptive statistics is done. The existing staff is able to run basic analysis.

One possibility is to use these data sets and analyses as an exercise for training Ministry of Agriculure staff. The Ministry wants to play such a monitoring role. They could station staff at SECID. The training would be done with actual analysis of the PLUS data sets.

Appendix 11. Financial and Economic Analysis

Contents

Summary of Recommendations for Financial and Economic Analysis

Given the importance of economic incentives in the design of PLUS, and, even more importantly, in the behavior of Haitian (like all other) farmers, basic financial analysis of PLUS interventions at the farm level continues to be fundamental. We recommend building on what has been done so far, but moving further in two complementary directions simultaneously. First, simple intervention budgets should be prepared, initially using the economic information available from the Case Studies and subsequently expanding to other interventions as well, using information to be obtained from representative farmer surveys. These budgets are primarily for the use of implementing staff, but can also be used for impact analysis, etc. Second, rough whole-farm budgets should be developed for selected "typical" target-group farms, first during the process of carrying out additional Participatory Diagnostic exercises in project areas, later to be supplemented through use of data obtain from representative surveys, standard cost data, etc.

Accomplishment of these objectives will provide PLUS much-needed information about the economic impact of its interventions upon Haitian farm families.

Functions of and Levels for Financial and Economic Analysis

Financial analysis

Financial analysis concerns itself with the costs, returns, scheduling of costs and returns and cash flow, return to investment, etc. of an activity and/or of an enterprise. The enterprise can include a farm family, a business, a cooperative of farmers, an NGO, or a project. There are, thus, multiple levels at which financial analysis may usefully be done. The key factor is that the unit under consideration incurs costs and gains revenues from project activities.

Two key roles for financial analysis in the PLUS project include analysis of the costs and benefits of project interventions on the one hand, and, even more importantly, given the project's orientation toward the farm household level decision-making matrix, the costs and benefits experienced by farm households from their participation in project activities.

Economic analysis

Economic analysis concerns itself with the "economic" value of an activity or a set of activities, usually to society as a whole, but also to a national, regional, or community economy. As such it focuses upon real costs and benefits and not merely nominal costs and benefits. Hence, it requires careful distinction among costs and benefits, and frequently requires use of analytic techniques, such as shadow pricing, to ascertain the real costs or benefits to society, a country, or a region of an activity. Economic analysis is, then, useful primarily to policy-makers, donors, and project managers. For them it serves the function of summarizing the overall benefits actually or potentially resulting from an activity. Economic analysis of projects usually plays two roles. First, ex ante economic analysis is used to determine whether economic benefits to society of the project justify the expenditure. This is the usual, and by far the most frequent, application of economic analysis to agricultural development projects.

Secondly, ex post economic analysis can determine the economic returns--or the overall impact--of the project after its completion. The empirical data required to perform such economic impact analysis usually come from the

project's own on-going monitoring and evaluation system, but may be supplemented by special impact studies.

Levels of Analysis.

As is indicated above, there are many different levels at which financial analysis can be performed. The key criterion for determining whether financial analysis might apply is whether the level represents an entity which receives revenues and incurs costs in its role relative to the project.

The most important level for the financial analysis of agricultural projects is the farm level, and at the level of enterprises or activities within the farm. The basic question at the farm level is what financial impact participation in project activities will typically have upon a farm.

Above the farm there may be--and, in some PLUS areas, there are--additional levels, at least the farmer group level and the local NGO level. Although, at the moment, financial analysis of these levels is relevant for PLUS, in the future when (and if) the groups take a larger role in making PLUS activities sustainable, future, ex ante financial (and institutional) analyses of typical farmer groups may become necessary.

Functions or uses for economic and financial analysis

Obviously, the different levels have different uses for the results of financial and economic analysis. It seems obvious that, for a project that is based upon the assumption that interventions can be found that are simultaneously environmentally sound and economically beneficial to adopting farmers, good financial information about the costs and returns of these interventions to the farmers are most important to farmers themselves. And, of course, they are essential to regional project staff who work directly with and make recommendations to farmers.[1] They also provide essential information to project managers in both allocating resources and in making the case for the resources necessary to operate the PLUS program.

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[1] In one of our field visits one of the consultant team pressed the regional project team concerning a farmer's options for use of a particular hillside field. The team responded that, of course, it depended upon the farmer's objectives, whereupon the team member made up some income objectives. Had the regional team had simple budget information available, it could have responded better than it did. As it was, its response was simply that it would not be possible to obtain the desired income from the plots in question.

Analysis of family well-being and food security

The strategy of PLUS, focusing as it does upon the simultaneous achievement of natural resource conservation and immediate economic benefits may tend to obscure a fundamental objective, which is to increase the well-being of Haitian farm families. And, the M&E system SPI's include no measures of family well-being. Still, there is a strong interest in both of the implementing agencies in whether these ultimate objectives are being reached. In part, of course, one can assume that family well-being follows from economic improvement. However, like the need for a more sensitive assessment of the real impacts of PLUS on the bio-physical environment, attention also needs to be paid to systematic observation of the well-being of the farm families in the target areas, and of trends in their well-being.

The flexibility of the Participatory Rural Appraisal or Participatory Diagnostic approach provides opportunity to examine family well-being and trends in family well-being. Hence, this dimension should be considered in the performance of the PD's recommended below.

Financial and Economic Analysis in PLUS

Given the long history of USAID-funded resource conservation and agricultural development projects in Haiti, and especially the sequence of projects which provide the theoretical background and "lessons" which are being implemented in PLUS, remarkably little economic or financial analysis had been done on the underlying logic of PLUS. Fleming and Karch reviewed this work, and found very little that could be used, virtually none that had attempted to capture the economics of Haitian hillside farms on a whole-farm basis (Fleming and Karch, 1991).

Independent financial analyses

Nevertheless, using the sources available to them, Fleming and Karch concluded that the returns to investment in the kinds of interventions included in the predecessor projects was quite high (1991). Brown, Grimes, and Fontaine, using much the same data, were also persuaded that the returns to PLUS interventions were high (Brown, et al., 1994).

Financial Analysis in the PP

A rather detailed financial analysis at both the farmer and at the project level is reported in the PP. It was apparently done by Fleming and Karch, using a spreadsheet model for financial and economic analysis designed to be used

with the USAID design Manual. The paucity of whole-farm-level data is again noted. However, the PP proceeds to use a built-up whole-farm model, gathering price information wherever possible: "Data for the analysis is from project observations, anecdotes, field observations, prior projects such as ADS-II, parallel projects such as Sove Te, and best estimates from agroforesters, agronomists, animal scientists, and researchers," PP, p. 18. Unfortunately, although it is stated that the entire model is available to PADF and CARE, the actual prices used for the various farm-level inputs are not given, nor are the numbers of farmers used. This financial analysis, which is based upon ". . the incremental increases in production of marketable commodities resulting from the extension of project practices in the field." shows very positive results, with a net present value per farmer of $240, annualized to $12, at a project cost of $121 per farmer (PP., Table 5, page 19).

This analysis, and the previous work done by Karch, was severely critical of previous economic and financial analysis in the predecessor projects, and strongly advocated the performance of farm-by-farm case studies, with a focus upon the whole-farm operational budget (PP, page 29). "If data is collected with this use (whole farm) in mind, the essential data for all other analyses will be collected. If one has collected quality, relevant data, i.e., the data required for the hill farm economic model, then partial budgets, DCFs, and other analyses as well as project monitoring can be performed adequately and with relative ease (PP, pp.).

The PP further advocates the integration of economic analysis into the project at several levels. Thus, although the information available strongly supports the PLUS interventions obtained from the previous projects, it is based upon a very weak data base.

Financial and economic analysis performed within PLUS

The financial and economic analysis of PLUS is almost entirely the responsibility of the SECID Economist.[2] Financial and economic analysis are,

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[2] The role of financial and economic analysis in PLUS seems peculiar. SECID has a full-time economist on the project, and several economics consultants have contributed to PLUS. Ironically, however, these talents seem to have been used for nearly everything else besides economics, in spite of the fact that the PP made a strong appeal to strengthen the economics component of the project. And, given the logic of PLUS, one would have expected a strong economic analysis component. Consistent with this, this consultant (a sociologist) was surprised to find, in the SECID offices, a shelf quite full of books on evaluation methods, none of which included the techniques

apparently, considered to be exclusively the domain of M&E. And, apparently because of the overall cost burden of M&E, whole-farm level analysis has previously been explicitly rejected. Thus the work that has been done so far has focused exclusively upon the major project interventions, and upon calculating Rates of Return and Net Present Values for these interventions. The approach used is to obtain net incremental returns to the interventions by comparing returns on intervention plots with their paired control plots, on case study farms.

Three SPI's, III.1, IV.4, and IV.6 specifically address farmer income related issues. III.1, "Incremental net returns for each intervention," is a very useful measure, linked as it is to both USAID's need for information about (potential) impact and to the PP's ex ante financial analysis used to justify the project in the first place. It will, in future, be strengthened in several ways. First, through the progressive use of information about interventions on representative samples of farmer fields, and second, through the inclusion of other interventions as data becomes available on them. Finally, qualitative information from Farmer Evaluation Sessions will become available to help understand and interpret the meaning of potential income changes to farm families.

IV.4 is problematic, as it is virtually impossible to arbitrarily classify all interventions of a particular type in terms of whether or not they are environmentally positive. However, it should be possible to calculate a rough estimate in the future, after the recommendations on assessing the actual environmental impacts of actual on-farm interventions in "Recommendations on Assessing the Bio-physical Impact--M&E of Better Land Husbandry" are implemented. Even then, though, rough, qualitative assessments may be more useful than efforts to calculate a precise percentage.

IV.6 is superfluous, as is noted by Lea (January, 1995), III.1 is being calculated and reported on a land-area basis. Hence, nothing is added by calculating it.

While the data that go into these measures provides very useful information for the several case study interventions, information that can be used to calculate simpler intervention budgets for use in the field (as we recommend) it suffers not only from its narrow focus upon the four major interventions, but apparently cannot continue to be done in the same way in the future

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of financial or economic analysis. He could not find the "bible" of financial and economic analysis by Price Gittinger at all.

because of the loss of "witness" plots, and of a decision to de-emphasize the extensive monitoring of the case studies (which we support).

It is important, then, to expand the coverage for obtaining information about the returns to PLUS interventions to include the wide variety of interventions being proposed, as well as those emerging farm farmer creativity; to obtain this information from more representative on-farm applications of these interventions; and to reconsider the PP's strong recommendation concerning whole-farm analysis.

The function of Financial and Economic Analysis in PLUS M&E System SPI's

There is, to date, a contradiction in how the financial analysis has been done under the SPI's. It is quite clear, in the design of the M&E system, that the calculation of net incremental returns, and the Internal Rate of Return (IRR) and Net Present Value (NPV) from these was intended to serve the purpose of determining the potential benefits of the project's interventions to farm families, and comparing the relative benefits of the different interventions. These results were to be used in decision-making within PLUS and its implementing agencies. The data, obtained as it was from the case studies, was not intended to be used to estimate over-all PLUS impact. At best, it could say what can be achieved with the PLUS interventions, not what actually is being achieved, on average, by those who adopt. Not surprisingly, though, the data have so far been used primarily as indicators of over-all PLUS impact, for which they are not appropriate. Also, until now at least, these results have not yet been prepared into the simple budget format that will be necessary for use by the implementing agencies at the field level. Fortunately, doing that will not be difficult.

Suggested worksheets and protocols for Financial Analysis in PLUS

There are basically two recommendations concerning financial and economic analysis. These are to prepare and make available "intervention budgets," and to develop rough whole-farm budgets for selected target-group farms, both for use at all levels in PLUS. To achieve this, we suggest, in particular, that the following sources be used as guidelines:

1. The financial analysis performed as Annex B of the Project Paper, which was prepared by Fleming and Karch, as well as the spreadsheet templates they provided (which are available at SECID, PADF, and CARE).

2. "Worksheets for Characterizing Rural Household Circumstances" prepared by Malcolm Douglas (Appendix 13), especially Worksheet 21, "Production Inputs;" Worksheet 22, "Yields and Production Levels;" and Worksheet 23, "Household Income/Farm Performance."

Detailed Recommendations, Responsibility, Products, Time Requirements and Suggested Scheduling for Recommendations

1. Begin to shift emphasis in data collection for financial analysis to yields and gross revenue generated and expand this to obtain more representative data on all interventions. Detailed monitoring of inputs--especially labor inputs--is extremely expensive and, and, in any case, M&E is building a base of cost data that may--with caution--be applied somewhat generally.

Responsibility.--The SECID Economist gives leadership, working with the CARE and PADF M&E Specialists. Regional M&E staffs are also involved in the changes.

Product.--Expansion of the coverage for financial analysis to additional interventions.

Time requirements.--These changes are inherent in other recommendations, so there will be little additional work required specifically with respect to economic analysis.

Scheduling.--See recommendations on data collection and sampling.

2. Continue the financial analysis being done on the selected interventions or enterprises, including the calculation of NPV IRR, with appropriate alterations to deal with the loss of witness plots, the use of rented plots, and the question of representativeness of the data obtained from currently monitored plots. Decrease the intensity of monitoring the case study plots after 1995.

Responsibility.--The SECID Economist gives leadership, working with the CARE and PADF M&E Specialists. Regional M&E staffs are also involved in the changes.

Product.--Continuation of current analyses, with future financial measures having a stronger, representative base.

Time requirements.--No additional.

Scheduling.--See recommendations on data collection and sampling.

3. Produce and make available to technicians and field agents simple intervention budgets based upon M&E results and/or based upon information compiled by technicians and field agents. Budget coverage should be expanded to include all of the major interventions being used in PLUS, and, to the extent feasible, should be specific to variation in environmental conditions. They should be done both with and without labor as a cost. Expansion beyond the case study interventions will require a sample survey approach. It may also be facilitated by farmer record keeping (See recommendation 4 below).

Responsibility.--Initial formats and budgets prepared by SECID staff, in close collaboration with CARE and PADF M&E staff. Subsequently, this becomes the responsibility of the M&E Agronome at the regional level, in close collaboration with other regional staff, field agents, and farmers.

Product (for whom?).--Budget information that can be used by farmers, farm agents, farm organizations, and by regional PLUS staff in assessing the relative benefits of various interventions.

Time requirements.--A considerable amount of this activity is already going on. It will continue, and depend upon the data that comes in from the M&E system, including the incorporation of representative samples to obtain impact information. Hence, it is difficult to estimate the incremental time required to carry out this specific recommendation, which has more to do with the format of analysis and presentation, than with the existence of analysis and presentation. It seems reasonable, however, to estimate that it will take a considerable amount of the time of the SECID Economist to organize the budget formats, to calculate budgets, and, subsequently, in collaboration with central M&E staff, to train regional staff in the use, and ultimately the calculation of these budgets themselves.

Hence, we estimate, during the next year, approximately 10-20 person-days for the SECID economist, approximately 5 additional person-days for CARE and PADF central staff, and approximately 5 additional person-days each for the regional staffs involved in this effort. Assuming that this applies, in CARE, initially only to the Northwest, a total of 3 CARE regions and 4 PADF regions are considered, resulting in 35 additional person-days at the regional level for this effort.

Scheduling.--In 1995 simple budgets could be prepared for the four case-study interventions, and these could be presented to and discussed with regional M&E staff. Then, in 1996 this activity should be expanded to additional interventions.

4. Expand the coverage of these enterprise budgets to all project interventions, and engage in dialogue with regional CARE and PADF staff about these enterprise budgets and with farmers themselves, so as to (a) fine-tune the budgets on a region and target-group specific basis where necessary and (b) assist the respective actors in being able to project the potential financial impact of interventions at the farm level.

For responsibility, product, time requirements, and scheduling see recommendation 3 above.

5. As an output of the PRA process, and using other information sources available (e. g., standard prices, standard labor requirements, etc.) develop typical whole-farm descriptions of key target group farms, and include, in this process, rough whole-farm budgets.[3] These descriptions should include the following:

a. The physical layout of the typical farm,
b. description of the various enterprises on the farm and their interactions (e. g., outputs of one enterprise as inputs into another)
c. description of the farm family,
d. description of labor, cropping/production, and consumption calendars,
e. rough whole-farm budgets, including, to the extent feasible, all income sources and expenditures.

These are used as a yardstick to gauge future changes, to judge the fit of project technologies or of proposed technologies, and to understand farmer incentives for accepting or rejecting proposed technologies. While

[3] This recommendation poses somewhat of a dilemma. The detailed monitoring required to obtain accurate data on a whole-farm basis, especially labor inputs, is prohibitively expensive, as was apparently realized when the whole-farm approach was dropped earlier. However, it is also true that a major decision to invest in PLUS was made based upon one, standard, whole-farm model for Haitian hillside farms (PP, pp.). That strongly suggests that it should be possible to build rough and useful budgets without a costly monitoring effort.

acknowledging the complexity of this task, at present, with financial information available only on an enterprise-by-enterprise basis, PLUS runs the risk of:

a. underestimating the benefits resulting from complementarity among enterprises (the benefits of biomass for animal production), or,
b. overestimating the benefits due to incompatibility of enterprises (e. g., a farm family transfers wage labor on the road to building a gully plug which, in the end, returns less than the labor).

Responsibility.--Leadership for this effort will have to come from the SECID Economist, especially in developing, or selecting among the various possibilities, the protocols to be used in the developing rough whole-farm budgets. Implementation, however, will be the responsibility of the regional staffs, and will be part of the Participatory Diagnostics, and/or their updates.

Product.--The product of this exercise is rough whole-farm budgets for typical target group farms by area, giving as comprehensive a picture as possible of the economy of the farm household. Thus, it includes all income sources--including non-farm sources--and, to the extent feasible, all expected expenditures. (See Douglas Forms Nos. 21 to 23 in Appendix 13 for usable worksheets, and the Project Paper Annex B and the associated whole-farm spreadsheet prepared by Fleming and Karch.)

Time Requirement.--Because the time spent on this effort at the regional level is part of the Participatory Diagnostic process, no additional time is allocated at the regional or area level. However, it is estimated that this could, during the next year, take as much as 20 days of the SECID Economist's time, and 10 days each of the PADF and CARE central staff time.

Scheduling.--In 1995 the groundwork for the development of whole-farm budgets will be laid in the several Participatory Diagnostics. Hence, this effort should be an integral part of those. Subsequently, in 1996, in at least in one area for PADF and one for CARE, the annual sample survey should focus upon obtaining more accurate and representative information on household income and expenditures. This information, in addition to other uses, will, then, supplement the original, rough information put together during the Participatory Diagnostics.

Appendix 12. Notes on Monitoring Post-harvest and Marketing Interventions

The PLUS is entering the post-harvest arena. What are the minimal indicators for an M&E system tied to such activities as marketing basic produce, transforming production and adding value? This section is called "notes" because it is ad hoc, though based on some experience.

First, the owners, workers, and suppliers of the enterprise go into the dossier/farmer list system. Keeping receipts is a good way to track raw materials suppliers. As for all project activities, count the volume produced, the value, and the people benefitted. The producers who obtain a monetary or in-kind benefit from the activity are the ones to count, excluding those who benefit by less than a certain amount that you should set (say, $10US). Counting consumers as beneficiaries should not be done unless you can demonstrate that they obtained products at substantially lower prices than they would have or that they obtained an important product that they would have otherwise been unable to obtain (e.g. food oil in some, but not all, localities).

Location and context are particularly important for post-harvest activities. A cassava processing activity in one area may work, while in an area closer to a city, people may have no intereste in processing the crop, and in a distant area there may be prohibitive transport costs. With 1,000 mm of rain, there may be enough for industrial production, while with 2,000 there may be too much clouds for the necessary 5 months of operations. And so forth. The M&E system should analyze such issues, in addition to the standard indices of output and impact. In particular, it should develope simple criteria of where and when each type of post-harvest intervention is likely to suceed.

For basics, track the following:

PROJECT OUTPUTS

Enterprises started and in operation, by size and type

Total invested

IMPACT

Number of enterprises benefitted
- processing or marketing enterprises
- farms supplying raw materials
- others

Number of individuals benefitted who obtain a monetary of in-kind benefit, by sex
- owners of the processing enterprises

individuals or partners
cooperative or group owners who obtain $20 or more benefit from ownership
workers (full or part time, suppliers of a service)
suppliers of raw material
others (construction workers who obtain a wage, for example)
materially benefitted consumers (OPTIONAL)
gender ratio

Volume of financial or in-kind benefits
gross sales
incremental gross revenue to beneficiaries
value added to farm gate and town value

TECHNICAL EFFICIENCY (product specific)

ratios of transformation, compared to competition, by area and environment

costs per unit produced, compared to competition, by area and environment

gross production, by area and environment

SUSTAINABILITY

Accounting systems started and in operation

Actual costs, revenues

Projected costs, revenues

Amounts and proportions invested by beneficiaries (initial, from profits, other) compared to amount provided by the project.

PROJECT EFFICIENCY

days of project support for training and technical assistance, by staff category per enterprise and per volume of production

cost of support per enterprise and per volume of production

Appendix 13. Examples of worksheets for characterizing rural household circumstances

The following worksheets were developed for use in Rapid Rural Appraisal/Participatory Rural Appraisal training in Ethiopia by Malcolm Douglas. They are provided here as examples which may be adapted for use in Participatory Diagnostics by PLUS. These materials were prepared to support the concepts presented in Chapter 5 of Douglas, Malcolm, n.d., A Framework for the Development of Conservation Effective Farming Systems. Rome, Italy: The Farm Management and Production Economics Service, Agricultural Services Division, Food and Agriculture Organisation of the United Nations (FAO), pp. 21-32. The last one, "Worksheet for the Documentation of Indigenous Land Husbandry Practices," is an expansion of Worksheet 26, "Existing Conservation Practices."

Worksheets for Characterising Rural Household Circumstances

Location (PA, Woreda, Zone & Region):	
Rural Household Socio-economic Group:	

The attached worksheets have been prepared as an aid to characterising the circumstances of particular socio-economic groups of rural (farm) households[1]. Their purpose is to provide a means for organising and consolidating the data gained, initially from the review of secondary data, but primarily from the informal survey and other RRA/PRA exercises. These worksheets should <u>not</u> be used in the field as a questionnaire during group or individual interviews. They are intended to be used by the survey team at the end of each days field work as a means of consolidating the data, obtained from individual interviews and direct observation, in an organised fashion. The worksheets will serve as detailed notes when compiling the final written report detailing the characteristics of the various farm households in the area involved in the participatory planning activity. A separate set of worksheets should be completed for each clearly identifiable socio-economic group of households within the participating Peasants Association(s). The boxes to the right of the table below can be used to indicate the status of each worksheet, eg a tick to indicate completed, blank indicating no data yet available.

Worksheet 1: Farm Household Enterprises	
Worksheet 2: Farm Household Goals	
Worksheet 3: Market Orientation and Strategies	
Worksheet 4: Food Preferences, Needs and Production Strategies	
Worksheet 5: Energy/Fuel Preferences, Requirements and Source	
Worksheet 6: Cash and Capital Resources	
Worksheet 7: Labour Resources	
Worksheet 8: Division of Labour and Decision Making Responsibility	
Worksheet 9: Land Resources	
Worksheet 10: Social and Cultural Influences	
Worksheet 11: Community Organisations, Local Infrastructure and Support Services	
Worksheet 12: Draft Power and Mechanisation	
Worksheet 13: Cropping Characteristics	
Worksheet 14: Cultivation Practices	
Worksheet 15: Post Harvest Practices	
Worksheet 16: Livestock Characteristics	
Worksheet 17: Animal Husbandry Practices	
Worksheet 18: Utilisation of Trees and Forest Products	
Worksheet 19: Silvicultural Practices	
Worksheet 20: Other Land Use Enterprises and Income Generating Activities	
Worksheet 21: Production Inputs	
Worksheet 22: Yields and Production Levels	
Worksheet 23: Household Income/Farm Performance	
Worksheet 24: Production Problems and Constraints	
Worksheet 25: Land Degradation Problems	
Worksheet 26: Existing Conservation Practices	

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[1]Individual socio-economic groups are ones in which the constituent farm households:

- share broadly similar bio-physical and socio-economic circumstances;
- follow similar farming systems (ie. engage in the same range of farm enterprises); and
- face the same production constraints and sustainability problems.

An assessment of the circumstances of the households within such a group would reveal that they share a range of common problems, constraints and development potentials.

Worksheet 1: - Overview of the Various Enterprises Undertaken by the Farm Household

This worksheet should be used to provide a summary description of the typical range of enterprises undertaken by the farm households representative of a specific socio-economic group.

Farming System

Broad-scale farming system type*	

* eg. Plough cereal-based mixed farming system, hoe tillage cereal-based mixed farming system, coffee based mixed farming system, Enset based mixed farming system, agro-pastoral system, nomadic pastoral system.

a) Crop Enterprises

Major crops (ie. grown by all households, comprise a principal part of total farm production)	
Minor crops (ie. grown by most, but not all, households, comprise a small part of total farm production)	

b) Livestock Enterprises

Type and purpose*	
Species of livestock kept	

* eg. stall feeding, backyard enterprise, extensive grazing, subsistence food needs, prestige/wealth accumulation, commercial dairying or fattening, etc.

c) Tree and Perennial Cash Crop Enterprises

Type of Enterprise*	
Trees and other perennial crops grown	

* eg. Woodlot, orchard, coffee garden, mini-plantation, fodder bank etc.

d) Use of Common Property Resources

(ie. natural resources that are not owned or used solely by one farm household)

Common property resources used*	
Products obtained**	

* eg. communal forests, woodlots, grazing areas
** eg. timber, fuelwood, fodder, poles, honey, nuts, wild fruits, medicines etc

e) Off-farm and Non-farm Income

Income from off and non farm activities*	

* eg. waged employment, childrens' remittances, labouring, cottage industries, trading etc

Worksheet 2: - Farm Household Goals

This worksheet should be used for describing the goals and objectives which the farm households, representative of a specific socio-economic group, are seeking to meet through the various farm household enterprises described in worksheet 1.

Farm Household Goals

a) Subsistence/Food Security Goals	
b) Production/Cash Maximization Goals	
c) Social and Cultural Goals	

Farm Household Targets

a) Immediate targets to achieve goals*	
b) Degree to which goals are currently met**	

* Level of crop/livestock production expected from each on-farm enterprise undertaken, expected contribution from non-farm and off-farm activities.

** eg. extent to which the household can achieve its subsistence goals and meet its social and cultural goals, its ability to earn extra cash through maximising farm production.

Worksheet 3: - Market Orientation and Strategies

This worksheet should be used for describing the market orientation and strategies of the farm households. ...

Market Orientation

a) Enterprises undertaken primarily for subsistence production purposes (type and percentage of total farm production)	
b) Enterprises undertaken primarily for commercial production purposes (type and percentage of total farm production)	
c) Enterprises undertaken for both subsistence and commercial production purposes (type, percentage of total farm production, ratio of subsistence to commercial production per enterprise)	

Marketing Strategies

Type of produce marketed	Product 1	Product 2	Product 3	Product n
Market location (where the produce is usually marketed)				
When the produce is usually marketed (season of the year or frequency of market visits if non seasonal)				
Quantity typically marketed on each visit to the market				
What the produce is usually exchanged for (eg. cash or bartered for other goods)				
Quantity disposed of via interhousehold and/or community exchange mechanisms, frequency of such exchanges				

Worksheet 5: - Energy/Fuel Preferences, Requirements and Source

This worksheet. should be used for describing the fuels used during the year by the typical farm household, the source of that fuel and the annual fuel requirements.

Fuels Used

The table below should be used to list the different fuels and show which months they are used.

	J	F	M	A	M	J	J	A	S	O	N	D
Fuels used for cooking, heating etc												
Firewood												
Charcoal												
Crop residues												
Dried manure												
Paraffin												
Other												
Fuels used for lighting												
Paraffin												
Electricity												
Other												
Fuels used for cottage industries (brickmaking, baking, brewing etc)												
Fuelwood												
Charcoal												
Crop residues/manure												
Other												

Annual Fuel Requirement/Consumption

a) For cooking, heating etc	
b) For lighting	
c) For cottage industries	

Source and cost (including time and distance travelled for collection of firewood)

a) For cooking, heating etc	
b) For lighting	
c) For cottage industries	

Worksheet 6: - Cash and Capital Resources

This worksheet should be used for describing the cash flow and capital resource/asset situation of the typical farm household.

Household Cash Flow Profile

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CASH INFLOWS													
Sales of crops													
Sales of livestock & livestock products													
Sales of tree/forest products													
Sales of non-farm products													
Wages													
Remittances													
Credit/loans													
Other													
Total Inflow													
CASH OUTFLOWS													
Food purchases													
Purchased inputs for: a) crop production; b) livestock production; c) tree production.													
Hired labour													
School fees													
Credit/loan repayments													
Tax													
Other													
Total Outflow													
Net Cash Flow													

Worksheet 6 continued

Capital Resources/Assets

a) Farm buildings	
b) Farm equipment (implements)	
c) Livestock	
d) Established woodlots, plantations, coffee gardens and orchards	
e) Other	

Credit

a) Typical amount borrowed	
b) Source (eg. bank, private money lenders, government programme, NGO project, friends & relatives)	
c) Purpose for which the credit is used	
d) Ability to repay	

Worksheet 7: - Labour Resources

This worksheet should be used for recording the labour resources and total labour requirements of a typical farm household.

Average Farm-household and Family Composition

<table>
<tr><td>Household Head</td><td>Age:</td><td>Gender:</td><td>Availability for farm work[1] (%):</td></tr>
<tr><td>Number of Adult Household Members</td><td>Age:</td><td>Gender:</td><td>Availability for farm work[1] (%):</td></tr>
<tr><td>Number of Children under 15 years</td><td>Age:</td><td>Gender:</td><td>Availability for farm work[2] (%):</td></tr>
<tr><td rowspan="3">Hired Labour</td><td rowspan="2">Number:</td><td>Daily cash payment</td><td rowspan="3">Farm enterprises/activities for which hired:</td></tr>
<tr><td>Daily non-cash payment</td></tr>
<tr><td colspan="2">Mandays per month

J..... F..... M..... A..... M..... J.....

J..... A..... S..... O..... N..... D.....</td></tr>
</table>

1 If individual household members are engaged in off or non farm work this will limit their availability for farm work. Female household members will have other domestic duties (collection of fuelwood, water, cooking, child care etc) which will also limit their availability for farm work.

2 Children attending school are not available for farm work during school hours.

Labour Requirement (this to be assessed in conjunction with the labour input requirements noted on worksheet 21)

Total household labour available (mandays)	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D..... Annual total:
Total labour requirement for all land use/farm enterprises (mandays)	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D..... Annual total:
Labour balance (surplus or shortfall)	J..... F..... M..... A..... M..... J..... J..... A..... S..... O..... N..... D..... Annual total:
Labour use strategies*	

* eg. only use household labour, deliberate use of labour saving practices, hire labour etc.

Worksheet 8: - Division of Labour and Decision Making Responsibility

This worksheet should be used for determining which members of the farm household are involved as workers and/or decision makers in the various enterprises and activities undertaken in seeking to satisfy the goals and objectives of the household.

Farm Household Enterprises

ENTERPRISE	WHO DOES WHAT?	WHO DECIDES WHAT TO DO, WHEN?
Food crop production		
Cash crop production		
Livestock production (cattle, equines, camel etc)		
Small animal production (goats, sheep, pigs, poultry etc)		
Tree and perennial cash crops (eg. coffee & chat)		
Non-farm/Off-farm		

Domestic Duties

TASK	WHICH HOUSEHOLD MEMBER(S) DO WHICH TASKS? If tasks shared what percentage of the work is done by each person?
Fuelwood collection	
Water collection	
Child care	
Food preparation	
Building, maintenance and repair of housing	
Other household chores	

Household Finances

Which household member(s) control (decide) the use of the household's cash resources?*	

* Note in some societies male and female household members may have separate 'purses' rather than one common household purse which may be used for different purposes. If so this should be noted.

Worksheet 9: - Land Resources

This worksheet should be used to describe the size, shape and fragmentation of typical land holdings. The description.should give the normal range for the recommendation domain rather than just an average figure. Details of tenure status should also be determined.

Individual Household Land Resources

Total land holding		Total used for farm production		Number of plots	

	Plot 1	Plot 2	Plot 3	Plot....n
Size				
Shape				
Land management unit*				
Rights to use individual plots				
Land use				
Extent to which plot subject to land degradation				

* This cross references to the bio-physical data base with information on the agro-ecological conditions (climate, soil type, slope etc) that could be expected within each plot.

Common Property Resources

Total Peasants Association area		Total area allocated to individual land holdings	
Total area of communal grazing land		Total area of communal woodland/ forest resources	

Communal Grazing Lands

	Rainy season	Dry season
Total area		
Land Management Unit		
Individual household access/ user rights		
Extent of degradation of the grazing resource		

Worksheet 9 continued

Communal Woodland/Forest Resources

	Communal Woodlots (planted)	Natural Woodlands/Forests
Total area		
Location/Land Management Unit		
Individual household access/ user rights		
Extent of degradation of the resource		

Communal Water Resources (for domestic and livestock purposes)

	Rainy season	Dry season
Quantity		
Source		
Individual household access/ user rights		
Water use		
Extent to which the quality & quantity of the water resource has been degraded		

Worksheet 10: - Social and Cultural Influences

This worksheet should be used for determining the educational level, and technical knowledge of typical farm households and other aspects of their social, cultural and religious circumstances that may influence their land use/farming practices.

Educational/literacy level of household members (household head, adult male & female members, youths, children)	
Technical/farm management knowledge of household members derived from traditional knowledge or the agricultural/forestry extension services	
Degree of exposure to external innovations/extension advice	
Attitude/receptiveness to innovation and change*	
Religious affiliation (orthodox, other christian denominations, moslem, animist etc)	
Key religious taboos, traditional beliefs and customs (Saints days, other religious festivals, work & food prohibitions)	
Key social/cultural/political norms and obligations	
Security situation (ie. peace and order, risk of theft)	

* Note even without exposure to external extension messages farm households may be innovative and willing to change in response to changing circumstances and opportunities.

Worksheet 11: - Community Level Organisations, Infrastructure and Support Services

This worksheet should be used for recording information on the various organisations and institutions operating at the community level which farm household members belong to and/or are influenced by in relation to the land use enterprises pursued. Likewise for recording information about the local infrastructure and support services on which the farm households and land use enterprises depend. Also for recording information on recently completed, on-going and/or proposed development projects that have had, or could have, a positive or negative impact on land use within the area.

Community Level Organisations/Institutions

Crop, Livestock & Forestry Production related	Extension, Farmers Clubs/Groups	
	Credit, Clubs/Unions etc	
	Marketing Cooperatives/ Associations etc	
	Grazing Management Associations	
Social Welfare/Development related		
Religious Organisations		
Political Institutions		

Farm Production Support Services (Government and Private Sector)

Crop Production	Extension	
	Input supplies	
	Marketing	
Livestock Production	Extension	
	Animal health	
	Marketing	
Tree Production	Extension	
	Nurseries/input supplies	
	Marketing	
Other		

Worksheet 11 continued

Infrastructure

Proximity to urban areas/ markets, degree of geographic isolation	
External access (type and condition of road and other communication links for moving people, inputs and produce in and out of the area)	
Internal access (extent and condition of the road, track and footpath network for moving around within the area)	
Other	

Community Level Social/Welfare Services (Government and Private Sector)

Health	
Education	
Financial (loans/savings)	
Other	

Recently Completed, On-going and Proposed Rural Land Use Related Development Projects

	Government Projects	NGO Projects
Development activities & implementation strategy		
Duration (project dates)		
Area coverage		
Primary beneficiaries		
Executing/implementing agency(ies)		
Donor agency		
Budget		

Worksheet 12: - Draft Power and Mechanisation

This worksheet should be used for determining the draft power used by the farm household and the degree of mechanisation within the farming system. It should also be used for recording the different types of farm equipment used for the different land use enterprises.

Draft Power

Form of Draft Power Used	Type & No.	Means By Which Obtained*	Tasks Used For
Machinery			
Livestock			
Hand			

* eg. owned outright, obtained with the aid of a bank loan, hired, shared or borrowed.

Farm Equipment Used (Type and Numbers)

Activity	Owned	Hired	Borrowed
Crop Production			
Livestock Production			
Tree Production/ Forest Utilisation			
Other			

Worksheet 13: - Cropping Characteristics

This worksheet should be used for determining the major and minor crops grown (where appropriate specifying the particular varieties/cultivars), and the characteristics of the cropping system(s) used.

Crops Grown

Major Crops			
Crop	Cultivar	Area of Crop	Reason Grown*
Minor Crops			

* eg. for food, cash sales, cottage industries or combination.

Cropping Characteristics

	Plot 1	Plot 2	Plot 3	Plot....n
Cropping system[1]				
Intensity of cropping[2]				
Crop rotations[3]				
Crop combinations[4]				
Type of fallow[5]				

1 eg. pure stand, mixed cropping, sequential cropping etc.
2 eg. the number of years the plot is cultivated compared to the number of years fallow.
3 where farmers practice crop rotation the typical cropping sequence for each plot should be noted.
4 where farmers practice mixed or sequential cropping the particular combination of crops should be noted and the sequence in which planted.
5 eg. bush fallow, natural grass fallow, planted pasture or tree fallow etc. Note in a bimodal rainfall area farmers may fallow the plot for one of the two rainy seasons, if so this should be noted.

Worksheet 13 continued

Cropping Sequence Seasonal Profile

O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M

Note. Above can be used to prepare a seasonal calendar to show which crops are being grown at different times of the year, an 18 rather than 12 month calendar may provide a clearer description of the cropping sequence which can be related to seasonal variations in the climatic growing conditions. The above seasonal calendar begins with the month of October and finishes with March. Depending on the actual cropping calendar (ie. start of the growing season) it may be appropriate to start with a different month.

Worksheet 14: - Cultivation Practices

This worksheet should be used for recording the various crop cultivation practices for each of the major crops grown.

Operations Performed and Timing Within the Production Cycle

	Crop 1	Crop 2	Crop 3	Crop....n
Land Preparation[1]				
Tillage operations[2]				
Planting practices[3]				
Fertilizer application[4]				
Weeding operations[5]				
Crop protection practices[6]				
Harvesting operations[7]				

1 Covers methods used and timing of initial land preparation including where applicable land clearance.
2 Covers methods used, number of times ploughed, harrowed etc and timing.
3 Includes where applicable nursery practices and transplanting, and timing of planting.
4 Covers timing and methods of application (type of fertilizer and quantity used are recorded on worksheet 21: - Production Inputs).
5 Covers frequency, timing and methods including possible use of herbicides.
6 Includes scouting, spraying, timing and frequency (type of pesticide and quantity used are recorded on worksheet 21: - Production Inputs).
7 Covers timing and methods used and for perennial crops, and annuals where the harvested product matures at different stages in the crops life cycle, frequency of harvest.

Timing of the various operations can be shown in diagrammatic form by including reference to these in the seasonal cropping profile compiled as part of worksheet 13.

Worksheet 15: - Post Harvest Practices

This worksheet should be used for recording information on important on-farm post harvest practices particularly related to storage and prevention of losses, and any post harvest processing undertaken prior to consumption, storage or sale.

On-Farm Post Harvest Practices

	Crop 1	Crop 2	Crop 3	Crop....n
Produce storage[1]				
Produce protection[2]				
On-farm post harvest processing[3]				

1 Includes methods used and length of time produce is normally stored on-farm before being consumed or sold.

2 Includes methods used, timing and frequency (type of pesticide and quantity used are recorded on worksheet 21: - Production Inputs.

3 Includes specific processes used and whether undertaken for the purposes of subsequent consumption, storage or sale (eg. curing tobacco, drying cassava chips). In those areas where Enset is an important crop this section would need to be expanded to cover the complex post harvest processing activities involved in converting the plant into an edible (eg. kocho) and/or saleable (eg. fibre) product.

Worksheet 16: - Livestock Characteristics

This worksheet should be used for recording the types and numbers of livestock kept, purpose for keeping and products obtained from them.

Livestock Kept

	Cattle	Equines[1]	Sheep	Goats	Poultry	Camels	Other
Breeds							
a. Local							
b. Improved							
Numbers							
Male adults							
Female adults							
Young animals							
Purpose kept							
Products consumed on-farm							
Products sold /disposed of off-farm							

[1] Horses, ponies, mules and donkeys.

Worksheet 17: - Animal Husbandry Practices

This worksheet should be used for recording the different husbandry practices followed in raising and managing the various livestock kept.

Management Systems and Husbandry Practices

	Cattle	Equines	Sheep	Goats	Poultry	Camels	Other
Management system[1]							
Husbandry practices[2]							
Feeds[3]							
Type							
Source							
Adequacy							
Health[4]							
Common diseases & health problems							
Health measures, disease control							
Housing /Shelter[5]							

1 eg. free grazing on natural pasture, free grazing in croplands following harvest, tethered grazing within paddocks, stall feeding (zero grazing), 'backyard' production, etc.

2 to cover specific husbandry practices associated with the specific management system.

3 to cover the typical range of feedstuffs consumed, the source (ie. from on-farm production including crop residues, purchased feeds, others obtained on a direct grazing, or cut and carry basis, from community level common property resources), and the adequacy of the feeds in relation to the nutritional needs of the animals.

4 to cover the range of common diseases and health problems that act as local constraints to livestock production, and the existing health measures and disease control practices used (will include regular dipping/spraying to control ticks, dosing against internal parasites and other, both indigenous and introduced research derived, technologies).

5 to cover permanent stabling, pens, production sheds, night shelters and fenced paddocks.

Worksheet 18: - Utilisation of Trees and Forest Products

This worksheet should be used to compile details of the various trees species used by the farm households.

On-farm Tree Utilisation

Planted (ie. trees deliberately planted/introduced by the household and/or their ancestors)			
On-farm Location/ Management System	Croplands (Arable fields)	Around the Homestead	Orchards, woodlots & plantations etc
Tree species			
Spacing between trees and arrangement within the farm			
Purpose/products obtained			
Agroforestry systems*			
Naturally Occuring (ie. trees left standing when land originally cleared for farming)			
Tree species			
Spacing between trees and arrangement within the farm			
Purpose/products obtained			
Agroforestry systems*			

* should include details of the tree/crop/livestock components and interactions.

Off-farm Tree Utilisation

	Communal Woodlots (planted)	Natural Woodlands/Forests
Location/distance from the farm		
Species exploited		
Primary products obtained		
Secondary products obtained		

Worksheet 19: - Silvicultural Practices

This worksheet should be used for recording the various silvicultural/tree management practices for each of the major tree crops grown, or naturally occurring tree species deliberately managed. The purpose is to detail the ways in which farm households already raise and/or manage both exotic and indigenous tree species within their farming system.

Operations Performed and Timing Within the Tree Production Cycle

	Tree 1	Tree 2	Tree 3	Tree....n
Nursery practices[1]				
Land Preparation[2]				
Planting and establishment practices[3]				
Fertilizer application[4]				
Annual maintenance operations[5]				
Tree crop protection practices[6]				
Harvesting operations[7]				

1 Covers all practices associated with the raising of tree seedlings by the farm household in a nursery. Note where farmers do not raise their own seedlings but obtain them from Government or other nursery sources this should be noted (including distance from farm) rather than the practices followed within such nurseries.

2 Covers methods used and timing of initial land preparation including where applicable land clearance.

3 Covers methods used and timing for planting and other field operations undertaken during the establishment year.

4 Covers timing and methods of application at establishment and as applicable on an annual basis (fertilizer type and quantity to be recorded on worksheet 21: - Production Inputs).

5 Includes annual operations required to maintain the productivity of the tree eg. weeding, pruning etc.

6 Covers timing and methods of any operations undertaken to protect the tree and/or its fruits from pests and diseases (type of pesticide and quantity used are recorded on worksheet 21: - Production Inputs).

7 Covers timing and methods used eg. felling, pollarding, picking from the tree, collecting fallen fruits/nuts etc.

Worksheet 20: - Other Land Use Enterprises and Income Generating Activities

This worksheet should be used for recording details of the typical range of other land use activities and income generating activities undertaken by the members of the various farm households representative of a specific socio-economic group.

On-farm Activities

Enterprise/Income Generating Activity	Activities/practices /technologies involved	Household members involved	Where pursued	Purpose/products obtained
Other agricultural enterprise/activity[1]				
1				
2				
Non-farming enterprise /activity[2]				
1				
2				
3				

[1] eg. beekeeping, charcoal production
[2] eg. on-farm cottage industries (brickmaking, weaving, brewing etc)

Off-farm Activities

Enterprise/Income Generating Activity	Activities involved	Household members involved	Where pursued	Purpose/products obtained
Off-farm farming related employment[3]				
1				
2				
3				
Non-farm enterprise activity/employment				
1				
2				
3				

[3] eg. working as a labourer engaged in agricultural activities on another farm

Worksheet 21: - Production Inputs

This worksheet should be used for recording the material inputs, including labour, used by the 'typical' farm household for each crop, livestock and tree production enterprise. The source of the inputs should also be noted.

Crop Enterprises (one page for each)

Crop/crop mix			
Area of crop/crop mix		No. of times grown per year	

Inputs per crop event	Type & Source	Quantity Used	Cash Outlay
Seed/Planting material			
Fertilizer			
Chemicals (pesticides, herbicides etc)			
Draft power			
Animal manure			
Compost			

Labour[1]	J	F	M	A	M	J	J	A	S	O	N	D	Total
Land preparation[2]													
Planting													
Fertilizer application[3]													
Weeding/banking													
Pest control[4]													
Harvesting													
Marketing[5]													
Other[6]													
Total labour input													

1 To be recorded throughout in either man hours or man days.
2 To include land clearing where relevant (eg. shifting cultivation) and all tillage operations prior to planting.
3 To include labour devoted to the spreading of animal manures and compost.
4 To include scouting as well as spraying.
5 To include any post harvest operations/processing prior to marketing.
6 eg. compost making.

Recommended input levels	
Reasons for adoption /non adoption of recommendations	

Worksheet 21 continued

Livestock Enterprises (one per page)

Livestock enterprise[1]			
Species of Livestock		Breed(s)	
Herd/flock size		Sex & ages	

Annual inputs	Type & Source	Quantity/Frequency	Cash Outlay
Animals[2]			
Feeds/concentrates			
Breeding[3]			
Veterinary care[4]			
Dipping/spraying[5]			
Fencing/shelter[6]			
Other			

1 eg. dairy/beef production, egg laying, wool production etc.

2 for those livestock enterprises that depend on obtaining animals from off-farm sources eg. steers for on-farm fattening, day old chicks etc.

3 to include any costs and inputs associated with artificial insemination (AI) or for hiring (or loaning) of bulls/rams etc for servicing own females.

4 to include veterinary fees, routine prophylactic medicines and medicines for treatment purposes.

5 to include fees associated with the use of off-farm communal/government run dip tanks/spray races as well as inputs for on-farm spraying to control ticks etc.

6 to cover inputs required for routine maintenance of fences, livestock yards/shelters rather than capital expenditure on initial construction.

Labour[1]	J	F	M	A	M	J	J	A	S	O	N	D	Total
Herding/tending													
Feeding/watering													
Cleaning/mucking out													
Health care/tick control													
Milking/egg collecting etc													
Marketing													
Other													
Total labour input													

1 To be recorded throughout in either man hours or man days.

Recommended input levels	
Reasons for adoption /non adoption of recommendations	

Worksheet 21 continued

Tree Enterprises (one page for each)

Tree crop/tree mix	
Area/number of trees per farm	

Inputs[1]	Type & Source	Quantity Used	Cash Outlay
Nursery operations[2]			
Seed/seedlings/ planting material[3]			
Fertilizer			
Organic manures			
Chemicals (pesticides herbicides etc)			
Other			

1 Depending on the nature and extent of the tree enterprise inputs should be recorded on an area or per tree basis, and because they are perennial on a production cycle rather than annual basis.

2 Only applicable if farm households have on-farm nurseries for the production of planting material.

3 To cover inputs associated with direct seeding, use of cuttings/truncheons or obtaining seedlings from off-farm sources (eg. government nurseries or commercial tree producers).

Labour[1]	J	F	M	A	M	J	J	A	S	O	N	D	Total
Nursery operations													
Land preparation													
Planting/establishment													
Fertilizer application													
Weeding/pruning etc													
Pest control													
Harvesting													
Marketing													
Other													
Total labour input													

1 To be recorded throughout in either man hours or man days.

Recommended input levels	
Reasons for adoption /non adoption of recommendations	

Worksheet 22: - Yields and Production Levels

This worksheet should be used for estimating the annual total production from the various land use enterprises engaged in by representative farm households. Note figures for yields and production levels should be expressed as typical ranges rather than as precise single figures given that these will vary depending on the size of individual holdings and seasonal variations in the growing conditions.

Crop Production[1]

	Crop 1	Crop 2	Crop 3	Crop....n
Yield per ha.				
Main product				
By-product(s)[2]				
Yield per farm				
Main product				
By-product(s)				
Quantity sold off-farm				
Main product				
By-product(s)				
Quantity consumed on-farm				
Main product				
By-product(s)				
Price/value				
Main product(s)				
By-product(s)				

1 Where the level of crop production typically varies greatly from year to year, depending on the reliability and distribution of rainfall within the growing season, this table should not just present average crop production levels but indicate the range in yield that can be expected between a good and a bad year.

2 In traditional farming systems many crops provide the household with more than one product, for instance after harvesting the main product (eg. the grain, seeds or tubers) the residues left over may be valued as livestock fodder, fuel, thatching materials etc. Thus where a crop produces in addition a valuable by product this should be noted.

Worksheet 22 continued

Livestock Production

	Enterprise 1	Enterprise 2	Enterprise 3	Enterprise....n
Yield per animal				
Main product(s)				
By-product(s)[1]				
Yield per farm				
Main product(s)				
By-product(s)				
Quantity sold off-farm				
Main product(s)				
By-product(s)				
Quantity consumed on-farm				
Main product(s)				
By-product(s)				
Price/value				
Main product(s)				
By-product(s)				

[1] eg. manure, hides etc

Worksheet 22 continued

Tree Production a) On-farm

	Enterprise 1	Enterprise 2	Enterprise 3	Enterprise....n
Yield per tree				
Main product(s)[1]				
By-product(s)[2]				
Yield per farm				
Main product(s)				
By-product(s)				
Quantity sold off-farm				
Main product(s)				
By-product(s)				
Quantity consumed on-farm				
Main product(s)				
By-product(s)				
Price/value				
Main product(s)				
By-product(s)				

[1] eg. timber, poles, fuelwood, fruit, fodder (note some tree species may have multiple primary uses)
[2] eg. prunnings may be used as fuelwood

b) Off-farm

	Communal Woodlots (planted)	Natural Woodlands/Forests
Quantity harvested/ collected per household		
Main product(s)[3]		
By-product(s)[4]		
Quantity sold off-farm		
Main product(s)		
By-product(s)		
Quantity consumed on-farm		
Main product(s)		
By-product(s)		
Price/value		
Main product(s)		
By-product(s)		

[3] eg. timber, poles, fuelwood, charcoal
[4] eg. fruit, fodder, wildfoods, vines, bark string/cloth and a variety of minor forest products (from both woody and non woody forest plants)

Worksheet 23: - Household Income/Farm Performance

This worksheet should be used for determining the returns the typical household gets from its existing on-farm enterprises, and for assessing total household income by noting any income coming from other sources.

Fixed Costs (in Birr)

Farm implements & equipment depreciation	
Farm buildings[1] depreciation	
Maintenance & repair of implements & equipment	
Maintenance & repair of farm buildings	
Credit/loan interest[2]	
Taxes	
Total fixed costs (in Birr)	

1 Permanent buildings related to one or more farm enterprises eg. livestock shelters, granaries, fodder stores, tobacco curing barns.

2 Annual repayments and interest charged on mid to long term loans for purchase of oxen, farm equipment and construction of farm buildings.

Crop Enterprise Gross Margins

a) Variable Costs

	Variable costs[1]	Crop 1	Crop 2	Crop 3	Crop....n
Growing Costs	Seed				
	Fertilizer				
	Chemicals (pesticides & herbicides)				
	Oxen/tractor hire				
	Hired labour				
	Seasonal credit interest				
	Other (eg. manure)				
	Subtotal				
Harvest-ing costs	Bags/twine				
	Hired labour				
	Transport cost (field to homestead)				
	Other				
	Subtotal				
Post harvest costs	Chemical treatment in store				
	Hired labour				
	Transport cost to market				
	Other				
	Subtotal				
	Total variable costs				

1 For comparison purposes between socio-economic groups can be expressed on a per ha basis but ultimately net farm income will need to be calculated according to the actual areas cropped.

b) Enterprise Output

	Crop 1	Crop 2	Crop 3	Crop....n
Production kg (or quintals) per ha.				
Main product				
By-product(s)				
Production kg (or quintals) per farm				
Main product				
By-product(s)				
Price[1] per kg				
Main product				
By-product(s)				
Gross revenue per ha				
Gross revenue per farm				

[1] In the case of non-marketable by-products the price or value should be estimated using the opportunity cost of replacing the by-product by another of equal use that has a market value.

c) Gross Margin

	Crop 1	Crop 2	Crop 3	Crop....n
Total gross revenue per ha				
Total variable cost per ha				
Gross margin per ha[1]				
Total cropped area				
Gross margin per crop[2]				

[1] Calculated by subtracting the total variable cost per ha from the total gross revenue per ha

[2] Calculated by multiplying the total cropped area by the gross margin per ha.

d) Labour Productivity

Per enterprise	Crop 1	Crop 2	Crop 3	Crop....n
Total labour input				
Productivity per unit of labour[1]				

[1] Calculated by subtracting the variable costs (less cost of any hired labour) from the total gross revenue and dividing by the total labour input.

Livestock Enterprise Gross Margins

a) Variable Costs

	Variable costs[1]	Livestock Enterprise			
		No. 1	No. 2	No. 3	No....n
Feed Costs	Purchased feeds				
	On-farm fodder/pasture production[2]				
	Other				
	Subtotal				
Husbandry costs	Veterinary services & drugs				
	AI fees/hired bulls/rams etc				
	Dipping fees/chemicals				
	Hired labour				
	Fencing/shelter				
	Credit interest				
	Other				
	Subtotal				
Marketing costs	Slaughter fees				
	Transport costs to market				
	Other				
	Subtotal				
	Total variable costs				

[1] For comparison purposes between socio-economic groups can be expressed on a per livestock unit basis but ultimately for calculating net farm income will need to be calculated according to the numbers of livestock owned.

[2] Important to include the full range of costs involved in any on-farm fodder/pasture production. In an integrated farming system in calculating gross margins for specific enterprises it may be necessary to split the costs on a pro rata basis between related crop and livestock enterprises.

b) Enterprise Output (separate sheet per livestock enterprise)

i. Growth and Turnover (Livestock Inventory Change)

	Number	Value
Livestock sold or otherwise disposed of off-farm		
Livestock consumed on-farm		
Livestock at year end		
Subtotal A		
Livestock at year start		
Livestock purchased or otherwise obtained off-farm		
Subtotal B		
Total growth & turnover (A-B)		

[1] For some livestock enterprises should be broken down on basis of age and sex categories.

ii. Other Receipts

	Amount	Unit	Price	Value
Products sold/paid in kind[1]				
Products consumed on-farm[1]				
By-products[2]				
Total				
Gross value of production[3]				

[1] eg. milk, eggs, hides, wool etc.

[2] eg. manure (an estimated value can be calculated on basis of cost of purchasing equivalent nutrients in commercial fertilizers).

[3] Calculated by adding the total value of growth and turnover to the total value of other receipts.

c) Gross Margin

	Livestock Enterprise			
	No 1	No 2	No 3	No....n
Gross value of production				
Total variable cost				
Gross margin per livestock enterprise[1]				

[1] Calculated by subtracting the total variable cost from the gross value of production.

d) Labour Productivity

	Livestock Enterprise			
	No 1	No 2	No 3	No....n
Total labour input				
Productivity per unit of labour[1]				

[1] Calculated by subtracting the variable costs (less cost of any hired labour) from the total gross value of production and dividing by the total labour input.

Tree Enterprise Gross Margins

a) Annual Variable Costs

	Variable costs	Crop 1	Crop 2	Crop 3	Crop....n
Establish-ment costs for new tree plantings	Nursery costs[1]				
	Seedlings, cuttings or seed				
	Fertilizer/manure				
	Chemicals (pesticides)				
	Hired labour				
	Seasonal credit interest				
	Other				
	Subtotal				
Main-tenance costs for existing trees	Fertilizer/manure				
	Chemicals (pesticides, fungicides)				
	Hired labour				
	Other				
	Subtotal				
Harvest-ing & market-ing costs for mature/ fruit bearing trees	Containers for coffee berries/fruits				
	Hired labour for picking/felling				
	Transport costs to market				
	Other				
	Subtotal				
	Total variable costs				

[1] Nursery costs would only apply where farmers raise their own seedlings, costs could include seed, fertilizer, chemicals, and planting pots/tubes as appropriate.

b) Enterprise Output

I. Growth and Turnover (Tree Inventory Change)

	Number	Value[1]
Mature trees felled		
Seedlings planted and surviving at year end		
Immature trees surviving at year end		
Trees reaching maturity & mature trees remaining at year end		
Subtotal A		
Mature trees at year start		
Immature trees at year start		
Trees dying		
Subtotal B		
Total growth & turnover (A-B)		

[1] For non timber trees this may be an imputed rather than commercial value based on a subjective consensus amongst farmers as to the value of the tree to them (this might be the amount they would require in compensation should an outside agency require them to fell the tree).

ii. Other receipts

	Amount	Unit	Price	Value
Fuelwood sold				
Poles sold				
Fodder (leaves fine stems) sold				
Coffee berries/fruit sold				
Fuelwood consumed on-farm				
Poles consumed on-farm				
Fodder consumed on-farm[1]				
Green manure consumed on-farm[2]				
Coffee berries/fruit consumed on-farm				
Other tree products sold				
Other tree products consumed				
Total				
Gross value of production[3]				

[1] Value calculated on the basis of the opportunity cost of purchasing equivalent protein and dry matter in commercial livestock feeds.

[2] Value estimated on the basis of the opportunity cost of purchasing equivalent quantity of nutrients in commercial fertilizers.

[3] Calculated by adding the total value of growth and turnover to the total value of other receipts.

c) Annual Gross Margin

	Tree Crop Enterprise			
	No 1	No 2	No 3	No....n
Gross value of production				
Total variable cost per enterprise				
Gross margin per tree crop[1]				

[1] Calculated by subtracting the total variable cost from the gross value of production.

d) Labour Productivity

	Tree Crop Enterprise			
	No 1	No 2	No 3	No....n
Total labour input				
Productivity per unit of labour[1]				

[1] Calculated by subtracting the variable costs (less cost of any hired labour) from the total gross value of production and dividing by the total labour input.

Net Farm Income

Sum of crop enterprises gross margins	
Sum of livestock enterprises gross margins	
Sum of tree crop enterprises gross margins	
Sum of fixed costs	
Net farm income[1]	

[1] Calculated by subtracting the sum of the fixed costs from the total of the sum of the gross margins for all the farm household's crop, livestock and tree crop enterprises.

Farm Household Income

Net farm income	
Earnings from cottage industries/non farm enterprises	
Earnings from off-farm waged employment	
Off-farm remittances	
Earnings from sale of products obtained from communal woodlots/natural forests & woodlands	
Other	
Farm household income	

Worksheet 24: - Production Problems and Constraints

This worksheet should be used for compiling a representative list of the major problems and constraints, facing the farm households with regard to meeting their production objectives. The information recorded on this worksheet and worksheet 25 should be used to compile a causal diagram showing the cause and effect linkages of the various production and sustainability problems.

Main Production Problems	Causes
1. 2. 3. 4. 5. etc	
Subsidiary Production Problems	**Causes**
1. 2. 3. 4. etc	
Bio-physical Constraints	**Effects**
1. 2. 3. 4. etc	
Socio-economic/cultural Constraints	**Effects**
1. 2. 3. 4. etc	

Worksheet 25: - Land Degradation Problems

This worksheet should be used for recording the type, severity, location, cause of existing land degradation and the effect on farm households within the recommendation domain. The information recorded on this worksheet, and the previous worksheet 24, should be used to compile a causal diagram showing the cause and effect linkages of the various production and sustainability problems.

a) Land Degradation Problems Occurring at the Individual Farm Level

Type[1] & Severity	Location[2]	Cause	Effect
1.			
2.			
3.			
4.			
5.			
6.			
etc			

[1] eg. type of soil erosion, or other forms of soil, vegetation and water degradation.

[2] ie. where within the farm holding is the land degradation occurring - within the cropped areas, orchards, woodlots, coffee gardens, Enset plantations, pastures or around the homestead.

b) Land Degradation Problems that Occur at a Scale Larger Than the Individual Farm Level

Type & Severity	Location[3]	Cause	Effect
1.			
2.			
3.			
4.			
5.			
6.			
etc			

[3] ie. where within the Peasants Association is the land degradation occurring - in the communal grazing areas, woodlands, croplands, settlement areas or along the roads, tracks and footpaths.

Worksheet 26: - Existing Conservation Practices

This worksheet should be used for determining which existing land use/farm management practices, engaged in by the farm household within its individual farm holding and within the common property resources of the community, are consistent or not with good soil and water conservation (ie. conservation effective or conservation negative).

	Land use within the individual farm holding		Land use of common property resources ie. wider than individual farm holding[1]	
Practices related to:	Conservation effective practices	Conservation negative practices	Conservation effective practices	Conservation negative practices
a) Crop production				
b) Livestock Production				
c) Tree crop production				
d) Forest/ woodland product utilisation				
e) Other natural resource utilisation[2]				
f) Physical Infrastructure[3]				

1 eg. communal grazing areas, woodlots, forests, water resources etc.
2 including small-scale stone quarrying, mining, clay & gravel extraction
3 eg. paths, roads, settlements, physical conservation works.

Worksheet 26 continued

Specific Indigenous Soil and Water Conservation Technologies (farmers own rather than research derived technologies)

This part of the worksheet to be used for documenting briefly any indigenous soil and water conservation technologies used by the farm households. By indigenous technologies is meant practices that farmers have traditionally used, or have recently developed for themselves (local innovators) rather than research derived practices that they have adopted as a result of an extension programme.

Technology description	
Technical specifications	
Conservation effectiveness /benefits	
% of farm households using the technology	
Traditional practice or recent innovation	

Separate descriptions to be compiled for each specific indigenous technology used.

Worksheet for the Documentation of Indigenous Land Husbandry Practices[1]

The attached worksheet should be used for documenting indigenous land husbandry practices.

- The term land husbandry practice is used to cover not only specific measures adopted for soil and water conservation purposes, but also other conservation effective farming practices that maintain and enhance soil productivity.

- The term indigenous is used to refer to the farmer's own practices, and covers both traditional practices and ones developed recently by innovative farmers in response to changing circumstances. They are distinct from research derived technologies adopted as the result of following extension advice.

When seeking to document indigenous soil and water conservation technologies and conservation-effective farming practices it is important to tap the knowledge of the practitioners rather than merely recording ones personal observations, which are those of an outsider. This should be done by in depth discussion with at least one local expert practitioner.

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[1]This worksheet has been developed from the one used by the Soil Conservation Research Project of Ethiopia for their Inventory of Indigenous Soil and Water Conservation Measures.

Location where the Practice is used	Geographic location : Name of Community :
Name of the Practice	Local Name : English Name :
Information Source	Name of local expert/key informant: Name of recorder: Reports and other reference materials consulted:
Origin and Extent of the Practice	Origin of the practice Handed down from previous generations ☐ Recent indigenous innovation ☐ From whom was the practice learnt: Percentage of farm households using the practice:
Characterisation of the Practice	**Type of Practice** Agronomic practice: ☐ Biological practice: ☐ Physical practice: ☐ **Permanency** Permanent: ☐ (duration) Semi-permanent: ☐ ( ) Seasonal: ☐ ( ) Shifting: ☐ ( ) **Purpose of the Practice** Soil conservation Soil trapping ☐ Protection of soil surface ☐ Slope modification ☐ Soil improvement Organic matter management ☐ Nutrient supply ☐ Physical improvement ☐ Water management/conservation Water harvesting ☐ Water storage/infiltration ☐ Water disposal/drainage ☐ Runoff control ☐ Improved crop production ☐ Improved fodder production ☐ Pasture improvement ☐ Improved fuelwood production ☐ Woodland management ☐ Other: Important effects of the practice:
Construction/ Establishment/Operation of the Practice	**Implementation** Who designs/decides on the practice: Who implements the practice: Time of year when practice undertaken: **Materials** Kind of materials/plants (inputs) used: Amount of materials/plants used per unit: What tools are required: **Labour** Source of labour: Labour input per unit: Organisation of labour: Gender:
Maintenance of the Practice	Frequency of maintenance: Indicators of the necessity for maintenance: Source of labour: Labour input per unit: Organisation of labour Material inputs required:

	DESCRIPTION OF THE BIO-PHYSICAL CONDITIONS
Climate Characteristics	Agro-climatic zone: Temperature Mean annual maximum Mean annual minimum Frost occurrence ☐ Rainfall Bimodal ☐ Unimodal ☐ Mean annual total Reliability Intensity Hail occurrence ☐
Land Characteristics (Micro level)	Altitude: Micro level landform(s): Traditional landform classification (local name): Typical physiographic site position: Range of slope on which practised (in degrees): Range of effective slope length: Typical slope shape:
Soil Characteristics of the local area in which the practice is used	Soil type(s): Local name for the soil(s): Topsoil texture: Subsoil texture: Effective soil depth: Potential soil depth: Structure of topsoil: Organic matter level: H☐ M☐ L☐ Nutrient status: H☐ M☐ L☐ External drainage: Internal drainage: Surface stone content: Soil moisture regime: Limiting soil properties: Soil Degradation Sheet erosion: ☐ Rill erosion: ☐ Gully erosion: ☐ Mass movement: ☐ Loss of organic matter ☐ Soil nutrient decline ☐ Physical soil degradation ☐ Sediment deposition ☐ Dominant degradation processes Overall degradation status:
Characteristics of the local common property resource areas	Grazinglands Improved pastures ☐ Unimproved pastures ☐ Condition of the pasture (extent of overgrazing): Woodlands Natural woodlands ☐ Planted woodlots/plantations ☐ Extent of deforestation:
Erosion Hazard within the local area where the practice is used	Water erosion ☐ Climatic factors: Topographic factors: Soil factors: Land use factors: Wind erosion ☐ Critical period: Erosion Dynamic within the area where the practice is used Soil particles removed from area by erosion ☐ Soil particles transported through area ☐ Soil particles accumulating within area ☐
Typical erosion status once practice adopted	Low ☐ Medium ☐ High ☐ Indicators of erosion status:
Relationship to the natural drainage system	Practice used at locations within the natural waterway ☐ outside but with influence on the natural waterway ☐ outside without influence on the natural waterway ☐

	DESCRIPTION OF PRACTITIONERS SOCIO-ECONOMIC CIRCUMSTANCES	
Socio-cultural characteristics	Ethnic group: Religious affiliation: Key cultural beliefs & taboos: Key social norms & obligations: Degree of cultural & geographic isolation: Land ownership/user rights: Community level involvement Community organisations: Communal activities:	Average age of practitioners: Educational/literacy level: Typical family size: Division of labour/decision making responsibility:
Socio-economic characteristics	Practitioners relative wealth status within the community: Average farm household income level: Farm income as proportion of household income: Other sources of household income: Migrant labour ☐ Cottage industries ☐ Trading ☐ Remittances ☐ Typical land holding size: Typical family labour resources:	Food production: Usually self sufficient: ☐ Sometimes self sufficient: ☐ Rarely self sufficient ☐ Fuels used Fuelwood ☐ Charcoal ☐ Crop residues ☐ Dried manure ☐ Paraffin/kerosene ☐ Other:
Characteristics of the farming system	Market orientation Subsistence production ☐ Commercial production ☐ Component land use enterprises Annual crops: Perennial crops: Livestock: Trees:	Draft power/mechanisation Tractor cultivation ☐ Oxen plough cultivation ☐ Hand hoe cultivation ☐ External Inputs Used Improved seeds ☐ Fertilizer ☐ Herbicide ☐ Pesticide ☐ Other chemicals ☐ Purchased feeds ☐ Other external inputs:
Political and/or administrative factors	Do political or administrative decisions/actions influence the use of the practice: In what way do they have an influence:	

	DESCRIPTION OF THE PRACTICE
Technical description • technical specifications eg: - dimensions & spacing for physical structures & vegetative barriers; - construction, establishment & maintenance methods as appropriate; - component activities & timing of agronomic practices; - for water harvesting practices ratio between catchment area and cultivated area. • function • application • position within the farm • role within the farming system	
Illustration of the Practice Sketch, field plan, diagram or photo record as appropriate to provide a pictorial representation of the practice	

	ASSESSMENT OF THE PRACTICE
Main effect on production (in comparison to non adopting farmers or to so-called improved extension recommendations)	Comments Yield Increase ☐ No change ☐ Decrease ☐ Production area Increase in area of production ☐ No change ☐ Decrease ☐ Labour Labour saving ☐ Labour neutral ☐ Labour demanding ☐ External Inputs Increased use ☐ No change ☐ Decreased use ☐
Main conservation effect	Protection of soil surface ☐ Reduction of slope length ☐ Reduction in slope degree ☐ Reduction of runoff volume ☐ Reduction of runoff speed ☐
Main soil improvement effect	Increase in organic matter ☐ Increase in soil nutrients ☐ Improvement of soil physical properties ☐ Improved soil moisture availability ☐ Improved soil drainage ☐
Main vegetation effect	Increased groundcover ☐ Increased biomass ☐ Increased bio-diversity ☐
Important factors determining the farmer acceptability of the practice	
Problems associated with the practice (potential disadvantages)	
Options for the further development and improvement of the practice	

1999	SECID	CARE Units	CARE Core	CARE Reg.	CARE Area	PADF Units	PADF Core	PADF Reg.	PADF Area
PRA									
PD's summarized by area			15	35	30		15	35	40
Training for MARDNR (?)			15	15			15	15	
FES									
FES summaries prepared			15	25	10		15	25	10
Training for MARDNR (?)			15	15			15	15	
Intervention Budgets (Summarized)			15	20			15	20	
Whole-farm Budgets (Summarized)			10	20			10	20	
Capture Participatory methods			1				1		
Expand involvement regional									
Special Study/intensive survey (400)		1	15	19	35	1	15	19	35
Sample Survey (intensive, 1500)		1	15	19	83	1	15	19	83
Land Status Final Reports		All	10	10	45	All	10	10	45
Farmer record-keeping		1	3	10	10	1	3	10	10
Dialogue with NGO's			15	30			15	30	
Dialogue with MARDNR			15				15		
Update and transfer of dossier system			15	45	12		15	45	12
PRA, GIS, other methods		1	15	15	5	1	15	15	5
Report preparation			15	12			15	12	
Total			204	290	230		204	290	240

Notes on Appendix 14

[1] These are very rough estimates. Those dealing with Farmer Involvement and Participation are based on rough estimates in Appendix 4, those dealing with Financial and Economic Analysis are based on rough estimates in Appendix 11, those dealing with Land Husbandry are based on rough estimates in Appendix 9.

[2] Because of the different structures, the "regional" and "area" levels do not correspond to each other. In fact, for PADF they not be meaningful. The distinction we tried to make is between mid-level staff (regional) and field staff (Area). Our sense was that, for PADF, there were about 8 - 10 "Areas." For

CARE, we have treated the presence of "Assistant Regional Managers" as the rough equivalent of an area. Hence, CARE has 9 quasi-areas in the Northwest, and would have about 6 in the Grand d'Anse, if this structure is maintained.

[3] Would be done as part of implementation.

[4] This does not include normal reporting responsibility, but estimates the incremental increase due to these recommendations.

[5] This is for management and quality control only, surveys are performed during usual farm visits.

Adjusted (+ 15%) estimated person-day obligations and discussion

Since the person-day obligation estimates are very rough, given our unfamiliarity with the details of the implementing agencies, and exactly what will be required in Haiti, we prepared the following table making a 15% upward adjustment of all totals.

These figures confirm what has already emerged in our discussions with SECID, CARE, and PADF staff. First, most of the numbers aren't really that large, considering the number of staff available in the respective categories. Second, the resources of SECID will be stretched. Third, the large work loads show up in implementing the dossier system, especially moving toward computer data entry in PADF, implementing Participatory Rural Appraisals, and carrying out the surveys. The actual work load of the latter depends, of course, upon exactly how it is organized. If the extensive survey can be done as part of "normal" field contacts, as is assumed here, its burden will not be that great. If not, it will require additional time.

	SECID SECID	CARE Core	CARE Region	CARE Area	PADF Core	PADF Region	PADF Area
1995							
Sub-total	101	78	392	267	80	579	287
Adjusted Total	116	90	451	307	92	666	330
1996							
Sub-total	108	96	310	263	96	341	285
Adjusted Total	124	110	357	302	110	392	328
1997							
Sub-total	123	101	265	213	101	270	265
Adjusted Total	141	116	305	245	116	311	305
1998							
Sub-total	0	114	293	213	114	299	260
Adjusted Total	0	131	337	245	131	344	299
1999							
Sub-total	0	204	290	230	204	290	240
Adjusted Total	0	235	334	265	235	334	276