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UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D. C. 20523

HAITI

PROJECT PAPER

PRODUCTIVE LAND USE SYSTEMS
AMENDMENT NUMBER 1

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AID/LAC/P-760
CR-562

PROJECT NUMBER: 521-0217

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AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: C (A = Add, C = Change, D = Delete) — Amendment Number: 1

DOCUMENT CODE: 3

2. COUNTRY/ENTITY: Haiti

3. PROJECT NUMBER: 521-0217

4. BUREAU/OFFICE: Latin America & Caribbean — 5

5. PROJECT TITLE (maximum 40 characters): PRODUCTIVE LAND USE SYSTEMS*

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 12 DD 31 YY 94

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)
A. Initial FY 90 B. Quarter 1 C. Final FY 94

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY 90 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total						
(Grant)	(2,773)	(2,227)	(5,000)	(14,127)	(15,873)	(30,000)
(Loan)	( )	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.						
Host Country						
Other Donor(s)						
TOTALS	2,773	2,227	5,000	14,127	15,873	30,000

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) ARDN	210			11,049		78		23,547	
(2) PSEE						1,853		1,853	
(3) ESF								4,600	
(4)									
TOTALS				11,049		1,931		30,000	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

11. SECONDARY PURPOSE COD

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)
A. Code
B. Amount

13. PROJECT PURPOSE (maximum 480 characters)

The purpose of PLUS is to achieve sustainable increases in on-farm productivity and farmer income by integrating into existing farming systems appropriate land use and soil conservation measures, involving trees, shrubs, grasses, and other plant materials which will enhance soil fertilify.

14. SCHEDULED EVALUATIONS
Interim MM YY MM YY Final MM 06 YY 94

15. SOURCE/ORIGIN OF GOODS AND SERVICES
[X] 000 [ ] 941 [X] Local [ ] Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a ____ page PP Amendment.)

I have reviewed and approved the methods of implementation and financing for this project.

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Edward T. Gray
Robbin Burkhart
Acting Controller, USAID/Haiti

* Formerly Agroforestry II (AFII)

17. APPROVED BY
Signature: David Cohen
Title: Director, USAID/Haiti
Date Signed: MM 08 DD 14 YY 92

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION
MM 08 DD 14 YY 92

AID 1380-4 (8-79)

ACTION MEMORANDUM FOR THE MISSION DIRECTOR

FROM : Michelet Fontaine, ADO

SUBJECT : Approval of Productive Land Use Systems (PLUS) Project Paper (521-0217)

DATE : August 13, 1992

PROBLEM: Your approval is requested of the attached Project Paper amendment, redefining implementation strategy for the Agroforestry II (AFII) Project (521-0217) and changing its name to Productive Land Use Systems (PLUS). The amendment seeks to provide project implementors with improved mechanisms for the promotion of both economically profitable and environmentally sustainable agricultural activities.

BACKGROUND: The AFII project was authorized on December 12, 1989 with an LOP funding level of $30,000,000 and a PACD of December 31, 1994. It was designed to maximize the productive potential of Haiti hillside agriculture by reducing the on-going degradation of the country's natural resource base. Its purpose is to achieve sustainable land-use increases in on-farm productivity and farmer income through the integration of appropriate soil-conserving and fertility-enhancing crops and land use practices into existing farming systems.

The Project is being implemented by three private agencies: two grantees responsible for field-level operations -- CARE and the Pan American Development Foundation (PADF) -- and a Title XII contractor responsible for research and seed germplasm improvement -- SECID/Auburn University. CARE works directly with farmers in the Northwest, while PADF operates throughout the rest of the country through a network of 80 local PVOs. The project has been in suspension since October 1991, under the terms of Section 513 of the Foreign Assistance Appropriations Act, as a result of the September 30, 1991 coup d'état. Until then, CARE and PADF were charged with establishing and maintaining outreach programs that provide small farmers with extension services and plant materials in support of tree planting and other environmentally sound land use practices.

Authority to reactivate the project was received from Washington in July 1992, after which an external two-member U.S. technical team reviewed the status of the project in light of the country's present agricultural environment. The conclusions of this review, taking into account a draft amendment prepared by the Mission before the coup and after current consultations with CARE and PADF representatives, constitute the basis of the present amendment.

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DISCUSSION: The suspension affords the Mission and the project implementors the opportunity to reassess and revise the methodology of the AFII project, in an effort to sharpen the focus of activities and to assure a more meaningful and enduring economic and ecological impact. To underscore the new emphasis, and to alter the image of the project among many observers as essentially a tree-planting activity, this amendment introduces a change in the project's name to Productive Land Use Systems (PLUS).

The objective of this amendment is to increase the project's emphasis on achieving both economically profitable and environmentally sustainable agricultural activities. The project implementors will refocus their outreach programs to stimulate crop production in order to provide sustainable income for Haitian hillside farmers. There is a need to convince farmers that continuous and determined conservation practices are valuable not only to preserve the soil and water for future use, but also as an instrument to increase crop production and farmer income.

The goal and purpose of the project remain the same. PLUS implementation strategy will be characterized by two interrelated factors, one a basic project objective: **sustainable income generation through improved land use and increased production** and the other a key management process: **effective monitoring and evaluation.** This will enable project managers to improve their understanding of farmers' perceived needs and to design interventions which best meet those needs on a sustainable basis.

The amendment directs project implementors to:

* Optimize extension capacity to introduce agricultural and conservation technologies that will gradually be adopted and sustained;

* Improve project's internal monitoring and evaluation system to track economic performance more effectively, to identify appropriate practices, and to improve extension training;

* Realign complementary research activities to emphasize extension of demand-driven conservation and agricultural production practices; and

* Reduce management and overhead costs by emphasizing local capacity and streamlining operations.

These modifications in project implementation will effectively inject farm-level financial decision-making into what has been predominantly a conservation management program. By continuing to emphasize the profitability of sustainable agriculture and land resource management practices, farmers will be exposed to an

increasingly wide variety of production, marketing, and conservation opportunities. By harnessing the farmer's more immediate financial interests, the project will help stimulate the widespread adoption of both conservation and economic development activities upon which ecological and economic sustainability ultimately depend.

AUTHORITY:

Per STATE 2217774, the reactivation of AFII was authorized by AID/Washington on July 11, 1992, under the purview of Section 123(e) of the FAA. The Congressional Notification (CN), encompassing the new name (PLUS) and revised implementation strategy, was transmitted to the Hill on August 5, 1992 and expires on August 19, 1992.

This amendment involves no increase in authorized LOP funding or extension of the Project Assistance Completion Date (PACD) of December 31, 1994. The approval of the amendment lies within the authority delegated to you as Mission Director, per LAC Delegation of Authority 752.

RECOMMENDATION: That you approve the Project Paper amendment, including the change of name to Productive Land Use Systems (PLUS).

Approved: _____ Date 8/14/92
David Cohen
Director
USAID/HAITI

Disapproved: _____ Date _____
David Cohen
Director
USAID/HAITI

Clearance: ADO:MMartin _____ 8/13/92
PPS:GSpence _____ 8/13/92
PPS:SReichle _____ 8/13/92
PPS:MGilbert _____ 8/13
EXO:CDrilling _____ 8/13
CONT:EGiza _____ 8/14/92

Drafted: ADO:MFontaine:abh; 8/13/92
DOC: PLUSACT

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LIST OF ACRONYMS

AFII	Second USAID/Haiti Agroforestry project, begun in 1989, which has evolved into present PLUS project
AOP	Agroforestry Outreach Project, 1981-89
CA	Cooperative Agreement
CARE	U.S.-based Private Voluntary Organization for relief and development activities
CMP	Center for Management and Productivity
IRR	Internal Rate of Return in economic/financial analyses
LAC	Latin America and Caribbean Bureau of AID/Washington
M&E	Monitoring and Evaluation
NGO	Non-Governmental Organization(s)
NPV	Net Present Value
ORE	Organisation for the Rehabilitation of the Environment
PADF	Pan American Development Foundation
PADO	Private Enterprise and Agricultural Development Office
PLUS	Productive Land Use Systems, new name of this project
PVO	Private Voluntary Organization(s)
SECID	Southeast Consortium for International Development
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

This amendment introduces a mid-course correction to USAID/Haiti's Agroforestry II project (AFII), begun in 1989. AFII was a follow-on activity to the highly successful Agroforestry Outreach Project (AOP), which was conducted from 1981-1989 and introduced the concept of trees as a cash crop. Activities concentrated on tree planting and soil and water conservation. AFII differed from its predecessor project by developing on-farm propagation techniques and harvest schemes, promoting a broader range of perennial species of forages, grasses and non-woody vegetation and diversifying its interventions to include hedgerows, alley cropping, gully plugs, ravine control measures, and wider use of indigenous seed and germ plasm.

The AFII project was suspended, along with most of the USAID program, in October 1991 after the coup d'état. However, it remained in a status of partially-funded suspension to permit a rapid start-up, which was authorized in July 1992. The present redesign began the following week.

The nature of the redesign is characterized by the change of the project's name from Agroforestry II to Productive Land Use Systems (PLUS), reflecting a shift of emphasis away from subsidized tree-planting and conventional land conservation to a more sustainable program aimed at extension of conservation practices and increased farmer income through greater production, improved operations and reduced management costs. An important element of sustainability is the need to convince farmers that continuous and determined conservation practices are valuable not only to preserve soil and water for future use, but also as an instrument to increase crop production and hence farmer income.

The Goal and Purpose of PLUS remain the same as the AFII project:

> **Goal: To maximize the productive potential of Haitian hillside agriculture by reducing the ongoing degradation of the country's natural resources base through sustainable land-use interventions;**
>
> **Purpose: 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 materials which will enhance soil fertility.**

The essence of the changes reflected in this amendment lies in the project's implementation strategy. Although the same three institutions, CARE, PADF and SECID, will continue to serve as implementing agents, the focus will be on land use interventions which provide sustainable income for Haitian hillside farmers.

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For this initiative to be successful, interventions must be responsive to the motivations which drive farmers' decisions. To ensure the sustainability of practices introducéd, subsidies provided under the AFII project will be eliminated. The incentive for the farmer to continue will therefore be based on the perceived value and utility of the practices learned under the project.

With increased emphasis of extension of land use practices, PLUS will also pay increased attention to monitoring and evaluation (M&E). This is necessary to enable project managers to improve their understanding of farmers' perceived needs and to design interventions which best meet those needs on a sustainable basis. It will be the role of SECID to organize and direct the project's M&E effort, to analyze results of interventions and to provide the operating agencies, CARE and PADF, with practical feedback.

Two years remain for PLUS to complete the original life of project of the Agroforestry II project. The project budget will be somewhat leaner and expatriate technical assistance will be about one-third less than before. Similarly, geographic coverage, especially for PADF, and the numerical targets for interventions will be reduced from the levels of the first two years of AFII (see target tables in Section V). Nevertheless, important accomplishments are anticipated in the remaining life of the project. Foremost among them will be a significant increase in the number of Haitian farmers earning sustained higher incomes. Of the estimated 125,000 farm families expected to be touched in some way during the remainder of the project, at least 45,000 of them should meet the sustainability criteria at the end of the project. Another critical project contribution will be a major reduction in the environmental degradation of farm land which has plagued Haitian agriculture in recent years.

In more specific terms, project outputs will be achieved in the following areas:

<u>Increases in production and income</u> through propagation of improved varieties of fruit trees and food crops, grafting, foodcrop germplasm improvement, appropriate grain storage development, bio-intensive gardening, and improved market information and access.

<u>Sustainable production systems</u> involving soil and water conservation practices encompassing terracing and hedgerow technologies, ravine stabilization, rock walls, etc., as well as appropriate production technologies, including composting, deep tillage, cover cropping, and improved crop management.

<u>Multipurpose tree propagation</u> through training of farmers in propagation techniques, direct seeding, use of plastic sack nurseries, stump planting, etc., in order to maintain adequate numbers of trees for farmers to integrate into their farming system.

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I. Purpose and Objectives of the Amendment

For a full decade until the advent of Haiti's most recent political turmoil stemming from the September 30, 1991 coup d'état ousting the democratically elected Aristide government, two major USAID projects, Agroforestry Outreach Project (AOP) and Agroforestry II (AFII), have provided the continuous and vital delivery of agroforestry services to much of Haiti's rural population. In many areas, the projects offered the only basis for systematic and rational land use. These projects have also provided a formidable technical and institutional foundation upon which a new orientation of sustainable activities can now build.

Recent political events and the resulting hiatus in project activities since October 1991 now afford USAID/Haiti and participating NGOs -- CARE, PADF and SECID -- the opportunity to reassess and revise the methodology of the AFII project, in an effort to sharpen the focus of activities and to assure a more meaningful and enduring economic and ecological impact. Authority to reactivate the project was received from Washington in July 1992, after which an external two-member U.S. technical team reviewed the status of the project in light of the country's present agricultural environment. The conclusions of this review, based in part on a draft amendment prepared by USAID/Haiti before the coup and in part on current consultations with CARE and PADF representatives, constitute the basis of the present amendment. To underscore the new emphasis, and to alter the image of the project among many observers as essentially a tree-planting activity, this amendment introduces a change in the project's name to Productive Land Use Systems (PLUS)[1].

The objective of this amendment is to increase the project's emphasis on achieving both economically profitable and environmentally sustainable agricultural activities. Specifically, the amendment directs project implementors to:

1. Optimize extension capacity to introduce agricultural and conservation technologies that will gradually be adopted and sustained by:

-> geographically consolidating PADF and CARE activities;
-> concentrating attention on counterpart NGOs (PADF) or in communities (CARE and PADF) with strong support;

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[1] *To minimize confusion in this paper regarding the project name, the title AFII will be retained in historical references to past activities of the Agroforestry II project, and the label AFII/PLUS will occasionally appear with respect to continuous past and future activities. AOP refers to the original Agroforestry Outreach Project (1981-89). The new name, PLUS, will be used for clearly prospective actions.*

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-> retraining extension staff to offer a demand-driven range of sustainable agricultural technologies;
-> utilizing the capacity of local organizations to acquire improved germplasm, grafting materials, and provide training;
-> reducing the emphasis on forest tree production;
-> increasing the emphasis on fruit tree production; and
-> increasing women extension staff in order to increase coverage of women farmers and home garden technologies.

2. Improve the project's internal monitoring and evaluation system to track economic performance more effectively, to identify appropriate practices, and to improve extension training by:

-> developing a baseline of present conditions as a benchmark for new activities;
-> focusing complementary research on developing agile and effective monitoring and evaluation systems; and
-> attaching higher priority to estimating the project's economic impact.

3. Realign complementary research activities to emphasize extension of demand-driven conservation and agricultural production practices by:

-> guiding extension toward technologies with maximum sustainability and accelerated replication;
-> undertaking on-farm agronomic trials to assess the productivity and soil-enhancement potential of different crops and land use practices; and
-> placing the responsibility for determining short-term technical assistance needs in CARE and PADF, and meeting them through the SECID contract.

4. Reduce management and overhead costs by emphasizing local capacity and streamlining operations:

The following measures are proposed, subject to final negotiations with grantees organizations.

-> CARE will reduce international staff to two positions;
-> PADF will reduce international staff to three positions;
-> SECID will reduce international staff to two long-term positions, supplemented by short-term consultants;
-> SECID will locate in close proximity to PADF or CARE;
- CARE field office costs will be shared with its food distribution activities;
-> CARE and PADF will not increase other staff; and
-> CARE and PADF will target their respective activities not only to enhance impact but also to improve cost effectiveness.

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These modifications in project implementation will effectively inject farm-level financial decision-making into what has been predominantly a conservation management program. The project will integrate economic considerations into almost all its activities. By continuing to emphasize the profitability of sustainable agriculture and land resource management practices, farmers will be exposed to an increasingly wide variety of production, marketing, and conservation opportunities. By harnessing the farmer's more immediate financial interests, the project will help stimulate the widespread adoption of both conservation and economic development activities upon which ecological and economic sustainability ultimately depend.

II. Rationale for the Amendment

The activities of the AOP/AFII projects (described in the next section) have generally been very successful over the past ten years. CARE and PADF have been an important, and often the main, source for agricultural change in major parts of Haiti. Project activity targets have consistently surpassed projections and, more importantly, there are clear indications in the landscape that suggest the project is effectively changing the way farmers use trees to their economic advantage. Finally, the evolution of the project from a forestry activity to a broader agriculture support program has gradually taken place, by constantly learning from its achievements as well as its mistakes. Few projects have succeeded as well in maintaining this degree of objectivity.

This evolution of the project has been recognized for some time, and in fact, a draft amendment of AFII was prepared by the USAID Agricultural Development Office just before the September 1991 coup. This draft amendment was never acted upon because of the coup and program suspension intervened, but the general theme, as well as specific activities are reflected in the present amendment. The major objective of the 1991 redesign exercise was to increase sustainability - both the ecological sustainability of interventions introduced under the project and the financial sustainability of the technologies applied at the farm level. An important aspect of sustainability centers around a direct linkage to a wider range of market opportunities, providing farmers with an strong incentive to continue the new technologies developed under the project. This broader definition of sustainability will be understood at the local level when farmers recognize the income potential of implementing ecologically sound land management practices and improved information on and access to markets. When this occurs, farmers will develop a vested interest in continuing project activities well after the project itself has finished.

Questions regarding the lasting effect of activities result from the project's dependence on subsidies (production and distribution of free tree seedlings), the narrow range of conservation-oriented extension services provided to farmers, and the resulting limited market access for participating farmers. The driving principle behind the Mission's strong desire to

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reorient the path of the Agroforestry II project is **sustainability** - both to promote an enduring ecological balance, and to ensure a solid basis for financial stability and growth at the farmer-level.

Continued profitability, over time, of any agricultural crop or product is inseparably linked to the ecological sustainability of the production system. Regardless of how potentially profitable any agricultural commodity might be, it must be incorporated into an ecologically sustainable production system. For this very fundamental reason, PLUS will continue its extension/outreach and training program in this area. The CARE and PADF outreach program will continue to train farmers and transfer appropriate farming systems technologies to producers in reduced geographic areas. Likewise, the project will continue to pursue a strategy of convincing farmers to adopt conservation farming practices without relying on subsidies.

To achieve this responsiveness to more direct farmer incentives, the project must devote considerably more human and financial resources per production or farm unit than before. It will mean developing the capacity to assess particular combinations of tree, food, and forage crops and quickly develop appropriate extension messages. Developing this assessment capability, providing the re-training of forestry-oriented staff, and developing the required level of monitoring and evaluation proficiency will require time and resources to plan and execute. Results will not be evident for a minimum of several months.

Reduction of AID-financed resources and concerns regarding long-term sustainability of activities will oblige project implementors to make choices regarding resources allocation. This means selectively consolidating efforts both geographically, institutionally and technically along several lines. The necessary "triage" can be done in a variety of ways, to be developed at an early date with the implementing NGOs. Grantees implementing organizations will play an active role in this selection process, by setting a series of objective and realistic criteria to form the basis for the culling process in the workplans of the grantee organizations.

A. Geographic Consolidation

Both PADF and CARE will need to consolidate their geographic foci in order to deliver improved extension capability with fewer resources. Fundamentally, the two most widely used criteria - productivity versus environmental risk - illustrate the dichotomous criteria which might be applied differentially:

* **potential productivity assessment** - is a selection process where all activities would focus on achieving the greatest economic return per unit of project assistance. In both the north and south, this would suggest activities in high value crops, plasm improvement for commercial crops and perhaps even irrigation management. Activities in the north

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and northwest would be geared more toward bottom land improvement and conservation.

* **ecological risk assessment** - would take the opposite approach and support remedial activities on those most fragile lands that are in the greatest risk of being irreversibly destroyed through erosion or fertility mismanagement. This would tend to concentrate project activities on steep wooded slopes in the south and on drier hillsides and gullies in the central plateau and northwest.

The PLUS project is actually committed to both strategies, and the question of which takes precedence in any given situation must be determined by local factors. What the continuing reorientation stresses is that all interventions should be balanced by the economic realities of resource-scarce donor agencies and needs of agrarian societies: the most economical intervention must be stressed in order to stimulate spontaneous and endurable replication of activities. In effect, this economic rationale would likely promote agriculture intensification versus extensification across the board; productive lowlands will become the focal point for production increases, which will ultimately reduce pressure on the more fragile side slopes.

This does not imply that all hillside activities are marginal and should be neglected. Indeed, because of ecological realities of Haiti and the economic needs of its farmers, the policy environment in the northwest strongly suggests that we expend our efforts on behalf of the disadvantaged who are often hillside farmers eking out just enough to feed their families. Nonetheless, even these farmers will allocate labor and financial resources according to "best return" strategies. Thus the project must provide those who ask with the most economically viable technologies. The problem is to limit the "technology basket" (see below) so that only suitable, high-quality messages are sent and received.

B. Organizational Concentration

PADF operates differently from CARE, in that its extension outreach is largely achieved through local NGO structures with very disparate goals and staffing capabilities. CARE promotes most activities primarily through direct links with individual farmers or through small groups and "combites." These groups, too, have their strengths and weaknesses, and some are clearly more effective and hence durable for post-project longevity.

CARE and PADF will carefully review the capacity and sustaining power of individual organizations and concentrate on those with the highest potential to continue after the project ends. Some of the indicators would include alternative income, democratization, responsiveness to members, and linkages with technology-generating firms.

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CARE and PADF will propose systems by which they each will continually evaluate and focus on those groups showing the highest potential to achieve self-sufficiency within the remaining life of project.

C. Technical Calibration and Reducing Subsidies

Geographical and organizational adjustments should lead to a more refined understanding of which technologies will be most apparent in each region and training altered accordingly. Disciplining extension agents to move away from exclusively tree-based solutions and objectively listening to the farmer's particular concerns strongly suggests implementors emphasize communications skill development initially. Once the agent can begin to understand the farming system as a whole s/he can identify "turn-key" technologies that can be easily and economically introduced.

CARE and PADF technical staff will, with SECID's help, seek to identify the three or four technologies which hold the most sustainable promise in any given agro-ecological situation. Training will need to be tailored to these judgments and monitoring of extension advise routinely conducted to assure compliance. Both CARE and PADF, with the help of their SECID counterparts, will describe in amended workplans how this ongoing training will be accomplished.

Project sustainability also implies that the types of technologies preferred through the outreach not depend on external resources. It was widely believed that the dependence of the AOP and AFII projects on free seedlings and plant materials undermined the sustainability of technologies introduced by the project after USAID funding ends. To ensure the perpetuation of project-sponsored technologies, subsidies must be eliminated altogether. Strategies for the removal of these subsidies, whether total and precipitous or gradual and phased, must be developed by CARE and PADF based on local conditions and assessment of financial impact.

The elimination of subsidies and careful replacement with technologies which depend on resources available to farmers will not prevent or hinder the provision of temporary inputs for demonstration purposes. CARE and PADF will explain in their workplans exactly how they intend to comply with this change.

III. Background of the Amendment

This section summarizes nearly ten years of project experience and developments that have led to the present amendment.

A. Agroforestry Outreach Project (AOP), 1981-1989

Following the resumption of USAID's development assistance to Haiti in the early 1970s, the agricultural portfolio was designed to emphasize institutional strengthening, food crop research, and

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irrigation potential. Nevertheless, the agricultural sector continued to decline steadily, yields degenerated, and new arable land was exhausted. By 1980, agricultural specialists concluded that the principal constraints to both commercial and subsistence agricultural production throughout Haiti were declining soil fertility and water holding capacity due to improper land use and agricultural practices that promoted the widespread loss of vegetative cover and attendant erosion.

Responding to the urgency of the situation, USAID/Haiti adopted a "Hillside Strategy" in 1985 for its programs in the agricultural and natural resource sector. The strategy focused on remedial technologies aimed at the restoration of vegetative cover through on-farm tree planting, soil and water conservation, watershed management, and promotion of perennial vegetation. The target beneficiaries were primarily subsistence, hillside farming inhabitants.

The first project to embrace this strategy was the Agroforestry Outreach Project (AOP), which began in 1981. The ultimate objective of the project was the production and distribution of fast-growing tree seedlings as an environmentally appropriate, perennial income crop in the peasant farming system. The underlying philosophy was that the re-establishment of tree cover would reduce soil erosion while providing forest products for domestic needs and commercial sale.

The project was implemented under a framework of PVOs and non-governmental organizations (NGOs). Cooperative Agreements were executed with the Pan American Development Foundation (PADF) and CARE for field implementation, and SECID/Auburn was contracted to provide applied research support to the project.

CARE implemented field activities in the northwest, operating its own nursery program and extension network, based on four regional teams headed by Haitian agronomists and staffed by agricultural technicians, animateurs, monitors, and nursery workers. CARE worked directly with farmers, using its own extension agents. In contrast, PADF operated through local intermediary organizations, rather than directly with farmers.

The applied research component of the AOP was limited to modest assistance from the University of Maine/Orono to help the project identify and test the potential of multi-purpose trees in different sites. Few reports were produced, and this component of the project had limited impact.

The AOP consistently exceeded established output targets and continued operating through 1989, at which point an estimated 200,000 small farmers had received some benefit from project activities. The project distinguished itself from conventional reforestation and soil and water conservation projects in Haiti by promoting trees as a cash crop. While the project was highly successful in promoting trees within the landscape, it struggled to find alternative activities that generated spontaneous and

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sustainable adoption. Unable to find the "pulse" of farmer interest, the project was hampered in broadening its focus beyond its limited, yet admittedly important function of tree-planting.

B. Agroforestry II Project Summary

A thorough analysis of the AOP activities was conducted in 1986 as a point of departure for the Agroforestry II (AFII) Project. The evaluation identified three key areas requiring reorientation within AFII:

* The immediacy of financial returns and the diversity of farmer production goals went well beyond the energy-related tree planting originally envisaged. Most often farmers were more interested in cropping higher-value products including poles, posts, and saw timber.

* The primary motivation for many farmers seemed to be improvement of composite farming system yields, particularly sustainable food crop production. Project trees represented an alternative risk strategy for cash income and meeting labor shortages.

* Farmers were interested in low-input soil conservation and land improvement techniques in support of improved yields. Interest was expressed in remedial technologies such as the establishment of biological and mechanical soil retention structures, and the use of green manuring and mulching for soil structure improvement.

The Agroforestry II Project was designed in 1989 to build both on these findings and on the AOP's established extension capacity. It would move toward natural resource conservation through activities that could provide more immediate and lasting benefits to project participants. The goal of the AFII, authorized in December 1989, continues to be the maximization of the productive potential of Haitian hillside agriculture by reducing the ongoing degradation of the country's natural resource base through sustainable land-use interventions.

AFII/PLUS differs operationally from the AOP in:

* its introduction of on-farm tree propagation techniques, tree management, and harvest schemes that serve the needs of more experienced farmers who participated in the project previously;

* its promotion of a broader range of perennial species of forages, grasses, and other non-woody vegetation that combine both income and conservation characteristics; and

* its pursuit of diversification in its interventions, including hedgerow installation and management as a soil and water conservation measure and source of forage; development of stable alley cropping systems, gully plugs, and ravine

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control measures; use of green manures and mulch for soil fertility improvement; and wider use of indigenous seed and germplasm.

The implementing agent for the research component of AFII is the South-East Consortium for International Development (SECID) and Auburn University. The component was designed to provide prompt, applied support to the PVO grantees in several lines of inquiry. The specifics of the research agenda are formulated in conjunction with, and as a direct response to, the expressed needs of the grantees. Until recently, the resident team of five expatriates concentrated on four main research themes: alley cropping and soil and water conservation, tree seedling nursery technology, seed and germplasm improvement, and socio-economics.

C. Project Implementation to Date

Prior to the September 1991 coup, AFII was involved in five activities -- nursery production, seed and germplasm improvement, applied research and technology generation, outreach and extension, and training. These activities, which responded to changes agreed upon in 1989, were suspended after the September 30, 1991 coup.

1. Plant Production

Nursery production, distribution, and planting of tree seedlings have been the backbone of the AOP/AFII since 1981. A major achievement of the project has been the establishment of more than 40 regional and 30 community level nurseries that extend throughout most of Haiti. The centralized nursery network has produced over 60 million tree seedlings of more than 80 different species since 1981. Before the coup-related suspension, production had leveled off at a level of six to seven million seedlings per year.

As a rule, propagation techniques have been sophisticated. Most nurseries have used "root trainers" and imported potting medium due to the need, at least at the beginning, to move large numbers of plants long distances. Unit production costs have been comparatively high ($.12-.13 for direct costs alone). The use of root trainers in drought-prone areas has also raised some concerns. Survival coefficients vary widely, but most fall in the very acceptable 50 to 60 percent range. Still, it appears that little if any follow-up takes place after six months of planting. Neither CARE, PADF, nor SECID have tracked participants for longer periods.

The vulnerability of sophisticated, centralized nursery production has been underscored by the recent economic crisis. During this time, most centralized production has ceased. Although this development is understandable, several nurseries would have continued to produce, but were unable to procure potting materials.

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The AFII design took into account the increasing interest, especially by donors, in alternative production methods to increase farmer investment in seedlings. The motivation for this shift in strategy was to make seed production more sustainable financially and to increase survival rates. Techniques have included on-farm plastic sack nurseries, stump propagation, and bare root planting.

Of particular interest has been the rapid rise in the number of farmers who have established plastic sack nurseries on their own land. Over the past two years, over 2,000 project farmers have established backyard nurseries. Although the seedling production of these nurseries represents less than ten percent of total project production, the progress made in this area is encouraging.

2. Tree Planting Diversification

Prior to 1988, CARE and PADF concentrated their attention on solving the production and distribution problems of tree planting. Less direct attention was devoted to extension and outreach of alternative utilization of trees and records suggest most were incorporated as border plantings and woodlots. Since 1989, however, CARE and PADF have vigorously pursued efforts to extend contour hedgerow and alley cropping systems. In more fertile areas, these technologies appear to have been accepted as a promising innovation for control of erosion and rehabilitation of exhausted hillside farms.

Initial records suggest that over 4,000 project farmers have installed more than 400,000 linear meters (400 km) of these living barriers since 1988. Further information will be required to determine if these technologies are fully adapted and to what extent they are contributing to the project purpose of increasing farm income and employment generation.

3. Soil and Water Conservation

Complementing the diversification of tree planting are more direct soil and water conservation activities which were gaining importance in the AFII prior to the 1991 coup. Extension training and outreach in soil and water conservation activities were receiving a greater emphasis for incorporation on farms in combination with agroforestry and hedgerow plantings.

Mechanical and agronomic soil conserving measures including green manuring, composting, litter/rock terrace establishment, gully plugs, and contour planting were added to the extension messages. Initial indications suggest they are being readily adopted by participating farmers. The current program aims at directly improving crop yields and utilizing improved soils for the production of higher value crops.

As with the hedgerow program, adoption of soil and water conservation practices being promoted by project extension agents has

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taken place over time as farmers see the demonstrated economic benefits. With a continual and growing demand for technical assistance in this area, over 5,000 farmers have received training in various soil and water conservation techniques and are improving their land by using these methods.

4. Training and Extension

Training and extension services are the heart of the CARE and PADF programs. AFII has been and PLUS will remain a field-oriented program that is dedicated to educating peasant farmers about sustainable land use practices. According to project records, some 50,000 farmers received extension training and site visits, formal classroom seminars, and/or informal community level training sessions prior to political unrest. The sheer magnitude and numbers of rural Haitian families being touched by this project make it the largest single outreach network in Haiti, larger than the Ministry of Agriculture's extension program. In many places, particularly the Northwest region, the project is the sole agent of agricultural change.

Prior to its 1991 suspension, AFII supported approximately 1300 animators throughout the country. Extension duties include producing seedlings and coordinating delivery, recruiting new farmers to the program, site visits, and provision of conservation installation advise. Most of the follow-up monitoring activities are also performed by the extension agents, overseen by middle management and subject to analysis by SECID.

At the height of the AFII project, CARE had approximately 400 extension agents on its payroll and worked directly with approximately 8,000 farmers in the northwest, while PADF's network of NGOs in nursery production and extension activities throughout the rest of the country grew to more than 80. Five regional agroforestry teams provided material support, training, and technical assistance to NGOs interested in offering agroforestry services to their constituents. PADF estimates that its pre-coup outreach program provided seedlings and agroforestry extension services to some 15,000 farmers.

Continual in-service training of project animators is a major project activity taking place at all levels. The project provides training opportunities to its field staff through seminars and related course-work at selected universities and through study tours. Coordinators and assistants (who supervise animators) attend semi-annual training sessions in various aspects of tree management, soil and water conservation, and hedgerow management. Nursery personnel receive regular training in nursery techniques, pest and disease identification, and pesticide safety and use from Regional team leaders. Retraining the core staff cadre to be operational in an even wider set of agriculture technologies will be the most challenging aspect of project reorientation, but it is critical to the success of the project. In addition to internal project resources, other local

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training facilities, in particular the Center for Management and Productivity (CMP) in Port-au-Prince will be employed.

5. Applied Research

The research component of the AFII/PLUS (being implemented by the Southeast Consortium for International Development - SECID - with Auburn University as the lead institution) is providing research support to PADF and CARE field activities. The program was designed to focus on project specific applied research activities which were to be formulated as a direct response to the grantees. Project grantees were to have been closely involved in the conceptualization, development, and formalization of the research program, through the use of formal research protocols which clearly define responsibilities of all participants, the goals of the research, and the research design.

Prior to the October 1991 suspension of the project, the research team consisted of five expatriate and twelve local staff. The expatriates included an agroforester/agronomist, a nursery specialist, a seed and germplasm specialist, a socio-economist/Chief-of-Party, and an Administrative Officer. Each technical specialist was responsible for the accomplishment of the research agenda in his respective specialty. The Administrative Officer provided the range of support services required for the project in coordination with AID, SECID, and the Auburn campus. Their efforts included both short-term assignments in Haiti and support activities on campus, such as carrying out soil analyses and providing updates on the results of other scientific work useful to on-sight team members.

The general consensus is that while SECID produced several valuable contributions to the project, many were of marginal practical benefit to PADF and CARE as implementing agencies because of their academic orientation. Even well-conceived reports with clear conclusions were not readily assimilated into extension programming, and several research themes were not client-conceived. Despite regular coordination meetings, the desired synergy between field activities and applied research failed to identify or reorient activities along promising lines of technology with immediate impact at the farm-level.

IV. Revised Implementation Strategy

The goal and purpose of the Productive Land Use Systems project under the present amendment remain the same as pursued since 1989 under the Agroforestry II project:

> **Goal: To maximize the productive potential of Haitian hillside agriculture by reducing the ongoing degradation of the country's natural resources base through sustainable land-use interventions;**

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<u>Purpose</u>: 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 materials which will enhance soil fertility.

Thus the fundamental project objectives remain unchanged. What will change, in two important respects, is the project's implementation strategy: first, by focusing on a variety of land use interventions that stimulate crop production in order to provide sustainable income for Haitian hillside farmers and at the same time address the project's conservation objectives of preserving soil and protecting watersheds; and second, by increasing the responsiveness of project activities to the motivations that drive farmer decisions. In sum, the project's new implementation strategy can be characterized by two interrelated factors, one a basic project objective: **sustainable income generation through improved land use and increased production** and the other a key management process: **effective monitoring and evaluation.**

A. <u>Sustainable Income Generation</u>

Until now, the Agroforestry II Project has been viewed and operated essentially as a forestry project. Although the project has been concerned with increasing the on-farm productivity and incomes of hillside farmers, the entry point for project activities has been primarily trees, shrubs, and grasses. Moreover, operational criteria of success have been defined largely in conservation terms (e.g. numbers of trees planted, gullies plugged and kms of hedgerows placed). In contrast, the "agro" part of the equation, which is typically what farmers look to for the bulk of farm income, had been relegated to second priority. Despite some notable successes, project interventions have been more "add-ons" to farmers' mainstream activities than part and parcel of their economic decision-making. This tendency has been especially pronounced during the economic crisis of the past year in which farm households have been much more concerned about immediate survival than the long-term sustainability of the land that they work.

Looked at from a negative perspective, experience under the project to date raises serious questions about whether farmers will continue project-supported activities once the project ends. Looked at positively, however, the direction in which the project must shift to promote sustainable activities on farm is fairly clear. 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

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streams of higher income over time -- and, thus, induce them to sustain the activities that are the source of that 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.

Lest this discussion suggest that it is necessary for the project to go back to ground zero operationally, it is important to note that experience under the project itself points the way to future implementation. Specifically, it suggests strongly that there are three essential conditions that packages of project interventions must meet to assure sustainability of farmer adoption: first, **increased income**; second, **soil conservation**; and, third, **increased soil fertility**. As the Organisation for the Rehabilitation of the Environment (ORE) stated it in its 1990 annual report on similar activities undertaken under the Targeted Watershed Project:

> *"From the beginning it was clear that the three objectives of soil conservation, soil fertility and increased revenue are closely interrelated and that one cannot be achieved without the support of the others. Farming hillside slopes without soil conservation quickly results in loss of soil and crops, and the land rapidly becoming infertile and useless; at the same time soil conservation hedgerows require a certain level of soil fertility without which they do not perform well; and without an increase in the revenue from their land it is hard for the farmer to justify the cost of establishing and maintaining hedgerows, and they remain under pressure to continue destructive agricultural practices.*
>
> *The association of improved seeds and plant materials (to produce higher revenue for the farmers) with existing soil conservation systems was, therefore, the key to the success of the project. The suggested approach is to associate the distribution of improved plant materials with soil conservation, and fertility improvement activities." [page 2 of the ORE report]*

The shift to a mindset in which the sustainable generation of farmer income becomes the linchpin of project activities has a number of operational consequences. Principal among them are:

* The first decision to be made is the location of future project activities. Even before the coup and subsequent project suspension, it was recognized that consolidation of project activities would be required, and the need now is even greater. The fundamental criterion for selection of sites during the remainder of the project will be its potential to develop and deliver interventions that farmers will sustain over time. Fortunately, both CARE and PADF have ample experience to make informed decisions of this kind. In some instances, the decision will be obvious -- there are hillsides that are now so denuded, for example, that the potential for sustainable positive impact is

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minimal. In other instances, it is recognized that judgment will need to be exercised. In such cases, other criteria -- for example, the capability of local PVOs -- will enter the calculus as well.

* Following the selection of project sites will come decisions regarding the packages of interventions to be introduced. To facilitate these decisions, CARE and PADF, in collaboration with SECID, will conduct needs assessments in project areas. Farmers will be surveyed to articulate what they perceive as the principal constraints to increasing their on-farm productivity and income. Project personnel will then assess the extent to which they can respond effectively to these constraints, taking into account available markets both domestically and internationally, and the fact that the two executing agencies cannot do everything, particularly given the need to train animateurs in the packages in question, both to develop them on their own farms as demonstrations and to extend them to others.

* The actual implementation of project activities will not differ markedly from previous practice. Two major exceptions are worthy of note. The first involves the nature of the packages to be extended, some of which may differ substantially from the forestry-oriented packages of the past. Now that it will be possible to entertain a broader range of project interventions, perhaps the most significant challenge to implementing the remainder of the project successfully will be the task of defining a limited number of packages in user-friendly form and then retraining animateurs who are now accustomed to and believers in the forestry-based approach. A significant portion of the budget will be directed to this retraining and to the training of new animateurs.

* The second major departure from implementation procedures of the past will be the adoption of a strategy of decentralization, both in the generation and in the distribution of tree seedlings. CARE and PADF have already begun to move in this direction, but now the process will intensify. Several seedling production technologies have been demonstrated as acceptable to farmers, including plastic sack nurseries, stump propagation, and bare root planting. The extension and adoption of these technologies by individual farmers, including their acceptance without subsidy in recognition of their long-term value, will enable PLUS to eliminate the need to underwrite the production and distribution of free tree seedlings in the future. It will also build more of a market orientation -- and economic sustainability -- into the program. A similar strategy will be adopted to meet the anticipated increase in demand for improved seed and fruit tree grafting during the remainder of the project. CARE and PADF will not engage in production activities per se, but will serve as a source of technical assistance and a broker between interested farmers and local sources of supply.

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B. Monitoring and Evaluation

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.

Because of its importance to the program, SECID will focus its attention on the function of monitoring and evaluation for the remainder of the project. A project committee comprising all three grantees will review the status of the program at least quarterly and, in cooperation with USAID project officers, will coordinate solutions to both operational and policy problems. Two long-term SECID personnel will:

* coordinate the design and implementation by CARE and PADF of the baseline surveys of land use practices, production levels and farmer incomes, to serve as the basis for measuring increases achieved by project activities;

* guide CARE and PADF in setting up regular monitoring of project activities, including the development of indicators for assessing purpose-level and output-level achievement;

* assist CARE and PADF in interpreting and analyzing data emerging from their monitoring systems, and in identifying programmatic lessons that apply to the entire project;

* assist CARE and PADF in modifying their training programs in light of feedback received;

* assist CARE and PADF in designing protocols for on-farm agronomic trials to study yields, soil enhancement and economic value of promoted crops and land use practices;

* assist CARE and PADF in developing site-specific practices to respond to the agro-ecologic characteristics of the different sites, as well as to the local market structure;

* continue to work with CARE and PADF to refine the system to be responsive to program management needs.

Under the amendment, long-term SECID staff will be reduced to two positions. Subject to final negotiation with SECID, one of SECID's resident personnel will be an agricultural economist who will focus on the content of the monitoring and evaluation system, from design through to analysis and feedback of results, including data collection, processing, and retrieval. The second long-term resident will have expertise and experience in tropical agronomy and site-specific interventions.

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SECID will also continue to play a role in applied research of relevance to the program, but only on a short-term basis and in support of CARE and PADF as the primary responsible parties. One of the two long-term personnel will work as liaison with CARE and PADF to identify specific needs for technical assistance and then arrange for that assistance to be made available to the program through the broad array of resources available to the consortium. Examples of areas in which short-term technical assistance is likely to be required include: alley cropping and soil and water conservation; seed and germplasm improvement; cropping systems; the agro-economic production potential of food and forage crops; and market opportunities and constraints for specific products.

A use of short-term technical assistance worthy of special note will be an independent evaluation by SECID of ORE's program under the Targeted Watershed Project. In many ways, ORE's program appears to be a prototype of the direction in which PLUS will be moving, and it is important that lessons learned from that experience be built formally into PLUS as soon as possible. For this reason, the evaluation in question will take place immediately upon reactivation of the project.

V. Expected Achievements and Accomplishments

Although estimates will be made of the number of trees planted, the number of hedgerow systems installed, the number of gully plugs constructed, the number of farmers adopting improved seeds, etc., during the remainder of the project, none of these measures get to the essence of what the project, as amended, is intended to accomplish. It is fully expected that the numbers of trees planted in the next two and a half years will fall well below planting rates in the past, but the fact of the decrease is less important than that the trees planted fit into a sustainable system of farm production, both of agricultural and of forestry products.

The expected outcome that will best express achievement of the project purpose will be a sizable increase in the number of Haitian farmers earning higher farm incomes on a sustained basis. To the extent that the increases in income are indeed sustainable, then, *a fortiori*, sustainable environmental improvements will have been made as well -- or, at a bare minimum, environmental degradation will have been significantly arrested. In this way, the objectives of economic and ecological sustainability discussed above will also have been achieved.

At this juncture, it is anticipated that approximately 125,000 farm households will be affected in one way or another by the project over the remainder of its life. Of this total, it is estimated that one third -- approximately 45,000 farm households -- will meet the sustainability conditions at issue. As

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discussed above, a formal monitoring and evaluation system will be set up to determine whether this target is in fact met.

It is difficult to estimate at this time exactly what combinations of productivity-enhancing practices will have been adopted to bring about sustainable increases in farmer incomes. One possible breakdown is presented in the tables on the following pages. The changes are consistent with the new thrust of the project but, again, are illustrative, not definitive.

The outputs in the tables fall in the following categories:

* Increases in production and income - This category includes activities that are aimed primarily at increasing income and productivity. Examples include propagation of improved varieties of fruit trees, grafting, foodcrop germplasm improvement and multiplication, appropriate grain storage development, bio-intensive gardening, and improved market information and access.

* Sustainable production systems - This category includes activities involving soil and water conservation -- terracing and hedgerow technologies, ravine stabilization, rock walls, etc. -- as well as appropriate production technologies, including composting, deep tillage, cover cropping, and improved crop management.

* Multipurpose tree propagation - This category emphasizes training of farmers in propagation techniques -- plastic sack nurseries, direct seeding, stump planting, etc. -- in order to maintain adequate numbers of trees available to farmers for integration into their farming systems.

It is estimated that approximately 60,000 hillside farm families will engage in one or more of these project activities each year. This figure represents a moderate drop in the number of participating farmers from levels in previous years (difficult to aggregate because activity categories have changed). This reduction in actual numbers of farmers covered reflects reductions in the project's overall geographic scope and in budget levels of the grantee NGOs. The effect of the lower numbers, however, is counterbalanced qualitatively by larger increases in income per participant, thereby ensuring greater sustainability in the post-project environment of farming and conservation practices developed under PLUS. See the Economic and Financial Analysis below for measures of project effectiveness.

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PRODUCTIVE LAND USE SYSTEMS - PROJECT-WIDE TARGETS

	1993	1994	TOTAL

I. Income/Production Enhancement

Fruit Trees (000 trees)	275	550	825
Grafting (000 trees)	75	145	220
Cover Cropping (000 hectares)	6	10	16
Deep Tillage (hectares)	60	140	200
Bio-intensive Gardens (# of farmers)	1000	6500	7500
Improved Seed Promotion (tons)	*	*	*
No. of Benf. Families**	14000	20000	34000

II. Sustainable Production Systems

Hedgerows (Km.)	1200	2700	3900
Gully Plugs (plugs)	5900	9800	15700
Ravines Protected (Km.)	58	105	163
Rock Walls (Km.)	36	38	74
Dead Barriers (Km.)	375	1000	1375
No. of Benf. Families**	7000	10000	17000

III. Tree Production

Direct Seeding (000 trees)	750	900	1650
No. Individ. Nurseries	630	830	1460
No. Group Nurseries	240	330	530
Multipurpose Trees Planted (000 trees)	2000	2500	4500
No. of Benf. Families**	48000	56000	104000

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IV. Training

No. Farmers Trained	23000	30000	40000
Farmer Cross Visits (farmer/days)	5000	9500	14500
Field Agent Training (trainer/days)	7000	6000	13000
Sr. & Jr. Staff Training	3000	2350	N/A
Farmer Groups Participating	710	880	N/A

* **Not Available**

** **The same family may benefit from more than one practice**

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PRODUCTIVE LAND USE SYSTEMS - CARE TARGETS

	1993	1994	TOTAL

I. Income/Production Enhancement

Fruit Trees (000 trees)	75	150	225
Grafted Fruit Trees (000)	25	75	100
Cover Cropping (hectares)	18	30	48
Deep Tillage (hectares)	30	40	70
Bio-intensive Gardens (# of farmers)	600	2500	3100
Improved Seed Production (tons)	*	*	*
No. of Benf. Families**	4000	5000	9000

II. Sustainable Production Systems

Hedgerows (Km.)	200	1000	1200
Gully Plugs (plugs)	2500	5000	7500
Ravines Protected (Km.)	28	55	83
Rock Walls (Km.)	18	20	38
Dead Barriers (Km.)	175	400	575
No. of Benf. Families**	3000	4500	7500

III. Tree Production

Direct Seeding (000 trees)	150	200	350
No. Individ. Nurseries	280	480	760
No. Group Nurseries	100	150	250
Multipurpose Trees Planted (000 trees)	250	350	600
No. of Benf. Families**	8000	12000	20000

IV. Training

No. Farmers Trained	8000	10000	18000
Farmer Cross Visits (farmer/days)	2000	4000	6000
Field Agent Training (trainer/days)	3000	2500	5500
Sr. & Jr. Staff Training	1000	750	N/A
Farmer Groups Participating	310	380	N/A

* Not Available
** The same family may benefit from more than one practice

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PRODUCTIVE LAND USE SYSTEMS - PADF TARGETS

	1993	1994	TOTAL
I. Income/Production Enhancement			
Fruit Trees (000 trees)	200	400	600
Grafted Fruit Trees (000)	50	70	120
Cover Cropping (hectares)	50	100	150
Deep Tillage (hectares)	30	100	130
Bio-intensive Gardens (# of farmers)	400	4000	4400
Improved Seed Promotion (tons)	*	*	*
No. of Benf. Families**	10000	15000	25000
II. Sustainable Production Systems			
Hedgerows (Km.)	1000	1700	2700
Gully Plugs (plugs)	3400	4800	8200
Ravines Protected (Km.)	30	50	80
Rock Walls (Km.)	18	18	36
Dead Barriers (Km.)	200	600	800
No. of Benf. Families**	4000	5500	9500
III. Tree Production			
Direct Seeding (000 trees)	600	700	1300
No. Individ. Nurseries	350	350	700
No. Group Nurseries	140	180	320
Multipurpose Trees Planted (000 trees)	1200	1600	2800
No. of Benf. Families**	40000	44000	84000
IV. Training			
No. Farmers Trained	15000	20000	35000
Farmer Cross Visits (farmer/days)	3000	5500	8500
Field Agent Training (trainer/days)	4000	3500	7500
Sr. & Jr. Staff Training	2000	1600	N/A
Farmer Groups Participating	400	500	N/A

* **Not Available**

** **The same family may benefit from more than one practice**

VI. Economic and Financial Analysis (Summary)

An economic analysis of project activities was completed in September 1991[2]. Since this study used the most recent data set and constituted the most comprehensive analysis done on the project to date, its results are being used as the basis for determining the project's economic and financial viability. This analysis followed the approach identified in AID Handbook 3 and was performed on activities reoriented toward sustainable financial impact at the farm level. Net benefits were calculated both at the level of the farmer and at the level of the return to AID resources, projected over a 20 year period. Discount rates were estimated at 30 percent for Haitian capital and 10 for external financial support. It should be noted that while discounted, labor prices and other financial factors are conservative and deemed to be realistic, the biological side of the production equation remains quite speculative, given the dearth of farm-level data.

Net Present Value (NPV) on all planed interventions was found to be positive, as summarized in the following table:

Technology or Practice	Practice NPV
Hedgerows	Positive
Deep Tillage	Positive
Ravine Control	Positive
Forest Tree Planting	Positive
Fruit Tree Production	Positive
Fruit Tree Top Work	Positive
Trash Barriers	Positive
Rock Terraces	Positive
Home Gardens	Positive
Green Manure	Positive

The analysis measures the incremental changes in marketable commodity production using a partial budget topology. Assumptions as to actual production, subsistence consumption versus commercial sale, and real benefits from technologies are modeled with best available (but still inadequate) data. In the case of farmer returns, the analysis with respect to both individual farmers and the overall project are positive, with the IRR over

[2] Fleming, D.K. and G.E. Karch. 1991. Economic indicators of Agroforestry II strategy implementation: farm income analysis to agricultural project analysis. SECID and Auburn Univ., Port-au-Prince. 35 pp.

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50 percent. The present value return is $7.94 dollars for every dollar budgeted by USAID. The break-even point for all project costs and benefits occurs in 1995.

Unfortunately, the financial analysis determines only that all interventions have a positive return which, under ideal market conditions, suggests all would be undertaken. This reflects the lack of prioritization through a stratification of practices by their IRRs: those with the highest IRRs should be extended. More important than absolutes are the performance of different practices under local conditions. For this type of analysis to be useful, the SECID program will need to set up several longer-term partial budget surveys at the farm gate in order to calibrate the desirability of interventions and their long-term sustainability.

In analyzing the sensitivity of the project to risk and uncertainty, the variables of price, project targets, labor costs, spontaneous spread rate, and yield response are varied up and down by 50 percent, in increments of 10 percent, to determine the effect on the NPV. This shows the analysis to be the most responsive to change in commodity prices confirming the importance of the new market orientation of the project.

The next most sensitive variable tested was the change in project targets. This represents the changes in resource allocation within the project. The broadening of the range of project practices alleviates the effect of target shortfall in a more tightly focused agenda by spreading the risk.

Less sensitive was the change in the spontaneous spread effect. With the large base of farmers involved, and the highly positive returns to project activity, spread has less importance to the project outcome than would normally be expected. Least sensitive to change is the labor rate. It is so low that increases of several magnitudes has little effect in the overall project return. Again, it should be stressed that this model is built on speculative data.

In sum, the project is so robust that the usual variation limits of ±50 percent do not push the NPV into negative territory in any instance. The worst case scenario of all variables pushed down at once by -50% reduces the NPV by nearly 50 percent, but even at this extreme, the project remains positive.

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VII. Social, Institutional and Environmental Considerations

A. Social Impact

Since the social impact of the project is not expected to differ significantly from that of the original AFII project, the rather comprehensive Social Analysis in the 1989 Project Paper (Volumes I and II) is still considered valid. Since PLUS will concentrate more on activities which increase farmer income than in the earlier years of AFII, quality-of-life indicators should, over time, increase for participating farm families, in terms of better nutrition and improved access to schooling, health care, etc. Similarly, the increased use of women extension agents and greater attention to reaching women farmers, will enhance project benefits to women.

B. Institutional Factors

The same three executing institutions (CARE, PADF and SECID) will continue to implement the project. The respective role of each organization has already been described in sufficient detail in this amendment. All three U.S. grantee NGOs are experienced in Haiti and in the project. The reduction in the extent of expatriate technical assistance from the earlier years of AFII will require some adjustments in geographic coverage for PADF, including the numbers of participating local NGOs. Similarly, reductions in the SECID staff will require that its research be more sharply focused and more closely directed to the needs of its institutional clients.

Perhaps the largest institutional adjustment will be in the project management and monitoring function of USAID/Haiti. Simultaneous with the reactivation of this project, the USAID Agricultural Development Office (ADO) is being merged with the Office of Private Enterprise (OPE) into a single USAID office called Private Enterprise and Agriculture Development Office (PADO), covering agriculture and natural resource management; private enterprise promotion and credit activities; and agribusiness assistance. Since U.S. direct-hire agricultural officers will be reduced from three to one, more direct responsibility for project monitoring will fall to the experienced and capable Haitian professional staff in PADO.

C. Environmental Aspects

The Environmental Assessment (EA) included in the 1989 Project Paper remains valid in all respects. However, in light of the change in project name to underscore refinements to implementation strategy, the Mission has notified the LAC Bureau Environmental Office of the adjustments introduced by this amendment and has received confirmation that no further environmental investigation is necessary.

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VIII. Revised Financial Plans

The revised financial plans for this amendment are illustrated in the tables which follow. Budgets have been adjusted to reflect the current exchange rate for local currency. Project costs have also been recalculated to take into account the revised implementation strategy described above, reflecting a leaner technical assistance presence and a generally more cost-effective approach leading to enhanced sustainability. These budget changes will be incorporated into SECID's contract amendment and in amendments to the CARE and PADF Cooperative Agreements.

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PRODUCTIVE LAND USE SYSTEMS

PROPOSED BUDGETS

($000)

PADF

YEARS	09/12/92	CY 93	CY 94	TOTAL
PERSONNEL				
Expatriates	90.00	330.00	360.00	780.00
National	101.00	500.00	550.00	1,151.00
EQUIPMENT	30.00	30.00	30.00	90.00
TRAINING & EXTENSION	80.00	200.00	300.00	580.00
OPER. & MAINTENANCE	100.00	500.00	650.00	1,250.00
HOME OFF. SUPP.	12.00	46.00	49.00	107.00
Sub - Total	413.00	1,606.00	1,939.00	3,958.00
OVERHEAD (25%)	103.25	401.50	484.75	989.50
TOTAL	516.25	2,007.50	2,423.75	4,947.50

*INCLUDING $80,000 FOR CLOSE-OUT COSTS

CARE

YEARS	09/12/92	CY 93	CY 94	TOTAL
PERSONNEL				
Expatriates	61.00	220.00	240.00	521.00
National	117.00	581.00	650.00	1,348.00
EQUIPMENT	50.00	150.00	40.00	240.00
TRAINING & EXTENSION	40.00	150.00	200.00	390.00
OPER. & MAINTENANCE	90.00	350.00	400.00	840.00
HOME OFF. SUPP.	6.00	23.00	24.00	53.00
Sub-Total	364.00	1,474.00	1,554.00	3,392.00
OVERHEAD (9.24%)	33.63	136.20	143.59	313.42
TOTAL	397.63	1,610.20	1,697.59	3,705.42

*INCLUDING $50,000 FOR CLOSE-OUT COSTS

SECID

YEARS	09/12/92	CY 93	CY 94	TOTAL
PERSONNEL				
Expatriates	30.00	145.00	170.00	345.00
National	25.00	125.00	200.00	350.00
CONSULTANTS	20.00	50.00	70.00	140.00
OPER. & MAINTENANCE	80.00	140.00	180.00	400.00
G&A	37.70	97.15	121.80	256.65
OVERHEAD	10.00	39.00	70.00	119.00
TOTAL	202.70	596.15	811.80	1,610.65

*INCLUDING $40,000 FOR CLOSE-OUT COSTS

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AID BUDGET FOR PROJECT 521-0217 ($000)

ORIGINAL AFII

YEAR	1990	1991	1992	1993	1994	TOTAL
PERSONNEL	1,817.00	1,959.00	2,111.00	2,294.00	2,444.00	10,625.00
EQUIPMENT	481.00	527.00	280.00	348.00	218.00	1,854.00
TRAINING & EXTENSION	332.00	349.00	368.00	408.00	459.00	1,916.00
OPER & MAINTENANCE	1,136.00	1,216.00	1,300.00	1,383.00	1,375.00	6,410.00
HOME OFF SUPP	60.00	63.00	66.00	69.00	73.00	331.00
SUBTOTAL	3,826.00	4,114.00	4,125.00	4,502.00	4,569.00	21,136.00
OVERHEAD	544.00	615.00	600.00	651.00	667.00	3,077.00
TOTAL C.A.	4,370.00	4,729.00	4,725.00	5,153.00	5,236.00	24,213.00
RESEARCH	1,116.00	1,172.00	1,187.00	699.00	713.00	4,887.00
AID PROJECT MANAGEMENT	100.00	107.00	115.00	122.00	156.00	600.00
AUDIT	0.00	0.00	0.00	0.00	200.00	200.00
EVALUATION	0.00	0.00	50.00	50.00	0.00	100.00
GRAND TOTAL	5,586.00	6,008.00	6,077.00	6,024.00	6,305.00	30,000.00

AF II AND PLUS

YEAR	AF-II OBLIGATED THRU 09/92	AID PROPOSED BUDGET FOR PLUS PROJECT FROM 09/92 THROUGH 12/94				TOTAL
		1992	1993	1994	SUB TOTAL	
PERSONNEL	4,032.00	369.00	1,631.00	1,800.00	3,800.00	7,832.00
EQUIPMENT	947.00	80.00	180.00	70.00	330.00	1,277.00
TRAINING & EXTENSION	68.00	120.00	350.00	500.00	970.00	1,038.00
OPER & MAINTENANCE	2,124.00	190.00	850.00	1,050.00	2,090.00	4,214.00
HOME OFF. SUPP	117.00	18.00	69.00	73.00	160.00	277.00
SUBTOTAL	7,288.00	777.00	3,080.00	3,493.00	7,350.00	14,638.00
OVERHEAD	979.00	136.88	537.70	628.34	1,302.92	2,281.92
TOTAL C.A. CARE & PADF	8,267.00	913.88	3,617.70	4,121.34	8,652.92	16,919.92
RESEARCH SECID	2,701.00	202.70	596.15	811.80	1,610.65	4,311.65
AID PROJECT MANAGEMENT	81.00	0.00	0.00	0.00	0.00	81.00
AUDIT	0.00	0.00	0.00	200.00	200.00	200.00
EVALUATION	0.00	0.00	100.00	0.00	100.00	100.00
GRAND TOTAL	11,049.00	1,116.58	4,313.85	5,133.14	10,563.57	21,612.57

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PRODUCTIVE LAND USE SYSTEMS

PROPOSED PROJECT–WIDE BUDGET

($000)

YEARS	09/12/92	CY 93	CY 94	TOTAL
PERSONNEL				
Expatriates	181.00	695.00	770.00	1,646.00
National	243.00	1,206.00	1,400.00	2,849.00
CONSULTANTS	20.00	50.00	70.00	140.00
EQUIPMENT	80.00	180.00	70.00	330.00
TRAINING & EXTENSION	120.00	350.00	500.00	970.00
OPER. & MAINTENANCE	270.00	990.00	1,230.00	2,490.00
HOME OFF. SUPP.	18.00	69.00	73.00	160.00
OVERHEAD	146.88	576.70	698.34	1,421.92
G&A	37.70	97.15	121.80	256.65
SUBTOTAL	1,116.58	4,213.85	4,933.14	10,263.57
AUDIT & EVALUATION	0.00	100.00	200.00	300.00
TOTAL	1,116.58	4,313.85	5,133.14	10,563.57

*INCLUDING $170,000 FOR CLOSE–OUT COSTS

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REVISED LOGICAL FRAMEWORK

PRODUCTIVE LAND USE SYSTEMS
(521-0217)

Narrative Summary	Objectively Verifiable Indicators[1]	Means of Verification	Important Assumptions
Goal: To maximize the productive potential of Haitian hillside agriculture by reducing the ongoing degradation of the country's natural resources base through sustainable land-use interventions;	-Increased incomes for participating farmers -Increased forested and on-farm planted acres in projects areas -Reduced soil erosion -Farmers trained in land use management technologies	-National Agricultural Production statistics -World Bank and FAO estimates -USAID Monitoring Unit findings	**Assumptions for Achieving Goal Targets:** -Sufficient political stability exists in Haiti to allow project activities to be carried out as planned. -Climate and rainfall levels do not vary markedly from historic patterns.
Purpose: 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 materials which will enhance soil fertility. BEST AVAILABLE COPY	**End-of-Project Status (PLUS - 1992-94)** 30,000 farmers have adopted land use practices over 3 growing seasons 50,000 farmers have produced tree seedlings over 4 growing seasons 3,000 farmers have had bio-intensive gardens for more than 2 seasons 6,000 farms have increased productivity by at least 15%	-National and regional agricultural and rural income statistics -Semi-annual reports by CARE and PADF -Official records of local NGOs -Project evaluations	**Assumptions for Achieving Project Purpose:** -GOH policy permits NGOs and PVOs to operate independently in Haiti. -Technologies applied are technically and financially feasible. -Farmers are receptive to soil conservation measures to avoid further land degradation.

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[1]Since indicators used in AFII (1989-92) have changed somewhat under PLUS, quantitative measures apply only to the PLUS project (1992-94).

Outputs:	Magnitude of Outputs for PLUS (1992-94):		Assumptions for Achieving Project Outputs:
1. <u>Increases in production and income achieved</u> through propagation of improved varieties of fruit trees and food crops, grafting, foodcrop germplasm improvement, appropriate grain storage development, bio-intensive gardening, and improved market information and access.	1 million fruit trees planted 16,000 hectares under rotation with crops 200 hectares deep-tilled 7,500 bio-intensive gardens in production 34,000 farmers producing improved crops and fruit tree varieties	-CARE and PADF records -Field inspections by USAID PADO staff	-PADF can continue to work effectively with local NGOs as in AOP and the earlier years of AFII -Results emerging from SECID research will be practical and closely directed to client needs
2. <u>Sustainable production systems established</u> involving soil and water conservation practices encompassing terracing and hedgerow technologies, ravine stabilization, rock walls, etc., as well as appropriate production technologies, including composting, deep tillage, cover cropping, and improved crop management.	3,900 km of hedgerows planted 163 km of gullies protected 74 km of rock walls built 1,375 km of dead barriers established	-Records of local PVOs and NGOs -Project evaluations	-Farmers will be willing to purchase seedlings after subsidies stop, recognizing their prospective value -Farmers will be receptive to training opportunities and extension efforts
3. <u>Multipurpose tree propagation in practice</u> through training of farmers in propagation techniques, direct seeding, use of plastic sack nurseries, stump planting, etc., in order to maintain adequate numbers of trees for farmers to integrate into their farming system.	10,000 hectares under productive land use practices 17,000 farmers trained in soil conserving practices 40,000 farmers trained in tree seedlings production 1,460 individual and 530 group nurseries in place 4 million multipurpose tree seedlings planted 1.5 million trees planted		

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Inputs:	Magnitude of Inputs: (PLUS 1992-94)		Assumptions for Providing Inputs:
CARE, PADF & SECID			
Technical Assistance	CARE 2 L/T @ 28 mos PADF 3 L/T @ 28 mos SECID 2 L/T @ 28 mos Short-term consultants 35 pers/mos	CARE and PADF Cooperative Agreements SECID contract	Following the interruption in project implementation caused by the coup and program suspension, grantees will be able to staff positions with experienced and skilled personnel
Research	40 pers/mos by SECID in research activities	SECID Research reports	
Equipment & Supplies	Vehicles, motor bikes Scientific instruments Educational materials Farm tools, seeds	Procurement records USAID monitoring records	Equipment can be procured on a timely basis despite logistics problems related to the embargo
Training & Extension	150 seminars conducted Training materials prepared	Training records	
Operations & Maintenance	Office operations Vehicle maintenance Staff travel in-country		

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ECONOMIC INDICATORS OF AGROFORESTRY II STRATEGY IMPLEMENTATION: FARM INCOME ANALYSIS TO AGRICULTURAL PROJECT ANALYSIS

by

Kent D. Fleming and G. Edward Karch[1]

I. INTRODUCTION

The primary goal of the amended Agro-Forestry II Project (AFIIa) is to bring about sustainable improvements in Haitian hillside farm productivity and hill farmer net cash income. An analysis of the financial and economic impact of the whole project involves an assessment of the aggregated increases in sustainable productivity and income resulting from AFIIa interventions. Project level financial analysis implies farm level financial analysis. The pertinent indicator of project impact is change in farm production and producer net income, the elemental unit of analysis is the farm entity, and the appropriate method of analysis is a financial case study of the farm (Scherr and Muller, 1991). This paper reports on the development of project and farm level agroforestry strategy implementation indicators in the form of two economic models[2].

This study should be read within the context of Karch, "Haiti Agroforestry II Project Economic Indicator Analysis" (1991). Karch outlines five different levels or "checkpoints" from which the project's impacts, as opposed to activities, can be observed and measured. Direct measurement of impacts are feasible on two elevations of the framework: Level III, the project level adoption of interventions, and Level I, the farm level actions. The project level is where almost all monitoring of activities has been occurring. Multiplying the existing activity indicators by an income index transforms them into financial and economic impact indicators.

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[1] Agricultural Economist and Agroforestry Economist, respectively.

[2] The two economic models developed by this study are Lotus 123 "spreadsheet" templates. A spreadsheet is simply a matrix of cells created by overlapping rows and columns, similar to graph paper. Data, text, or formulas can be entered into the cells. Formulas referring to data in the cells, will be recalculated whenever the data is changed. One of the major advantages of using the spreadsheet format for economic models is transparency. With transparent models the user can see how any particular result is calculated. In contrast, "black box" models use a program written in code and unavailable to the user, ask for input, and then provide a result.

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The farm level ("Level I") offers the most direct view of economic impacts, but this level presents great measurement difficulties. Accurate, methodical, timely accounting of all financial and production inputs and outputs would satisfy the measurement needs, but this approach is neither "economically nor socially feasible in Haiti" (Karch, 1991, p. 3)[3]. Surveys are an alternative to direct accounting procedures, but they also have a number of inherent weaknesses. If they are to provide reliable, timely data, they are extremely difficult to perform properly, they are expensive and time-consuming, and they cannot be performed on an on-going basis (Scherr and Muller, 1991). Karch (1991) identified Level I indicators currently being used by the project. These include extension, training, and on-site demonstration activities. Karch also proposed that "snapshot studies" or farm case studies be utilized to determine farm-level economic impacts of interventions, such as hedgerow establishment. This paper critiques existing financial case studies of agroforestry interventions and develops an alternative methodology to perform critically important farm level financial analyses.

The methodology developed depends on a strong extension component and the recommendations in this study assume that this institution has been developed. This assumption appears reasonable based on our field observations in both the northwest (the area in which CARE operates) and the south (the area in which the Pan-American Development Fund (PADF) operates). The rapport between extension staff and farmers appears to be excellent. Over the past ten years[4] CARE and PADF, along with SECID[5], the primary research component of the project, have developed an excellent research-extension delivery system[6]. Wherever we went with extension staff, we were able to meet and to talk openly with the farmers. Staff and

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[3] Indeed, even in more advanced commercial agricultural economies, such as the U.S., it is estimated that less than 5% of all commercial producers keep adequate financial and production records.

[4] The initial agro-forestry project was the Agroforestry Outreach Project (AOP), starting in 1981 and concluding in December 1989. The AOP was replaced by the Agro-Forestry II (AFII) project in January 1990.

[5] The Southeast Consortium for International Development/Auburn University.

[6] Based on comprehensive experience with other agricultural extension systems, we believe that the system now in place would be the envy of many countries far more developed than Haiti.

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farmers were very positive about AFII[7] and felt intuitively that farmers had benefitted. However, little effort had been made to quantify the farm-level economic benefits.

Project emphasis until now has clearly been on bio-physical production aspects as opposed to economic considerations. A reflection of this problem is that none of the published research adequately documents farm-level economic impacts. The current study recommends that a strong economic component be injected into both the on-going project reporting and the research-extension activities. This study provides two economic models to help accomplish this task.

One reason the economic component has been weak, is the inherent difficulty of visualizing project bio-physical intervention in terms of the economics associated with on-farm implementation. Project level reporting has not been, but needs to be, expressed as economic impact. The project model developed will facilitate reporting the economic impact of activities. At the farm level the failure to report economic impact stems from the inadequate research/extension attention to the economics of on-farm production and marketing. The on-farm economic model offers a methodical, analytical approach to the whole-farm analysis of the agro-forestry land-use systems under consideration. Use of the model can facilitate rapid financial appraisals of specific farm interventions and provide concise but comprehensive summary budgets in a standard format.[8]

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[7] While the current analysis is primarily a projection of the impact of AFIIa, obviously all of our farm visits were observations of impacts of AOP and AFII interventions.

[8] The farm financial model offers two practical benefits. First, an individual farm can be considered "as is" before intervention and then reconsidered as it would be in a few years after the intervention. If the farm already had incorporated the improved practice, it could be analyzed as it now is. It could then be compared either to how it would have been had the farmer not adopted the recommended practice or to another local farm not practicing the intervention. In either case, the financial benefits would be graphically demonstrated for farmer, agent, project administrator, and donor.

A second important potential benefit of using a model is access to a group of comparable case studies. The case studies of similar farms can be used to develop a set of production and financial "benchmarks." When farms are analyzed in a similar manner and described according to a standard format, they will have a common denominator and be comparable. Over time a set of production and financial expectations will emerge. All parties involved will come to view farms similarly for financial purposes, and the project's economic and financial impacts will

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II. PREVIOUS WORK

Karch (1991) reviewed the literature relevant to the overall development of AFIIa project indicators. SECID has published two sets of financial case studies (Bellerive, 1991 ; Street, et al., 1990) relevant to farm-level economic indicators of changes in Haitian hillside farm productivity and producer income. The economists who undertook to develop these case studies attempted an important but difficult task. However, as Karch noted, they largely failed in their efforts. This section of the study provides: (a) a review of the "component" literature, studies which can contribute to the development of a Haitian hill farm financial case studies, and (b) a critique of the two existing farm case studies. The critique is intended to clarify the direction AFIIa should take regarding farm level economic indicators.

A. Component studies:

Component studies examine the costs associated with one of the elements of a farming system. An example of a component study is the analysis of the maize production segment of a mixed crop and livestock farming system or the marketing phase of a charcoal operation. SECID has published three component studies directly relevant to the development of whole-farm analyses (Street, 1989a; Street, 1989b; Street & Bellerive, 1989). The first of these is a general socio-economic study, but it includes useful information about labor profiles. The second study is a valuable study of charcoal marketing costs. The third study examines the marketing aspects of the pole industry. These three studies are particularly worthwhile because they are based on empirical research.

Much of the economic work conducted under AID's Agricultural Development Support II (ADS-II) project during the mid-1980's, relates to the formation of an economic model of the hillside farm. The ADS-II project's agricultural economics/farm management module functioned for less than a year and it focused on conditions in the south, but it achieved a great deal in terms of generating cost of production (COP) research results. These COP budgets are reported in Taylor (1984). The budgets must be used with caution because the projected results are to a degree region specific, but the format is sound regardless of the site. These budgets and those produced by other members of the ADS-II team (e.g., Pierre, 1987), when adjusted for location, can feed into an economic model of a hillside farm.

B. Farm case studies:

Case studies of on-farm activities are the foundation of a whole-farm financial analysis. Partial budgeting or enterprise

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become more readily apparent and more easily and accurately described.

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cost-benefit exercises are useful to the extent that they provide specific data on the costs and returns. They are inevitably limited because they examine only one ingredient of the total system. Considering the importance of changes in farm productivity and income as indicators for evaluation of project impact, there is a dearth of empirical economic research. Case studies (Bellerive, 1991; Street,et al., 1990) appraise 14 of the 250,000 farms which have been involved with one or more agroforestry extension interventions over the past ten years.

1. Bellerive, P.A. (1991) "A Financial Analysis of Selected Hedgerow Operations in Haiti's Southern and Northwestern Regions."

These case studies are fraught with a wide range of methodological and data collection and presentation problems. The overall study reveals a fundamental misunderstanding of the purpose and implementation of the NPV method. Nine farms were visited, but it is impossible, from the data collected, to determine past, present, or future production or income of any of these farms. These studies were not intended to consider whole farm income, but of course that is exactly the source of their predicament. The nature and severity of these problems will be apparent from a cursory review of the first two cases.

Case 1: Nan Suzan Farm (Table 1): We are told that the farm is 806 square meters, and that production consists of 279.1 meters of Leucaena hedgerows intercropped with a maize-pigeon pea mix. Hedgerows are arranged in "four rows at five meters each," so presumably we are already up to 1395 square meters (279 * 5).

One cycle[9] of maize returns are reported to be $25.00. With only 526 square meters available, the yield from one season of maize alone appears to be over two tons per hectare ($25/$0.22 = 114 kgs. of maize and 114 kgs. divided by 526/10,000 ha. = 2,167 kgs/ha.) Two tons is absurdly high for a hill farm with reportedly "low fertility" and a very low seeding rate.[10] The farmer also has

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[9] It is unclear how many cycles there are per year. If there is only one, this fact should be stated. If there are more than one, as is often the case, the number should be stated and the income calculated.

[10] The person collecting the on-farm data must have realized as the farmer spoke that something was not quite right. The researcher must have known as he performed his analysis and wrote his report that his results were impossible. And yet no one questioned this information, and it has consequently been published as serious economic research. Should this research be used to confirm that the introduction of hedgerows increased productivity and farmer income? If the interviewer/researcher had

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pigs, but we are not told how many. Therefore it will be impossible to calculate the feed requirements, the income from this enterprise, or the fodder value of the Leucaena.

Variable costs are fairly straight forward. Since the maize planting costs involve only maize seed and labor, and since the seed cost is reported to be $1 and the total planting cost is $2, labor must be $1 or about one man-day (about 5 hours.) Land preparation, weeding, and harvesting labor brings the total variable costs to $15.00.

TABLE 1. Bellerive (1991) Table 1 reproduced.

Net Present Value (NPV) for the Nan Suzan Farm at a 30 Percent Discount Rate for Maize Production. (Values in Dollars)

Year	Cost	Benefit	P.V.Cost	P.V.Benefit	Net P.V.Benefit
0	180.00	0.00	180.00	0.00	(180.00)
1	18.00	90.00	13.85	69.23	55.38
2	21.60	108.00	12.78	63.91	51.12
3	25.92	129.60	11.80	58.99	47.19
4	31.10	155.52	10.89	54.45	43.57
5	37.32	186.62	10.05	50.26	40.21
6	44.79	223.95	9.28	46.40	37.12
7	53.75	268.74	8.57	42.83	34.26
8	64.50	322.49	7.91	39.53	31.63
9	77.40	386.98	7.30	36.49	29.19
10	92.88	464.38	6.74	33.69	26.95
11	111.45	557.26	6.22	31.09	24.88
12	133.74	668.71	5.74	28.70	22.96
13	160.49	802.45	5.30	26.49	21.20
14	192.59	962.94	4.89	24.46	19.57
15	231.11	1155.53	4.52	22.58	18.06
16	277.33	1386.63	4.17	20.84	16.67
				NPV	339.95

Land is figuratively "purchased" in the first year, but since it is not "sold" at the end of the project, it presents problems of interpretation. First, the land is obviously used for other enterprises, such as the pigs. It was not in fact purchased literally for the hedgerows, so it is a "committed" or "sunk" cost.

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access to this model, he/they would have known immediately that the data input was incorrect. With the model in mind the results could have been estimated before the farmer finished providing his on-farm data.

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(Alpin, et al., 1972) Second, Bellerive states that the opportunity cost of the land was zero, so he could not have intended the $100 to be an opportunity cost (Alpin, et al., 1972), and in any case he needs to account for it at the end of the project, i.e., in 16 years. (As will be noted later in the methodology section, the land investment problem can be simplified by treating net income as a return to land.)

The actual total investment for the purposes of the investment analysis consists of the cost of labor to plant the hedgerows in year zero. Unfortunately, given the data from the single observation of hedgerow planting (Bellerive, 1991, p. 4), the cost could be either $0.20/meter or $0.29/meter. At $1.00 per five hour day, or $0.20 per hour per man, this rate would be equivalent to 0.7 to 1.0 meter per hour per man. In either case this cost appears high. PADF (1991) reports that hedgerows are planted at the rate of 5 meters per hour per man ($0.04/meter), and CARE (1991) reports a rate of 20 meters per hour per man ($0.01/meter.) This case study may be overstating the cost by a factor of 29[11]. This relatively high rate is utilized throughout the nine case studies, compounding the problem of basing an entire study on a sample of one observation.

Initial year costs and returns were $15 and $79 respectively. Presumably the intercrop is also planted in the first year, but curiously there is no crop income. However, there are far more serious problems. In the process of being entered but before they are discounted, the costs and returns become inflated by 20% for no apparent reason. Equally surprising is that both income and expenses continue to increase at this arbitrary rate for each of the subsequent 15 years. Is the 20% intended to reflect the inflation rate for the next 16 years? We are never told, but regardless, we have a problem. If there is also to be a precisely equal appreciation rate, as suggested here, then the two events would cancel out and should not have been reported. Since inflation has already been accounted for in the 30% discount rate, raising the costs and benefits by 20% in effect discounts the resulting stream of cash flows by only about 10%.

Benefits are limited to the savings on pig feed ($54) and the sale of maize ($25), including the maize produced for home consumption. It would have been preferable to express the value of the Leucaena as a function of (a) the value of pigs, and (b) the nutritive value to the hedgerow clippings and intercrop residual. A whole farm approach, as opposed to looking at the

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[11] Technically, the cost of seed should also be included in order to determine the complete cost per meter of hedgerow establishment. PADF is planting about 100 seeds per meter with the hope that 50 will become established. CARE plants up to double this amount.

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hedgerow intercrop enterprise alone, would better enable one to capture the interactive benefits of agroforestry.

A complex system has been portrayed as a simple production situation. The analytical advantage is that a condition has been created which is nothing more than an annuity problem. However, the simplicity has been obscured by the convoluted process of adjusting all the costs and returns. Table 1 is unnecessarily confusing and methodologically incorrect. Table 2 below provides the corrected NPV with a concise illustration of the process for calculating the NPV. The original data is utilized in this calculation.

TABLE 2. Corrected NPV of Hedgerow-Intercropping Intervention (based on data from Bellerive, 1991.)

Year 1 - 16:	Annual benefit	$79
Year 1 - 16:	Annual cost	-15

FV of annual net benefits (years 1 -16) =		$54/year
PV of stream of net benefits discounted @ 30% =	3.2832 * $54 =	$177.29
less initial investment:		80.00

NPV of investment in hedgerow-intercropping =		$97.29

It is not immediately apparent how the result of the analysis should be interpreted. We are told that "hedgerows make a substantial profit for the farmer" (Bellerive, 1991, p. 9). On an annualized basis this "substantial profit" is $6.07/year ($97.29/16 years), not really that substantial or impressive.

It is interesting to note that if the land cost were considered as it is in Table 1, the NPV would have been negative. On the other hand, if we leave the land price out, as we should, and use CARE's establishment cost, the NPV is $174.50 ($177.29 - $2.79). Now the value of hedgerows has only been overstated by a factor of two. Ultimately, if we were to continue in this vein and were to include all of the actual benefits and costs of Leucaena, we might well conclude that the NPV of the hedgerow is in fact close to the $340 originally reported.

This wide discrepancy between the case study estimates and the corrected calculations, becomes particularly significant for project-level analysis. A project's anticipated outcomes will differ, to the degree of the multiplier effect, depending on which farm level result is considered to be representative. The point of

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this critique is not that hedgerows may have been overvalued in this instance, but rather that questionable methodology and data quality will preclude credibility for <u>any</u> conclusion generated by this quality of farm-level analysis.

Can the farmer relate to the case farm results? Understandably, these farmers are extremely focused on current cash flows. A farmer's planning horizon is shortened in proportion to short-term survival needs. One should not underestimate the degree to which these producers are market-oriented, rational economic decision-makers. But given their orientation, they are not going to be giving a great deal of attention to breaking even in year four or to the NPV of 16 year capital investment decisions. Economic decisions will be more influenced by immediate returns from relatively low risk operations. The economic model will provide more relevant information for making farm-level economic decisions.

This case study is a classic example of how one can become confounded by an elementary discounted cash flow (DCF) problem when one is unclear about the fundamentals of investment analysis. For our purposes it is also a sad commentary on how limited research resources can be squandered when one does not have a clear vision of which methodology needs to be utilized and what data needs to be collected. Hopefully, an economic model can provide the necessary guidance to prevent this lamentable waste.

<u>Farm case 2: Madeque Farm</u>: The NPV of hedgerows is again incorrect[12]. However, this case adds another error to the inventory of miscalculations. In the previous case the opportunity cost was

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[12] In order to avoid again referring to the fundamental methodological errors of Bellerive's study, we can quickly recalculate the NPV's, given his admittedly unreliable data:

TABLE 3. Corrected NPVs of Bellerive (1991).

Case:	B	-	C	=	FV of NB * 3.2832	=	PV of NB	-	INVEST.	=	NPV
1	$79	-	15	=	$54		$177.29	-	80	=	$97.29
2	211.60	-	30	=	181.60		596.23	-	57.50	=	538.73
3	110	-	26	=	74		242.96	-	44.66	=	198.30
4	113	-	47	=	66		216.69	-	33.25	=	183.44
5	57.20	-	18	=	39.20		128.70	-	19.20	=	109.50
6	33	-	11	=	22		72.23	-	27.43	=	44.80
7	84	-	29	=	54		180.58	-	46.30	=	134.28
8	30	-	5	=	25		82.08	-	15.84	=	66.24
9	4	-	.4	=	0		0.00	-	9.77	=	(9.77)
AVE.=	80.20	-	20.55	=	59.64		195.82	-	37.11	=	158.71

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assumed to be zero. In this case it is calculated to be $10. The $10 is correctly recognized as a cost and deducted in the first year. However, it is never deducted again. This cost does not disappear and must be deducted in each of the subsequent years (Alpin, et al., 1972).

Problems in the collection of relevant, reliable data are again evident in the land area measurement effort. It is incorrect to assume, as is apparently done in these case studies, that we are only attempting to measure increases in gross farm productivity and that assessing the productive land area is some how secondary. If we make this assumption, production per farm could be increased simply by enlarging or merging farms. Net income could be raised simply by raising product prices or lowering input costs. Farm-level results which are not expressed in productivity or net income per unit of land will not be as useful for project-level analysis. Given the limited land resource, the intent of the AFIIa project is to increase productivity and income per unit of land. Therefore, income should be viewed as a return to the most limiting resource, land. The actual area of productive or potentially productive land is required to make sensible projections of improved productivity and income.

The second case farm begins by reporting that the area could not be determined because the farmer failed "to volunteer" the information. In that case it would be useful to ask the farmer the size. If he did not know the area (unlikely), one could measure it for one's self. If he refused to allow one to calculate this data, one might seriously question whether this farmer is the type of person with whom we should be working.

Similar data collection and methodological problems recur throughout the remaining seven case farms of this study. The increased effort to collect the essential data for a whole farm analysis would have been minimal. This data could then have been used for a variety of analyses, all of which would have been more useful and of greater interest.

2. Street, D.R., A.G. Hunter and P.A. Bellerive (1990) "Tree Operations in Haiti's Northwest and Central Plateau"

The published results of the Street study are clearly expressed, reveal a genuine concern with the quality of the data, and are not burdened by arithmetic errors. The Street study also contains fewer conceptual problems. For example, the "purchase" of land is not included in the NPV calculations, farmers on these

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farms incur costs upon planting, and the opportunity cost is calculated meticulously and utilized correctly.[13]

However, the two studies do share a major problem: costs and returns are inflated by 20% for no apparent reason. Again, this approach leads to unnecessary confusion and to varying degrees of distortion. For example, the case of neem borders in Mirebalais utilized for poles (Street, et al., 1990, Table 3, p. 15) is calculated to be the most profitable pole operation sampled. If we ignore the redundant 20% adjustments, the NPV is not $119.60, as reported but rather $22.75. The difference, given the case data, is a five-fold overstatement of the actual benefit. The effective discount rate is not 30%, as claimed, but only about 10%. Consequently, some of the scenarios that are portrayed as having positive NPVs, can in fact become negative, and all are closer to being negative than one is led to believe. As a further example, the subsequent case (Street, 1990, Table 4) is depicted as having an NPV of $27.91 when in fact it is just under $11.00.

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[13] One serious problem shared with the Bellerive study, is the failure to clear establish the area of production. The opportunity cost is based on one hectare. But it is unclear how large the actual field is. If the NPV is meant to be on a per hectare basis, as we assume it must be, then this assumption needs to be stated explicitly.

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III. METHODOLOGY

A. Economic and Financial Analysis of the Reoriented Project:

The methodology utilized to produce the project analysis is to convert the reported project activities into economic impacts. This procedure requires economic coefficients for each of the agroforestry interventions. The coefficients were developed from a wide range of data sources. Collecting reliable, useful data is always a major concern, but it is particularly difficult in this instance because economic impacts have only recently been emphasized. Unfortunately, farm case studies, an obvious starting point, were not available as a useable resource.

The analysis itself follows the approach outlined in AID Handbook Three (USAID, 1987). Net benefits were calculated for each practice for the various participants: farmers, project donor, and society. These benefits were projected for 20 years, and then discounted at 30% for farmers and 10% for others.

A DCF helps one evaluate a particular capital investment proposal over a relatively long future period of time. If one can determine an appropriate time value of money (i.e., a "discount rate"), the DCF method can help one decide if an initial capital investment is financially and/or economically justified by the subsequent stream of income directly generated by this investment. If the net present value (NPV) of this stream of income is greater than the present value of the investment, the project is deemed feasible.

An economic model was developed to facilitate the project analysis. The results which are reported in section IV of this paper were derived directly from the model. The model itself is not printed out, but a modified form is available to CARE and PADF to simplify future reporting of economic impacts.

B. Financial Analysis of Farm Case Studies

Case study methodological questions were raised in the literature review. However, a more fundamental methodological question needs to be asked: is the discounted cash flow (DCF) the most appropriate analytical method for the farm case situation? Does a DCF provide a better understanding of the farm-level agroforestry farming system dynamics, than any other method of analysis available to us? Some readers of these studies may have asked themselves, "What was the author's point? What more do I understand about the economics of the farming system in question?" In short, is the DCF method relevant here?

The project level model calculates the NPV of the various AFIIa practices and the project as a whole. The project model can help a donor agency decide whether a set of benefits received over a 20 year period (given the agency's time preference for money) justifies a multi-million dollar investment. But is this the

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situation for a Haitian peasant farmer deciding whether or not to plant a hedgerow? With a minimal investment of labor (perhaps only 3 minutes or $0.01 per meter) he can establish a crop which will shortly (within a year or two) provide increased productivity and income. Does it increase our understanding of the income effect of the hedgerow intervention to know that the NPV of a few hours planting and weeding, is $11.00, given a 16 year planning horizon with a discount rate of 30%? How does the farmer or the extension staff person interpret the difference between this $11.00 NPV and an NPV of $6.85 or of negative $1.25? Is the NPV of this intervention a good farm-level economic indicator of progress toward the achieving the AFIIa project's goal?

1. Whole-farm budget vs. partial budget:

A farm operations budget, as opposed to a capital investment budget, is a better farm-level economic indicator of intervention effect on whole-farm productivity and dollar income. Unfortunately whole-farm budgets are difficult to do by hand. With a spreadsheet economic model of the farm operations, any adjustment in production practices, production costs, or market prices, will immediately be reflected in a change in farm productivity and/or income. For example, in Table 6 below, the addition of a livestock enterprise is immediately reflected in the annual whole-farm net income. Without a whole-farm economic model, one would likely limit one's analysis to a partial budget.

The whole farm budget approach demands better data than a partial budget. If the partial budget analysis were comprehensive, the partial budget approach would initially arrive at the same result with slightly less cost and effort. The advantage of the whole-farm economic model becomes apparent when a second alternative intervention is contemplated. The marginal cost of this second analysis will be substantially lower because the relevant on-farm data will already have been collected and organized into useful information for economic decision-making. When dealing with a complex system, such as agroforestry systems tend to be, one usually wants to consider multiple interventions simultaneously.

2. Terminology:

The whole-farm budget presented for consideration is in fact a whole-farm "gross margin[14]" budget, that is, the gross revenue for the farm minus all variable costs. "Variable" or "operating costs" are usually defined as those operation costs which vary with reasonably small changes in the level of production. They are in contrast to "fixed" or "ownership costs," costs which will be incurred whether or not there is any production. The difference between the gross margin and the ownership or fixed costs, is "net

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[14] ADS-II publications use the identical measure, gross revenue minus variable costs, but refer to it as "gross profit" rather than gross margin.

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farm income." Since the "fixed costs" are minimal to non-existent, we may ignore them, and the gross margin becomes the net income.

Three costs are problematic within the Haitian hill farming socio-economic context: the costs associated with (a) unpaid family labor, (b) management, and (c)"family living." Let us set aside "family living" for a moment. Normally for the purposes of whole farm budgeting, the "costs" of paid labor and management may be considered as either variable or fixed costs. If we were always to account for all labor (including "unpaid family labor") as "paid labor," even if its opportunity cost were at times equal to zero, a return to all labor would automatically be included in the variable cost section. The net income then becomes a return to land and management (including risk-taking) or "entrepreneur-ship." The model default is to pay all labor at the rate specified by the user. However, since there are differences of opinion on this procedure, the user has the option to switch "off" one or more types of labor (cf. Results 1 and 2 below.)

Some allowance should be made for management.[15] It would be convenient simply to ignore it. A practical compromise is to value this resource as another residual. The gross margin, in the absence of fixed costs, is in effect a return to land. We can broaden this return to land to include a return to management and risk. We now have two residuals, which together constitute the returns to land and management. The market value of land is its income generating potential. The income potential is largely a function of management. Since the return to management is conceptual, it will simplify matters to acknowledge that a return to the land resource implies an unspecified return to management.

We can now return to the "family living" expense item. On a strictly commercial farm, "family living" would not be a major issue. Technically, the allocation for that "family living" which is not covered by "paid family labor," should be a draw from net farm income. However, the reality of the hill farm situation is that household consumption often is taken earlier. Often a third of total production is utilized for on-farm consumption. Consequently, reported yield or reported farm production is often actually production net of household consumption, the amount available to be marketed in one way or another. If yield is reported in this way, it should be adjusted back to gross yield. The actual or estimated actual yield figure should be used in the crop budget. This harvested production is entered into the budget as the "production amount." This amount is subsequently multiplied by a conversion factor (determined by the user) to provide a marketable yield. The conversion factor accounts for the total amount of loss due to

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[15] A convention which is often used, but which would be impractical and arbitrary here, is to assign a percentage of gross production, say 5%, as a reward to management.

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processing, drying or family consumption. It is the amount available to be marketed in one way or another. (Rural Haiti is a strongly market-oriented economy, albeit one with many market imperfections.)

The return to land (and by implication, to management and risk) and the actual production (i.e., total farm yield) together constitute the two-fold target of the project. The goal is to increase the production and income, but the actual indicators themselves usually can not be measured directly. The question has been raised as to what one should monitor? The answer usually is to collect data about the secondary indicators, such as labor hours (in person-days), other costs, if any, actual yields, and market prices. Usually the two primary indicators, production (marketable yield) and income, move together. Ideally both production and income will increase. However, production is an important part of the income equation, because if price were to drop and consequently net farm income were to decrease, the project could still be termed successful if production were to increase.

3. Output of the farm-level model:

Income: The model allows one to simultaneously consider up to 12 major individual crops (four tree crops, four hedgerow-intercrop crops, and four other interventions, such as vegetables and gully plugs) and four major livestock enterprises. The model relies on a series of 16 standardized enterprise budgets which can be changed, indeed should be changed to match on-farm experience. These 16 potential sources of income will be adequate in most cases, but further activities within each of the four main categories of enterprises, can be included in aggregate as "other income," for example, as other tree crop income. Other farm income which does not fall within one of these four agroforestry categories is accounted for in another major category: "Other Farm Income." The program then totals all sources of farm income and presents results both on a whole-farm basis and, for efficiency comparisons, on a per hectare basis.

Crop Expenses: The program aggregates all operating costs as they are reported in the underlying crop and livestock budgets. Expenses are printed out as either crop or livestock expenses. Within the crop category, itemized expenses consist of:

(1) actual seed and plant expenses and
(2) total fertilizer and chemical expenses;
(3) labor, which is further sub-categorized in terms of:
    (a) land preparation,
    (b) planting,
    (c) weeding,
    (d) harvest, and

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(e) post-harvest labor costs;[16]
(4) marketing, which usually consists largely of labor, but may also include other costs, such as paid transportation and packaging.

Livestock expenses: Neither CARE nor PADF have an explicit livestock activity in their projects. Livestock are an extremely important and often undervalued component of Haitian hillside agroforestry systems. Livestock have been an integral aspect of balanced agroforestry land-use systems for 2,000 years (Von Calowitz, 1989). A recent survey reveals that over 84% of all farms with which CARE currently works, include livestock as an integral component of the farm production system. The many purposes that livestock serve are well documented. These include meat and milk for home consumption or market, transport, and proxy savings accounts.

Perhaps the most important purpose of livestock is to enable farmers to market otherwise unmarketable production. This production includes inedible crops, such as leucaena leaves and branches, an excellent high-protein fodder, and waste products from grain, vegetable, and fruit production, which provide excellent energy sources for balanced livestock nutrition. If this function is over-looked, as it often is, the value of the various crops will be underestimated. The computer model accounts for all contributions by all crops to total fodder and energy available for utilization by livestock. In this way increased carrying capacity can be realistically readjusted and the marginal value product of the relevant agroforestry products can readily be accounted for as a function of the value of the livestock.

Gross margin: Gross margin is gross income minus total variable costs. Gross margin is the "bottom line"in our analysis and can be thought of as a return to land (and by implication, management and risk.) Thus, the economic indicator often referred to as net farm income, can be viewed as a return to the major limiting resource: land.

The final result of this analysis can provide three financial views of the farming operation:
(1) the farm as it was before the intervention,
(2) the farm as it is currently, and
(3) the farm as it might be in one to three years with further interventions. Thus the economic model, when used properly,

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[16] In actuality, labor is often not a cash operating expense. However, as we explained earlier, it is preferable to assign labor a value and consider it an operating expense. (If a user has a particular reason to do otherwise, an on/off toggle switch allows the user to decide when not to include a type of labor in the total farm operating expenses.)

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functions as the economic indicator of actual progress and projected progress toward achieving the goal of AFIIa.

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IV. RESULTS

A. Project-level Economic Indicators

The financial analysis of the reoriented project is based on the incremental increases in production of marketable commodities resulting from the extension of project practices in the field. As only the increase and not the entire farm is being valuated, a partial budget analysis of only the project inputs and resulting economic impacts is used.

PRACTICES	NPV of Practice
Hedgerows	Positive
Deep tillage	Positive
Ravine	Positive
Tree planting	Positive
Fruit planting	Positive
Fruit top work	Positive
Direct seed	Positive
Trash barriers	Positive
Rock wall	Positive
Bio-intensive gardens	Positive
Improved mgt. practices	Positive
Green manure cover crop	Positive
Livestock	Positive

TABLE 4

The major practices and the major crops were selected for use in the analysis. Animals were included as one of the farm activities used to convert hedgerow biomass to a marketable commodity. Each practice is tested individually for financial viability.

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, agronomist, animal scientists, and researchers.

Estimates of farmer inputs were calculated per output unit and applied to target projections of economic indicators to arrive at benefits. Costs and benefits were projected for 20 years and discounted to the present to arrive at present day values for the project. These are seen in Table 5. The projected benefits are calculated on a per farmer basis to examine the project purpose of increased farmer income. Taxes are usually included as a cost in a financial analysis, however in this case, there does not appear to be a consistent rural tax structure. Taxes imposed in a future projection would effect the NPV. The magnitude of any tax structure that would drive the NPV to negative would have to be something over a 50% tax rate.

The results of the financial analysis as required in USAID Handbook III (USAID, 1987) is positive. The NPV of the project as a whole is positive, and the IRR is over 50%. The NPV per farmer is positive. The cost per farmer is $105. The present value return is $10.25 for every dollar budgeted by USAID. Breakeven of all project costs and benefits occurs in 1995. Breakeven of farmer costs and benefits occurs in 1991.

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The Economic analysis as described in USAID Handbook III (USAID, 1987) is also positive. It differs from the financial in the following points. As the economic analysis considers the investment from the point of view of society as a whole the farmer is not considered separately.

Foreign exchange is shadow priced at 7.5:1 compared to 7:1 in the financial analysis. Internationally marketed commodities are shadow priced at their international market price (Gittinger, 1972). Labor is shadow priced at 50% of the price of rural labor during harvest season.

FINANCIAL ANALYSIS RESULTS	
Farmer's Viewpoint In Haitian Dollars	
NPV	$37,525,020
NPV /Farmer	$240
Annualized NPV	$1,250,834
Annualized NPV /Farmer	$12
IRR	over 50%
Donor's Viewpoint In US Dollars	
NPV	$218,191,513
Annualized NPV	$7,273,050
IRR	over 50%
Cost /Farmer	($121)

TABLE 5

The NPV of the project as a whole is positive and the IRR is over 50%. The present value return is $7.94 for every dollar budgeted by USAID. Breakeven of all project costs and benefits occurs in 1995.

ECONOMIC ANALYSIS RESULTS In $US	
NPV	$194,908,205
Annualized NPV	$6,496,940
IRR	over 50%

Table **TABLE 6**

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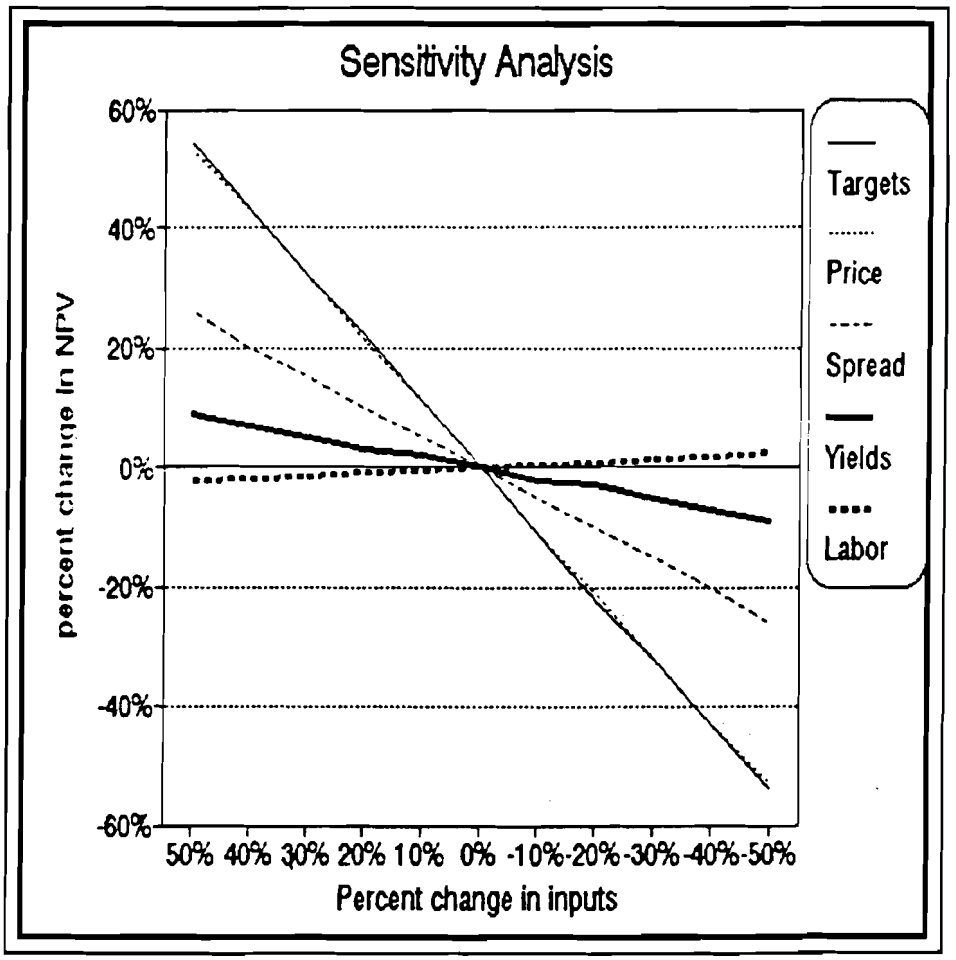
In analyzing the sensitivity of the project to risk and uncertainty, the variables of price, projected targets, labor cost, spontaneous spread rate, and yield response are varied up and down by 50% in 10% increments to see the effect on the NPV. This test shows the project analysis to be the most responsive to change in commodity prices. This finding confirms the importance of the new market orientation of the project.

The next most sensitive variable tested was the change in project targets. This change represents the change in resource allocation within the project. The broadening of project practices alleviates the effect of target shortfall in a tightly focused agenda, again confirming the reorientation of project resource allocation. Less sensitive was the change in spontaneous spread effect. With the large base of farmers involved, and the highly positive returns to project activity, spread has less importance to the project outcome than would normally be expected. Least sensitive to change is the labor rate. It is so low that increases of several magnitude have little effect in the overall project return.



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The project is so robust that the usual variation limits of +/- 50% do not push the NPV negative in any case. The worst case scenario, all variables pushed down at once by 50%, pushes the NPV down by nearly 50%. However, even in this extreme case, the project remains positive.

The structure of the analysis is reliable, but the accuracy of these results is a function of the data input. We used the best economic data available, but as the collection of economic data improves, better data will enable one to generate more accurate and reliable results. The purpose of this study is to develop farm and project level indicators; both models should be envisioned as means to execute on-going analyses of economic impact of interventions.

B. Farm-level Economic Indicators

The farm level economic indicator of productivity and net farm income is return to the land resource. The nature of this indicator requires one to perform farm case studies. Earlier efforts to perform farm level analyses were misdirected. Neither the methodology nor the data were appropriate. No existing case studies are capable of generating the required information. The purpose of this study is to develop project and farm level economic indicators and means to measure them. The economic models are methods to measuring the indicators.

It is beyond the scope of this study to develop a case study empirically. One's first inclination is, for illustrative purposes, to utilize data from existing farm case studies. However, problems with the quality of the data preclude this possibility. For example, the model depends on knowing the area of the farm. Land area measurement problems discussed earlier, prevent us from using most of the existing case studies.

The Bombardopolis Farm #1 case (Street, et al., 1990) presents the least data problems. For the purposes of this example we will assume the farm is exactly one hectare. The first step in using the model is to review the underlying budgets. In this case farm the only one of concern is the charcoal budget (Table 7.) The data is entered to conform with what Street reports having observed. In the process it is evident that at least one component of this production system, probably the charcoal processing, is extremely inefficient. Since Street's data does not include information on charcoal processing efficiency or mean annual increment of wood for charcoal produced per year, it is impossible to locate the source of inefficiency.

Great care was taken to count the number and kinds of trees growing and the number of poles produced, and to establish the mean annual increments of charcoal. Tree measurements were taken "to calculate pole volume, main stem volume, crown volume, total volume, stem biomass, crown biomass, and total biomass." (Street et al., 1990, p. 3) Had the study reported this data, it would have

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been extremely valuable, especially for calculating the fodder value of the foliage and locating the inefficiencies of charcoal production.

TREE CROP TYPE =>	Charcoal
Productive unit =>	per tree
OUTPUT /year:	
Production cycles/year	0.25
Harvest amt./cycle	4
Harvest units	shoots
Processing efficiency	4%
Marketable amount/year	0.011
Market units	sacks
Additional crop income	$0.20
Fodder produced (kg.DM)	0.48
Feed grain equiv. "	0.00
INPUT /year:	
Seed/plants ($/yr)	0.000
Fertilizer & chemicals	0.000
Land prep.labor (m-d/y)	0.000
Planting labor	0.000
Weeding labor	0.000
Harvest labor	0.017
Post-harvest labor	0.002
Marketing & transport/1	---
Enter plan # => 0	0.000

TABLE 7: Tree Budget for Charcoal

Harvest cost is not reported. It is assumed that harvest labor is excess labor with an opportunity cost of zero. It is claimed that "the benefits from fodder, firewood from trimmings, leaves as green manure and other byproducts offset the harvest cost" (p. 7). Perhaps so, but perhaps not; the reader should be allowed to decide. In fact, the value of these other products overcompensates for the harvest cost, and consequently seriously undervalues the potential income of the crop. Processing costs are also omitted. For a study that proclaimed that one of its two purposes was "to prepare exemplary financial analyses on tree production from selected areas where standing tree crops could be measured" (p. 2), these are serious omissions. One must estimate values of harvest and processing labor, the annual mean increment of foliage, and the other income from these trees.

Given the likely cash flow needs referred to above, given the probability for natural reseeding and for irregular growth differences between trees, and given the likelihood that all the trees were not planted in one week or even one year, there is a good chance that after three or four years, the producer will be harvesting throughout every year and not just once in four years. We will make this assumption since we are trying to present a picture of a typical year. Result 1 (Table 8 below) uses the limited data set (Table 7 above), assumes a relatively continuous flow production of charcoal rather than batch processing every four years, and assumes no labor costs (i.e., labor is switched off.) This print out is simply the gross income, because no costs are recognized. It is not a return to land per se, but rather to land <u>and</u> labor.

The subsequent print-out, Result 2 (Table 9), presents results for the same case but is a more realistic scenario because the

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labor values are estimated.[17] The bottom line income figure now better approximates the returns to land.

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[17] The only modification was to flip the "PAID?" toggle switch from "N" to "Y".

TABLE 8. RESULT 1.

ANNUAL REVENUE:	Production Total Units	Marketable a /Fm.:	Units:	Price /unit:	Farm Total:	Average $/ha.:
TREE CROPS (agroforestry):						
Charcoal	2,250 trees	25.8	sacks	$2.00	$51.56	$51.56
Poles	0 trees	0.0	poles	$1.75	0.00	0.00
Fruit trees	0 trees	0.0		$0.00	0.00	0.00
Border trees	0 trees	0.0		$0.00	0.00	0.00
Additional tree-crop income (calculated)					0.00	0.00
INTER-CROPS:						
Leucaena	0 sq.m.	0	kgs.	$0.00	0.00	0.00
Maize-Pigeon P	0 sq.m.	0.0	kgs.	$0.21	0.00	0.00
Inter/c #2	0 sq.m.	0.0	kgs.	$0.00	0.00	0.00
Inter/c #3	0 sq.m.	0.0	kgs.	$0.00	0.00	0.00
Additional inter-crop income (calculated)					0.00	0.00
OTHER CROPS:						
Grass	0 sq.m.	0.00	t.DM	$0.00	0.00	0.00
Garden	0 sq.m.	0.0	0	$0.00	0.00	0.00
Ravine	0 sq.m.	0.0	0	$2.00	0.00	0.00
Other crop	0 sq.m.	0.0	780	$0.00	0.00	0.00
Additional other-crop income (calculated)					0.00	0.00
LIVESTOCK:						
Goats	0.0 nannie	0	kgs.	$1.10	0.00	0.00
Sheep	0.0 ewes	0	kgs.	$1.00	0.00	0.00
Cattle	0.0 cows	0	kgs.	$0.60	0.00	0.00
Pigs	0.0 sows	0	kgs.	$0.80	0.00	0.00
Additional livestock income (calculated)					0.00	0.00
OTHER FARM INCOME	(enter farm total only)				0.00	0.00
					---	---
TOTAL GROSS REVENUE =					$51.56	$52

ANNUAL OPERATING COSTS (calculated):	Man-days/yr: PAID?(Y/N):	#:	Farm Total $:	Average $/Ha.:
ALL CROPS:				
Seed & plants (farm total)			$0.00	$0.00
Fertilizer & chemicals "			$0.00	0.00
Land preparation labor	N	0	$0.00	0.00
Planting labor	N	0	$0.00	0.00
Weeding labor	N	0	$0.00	0.00
Harvest labor	N	37	$0.00	0.00
Post-harvest labor	N	5	$0.00	0.00
TOTAL LABOR =		43 man-d/y	0.00	0.00
Marketing & transport (cost)			$0.00	0.00
Additional crop costs (enter farm total)			0.00	0.00
			---	---
CROP COSTS SUB-TOTAL =			$0.00	$0
LIVESTOCK:			Farm Total:	Average $/Ha.:
(all amounts are farm totals for all l/s units				
Breeding			$0.00	$0.00
Vet.& medicine			0.00	0.00
FODDER REQUIREMENT (t.DM):	Needed	0.00		
PRICES: Buy @ $0.00	Produced	1.08		
Sell @ $0.00	Balance	1.08	$0.00	0.00
ENERGY REQUIREMENT (t.DM):	Needed	0.00		
PRICES: Buy @ $0.00	Produced	0.00		
Sell @ $0.00	Balance	0.00	$0.00	0.00
Salt & minerals			0.00	0.00
Livestock supplies			0.00	0.00
Marketing			0.00	0.00
Labor ($/year) PAID?(Y/N): Y		0 p-d/yr.	0.00	0.00
Additional livestock costs (enter farm total)			0.00	0.00
			---	---
LIVESTOCK COSTS SUB-TOTAL =			$0.00	$0
TOTAL OPERATING COSTS =			$0.00	$0
TOTAL Annual Gross Margin or RETURN TO LAND =			$51.56	$52

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TABLE 9. RESULT 2. ANNUAL REVENUE:	Production Total	Marketable Units /fm.	a Price Units: /unit:	Farm Total:	Average $/ha.:
TREE CROPS (agroforestry):					
Charcoal	2,250 trees	25.8 sacks	$2.00	$51.56	$51.56
Poles	0 trees	0.0 poles	$1.75	0.00	0.00
Fruit trees	0 trees	0.0	$0.00	0.00	0.00
Border trees	0 trees	0.0	$0.00	0.00	0.00
Additional tree-crop income (calculated)				0.00	0.00
INTER-CROPS:					
Leucaena	0 sq.m.	0 kgs.	$0.00	0.00	0.00
Maize-Pigeon P	0 sq.m.	0.0 kgs.	$0.21	0.00	0.00
Inter/c #2	0 sq.m.	0.0 kgs.	$0.00	0.00	0.00
Inter/c #3	0 sq.m.	0.0 kgs.	$0.00	0.00	0.00
Additional inter-crop income (calculated)				0.00	0.00
OTHER CROPS:					
Grass	0 sq.m.	0.00 t.DM	$0.00	0.00	0.00
Garden	0 sq.m.	0.0 0	$0.00	0.00	0.00
Ravine	0 sq.m.	0.0 0	$2.00	0.00	0.00
Other crop	0 sq.m.	0.0 780	$0.00	0.00	0.00
Additional other-crop income (calculated)				0.00	0.00
LIVESTOCK:					
Goats	0.0 nannie	0 kgs.	$1.10	0.00	0.00
Sheep	0.0 ewes	0 kgs.	$1.00	0.00	0.00
Cattle	0.0 cows	0 kgs.	$0.60	0.00	0.00
Pigs	0.0 sows	0 kgs.	$0.80	0.00	0.00
Additional livestock income (calculated)				0.00	0.00
OTHER FARM INCOME	(enter farm total only)			0.00	0.00
				---	---
TOTAL GROSS REVENUE =				$51.56	$52

ANNUAL OPERATING COSTS (calculated): ALL CROPS:	PAID?(Y/N):	Man-days/yr: #:	Farm Total $:	Average $/Ha.:
Seed & plants (farm total)			$0.00	$0.00
Fertilizer & chemicals "			$0.00	0.00
Land preparation labor	N	0	$0.00	0.00
Planting labor	N	0	$0.00	0.00
Weeding labor	N	0	$0.00	0.00
Harvest labor	Y	37	$37.46	37.46
Post-harvest labor	Y	5	$5.16	5.16
TOTAL LABOR =		43 man-d/y	42.62	42.62
Marketing & transport (cost)			$0.00	0.00
Additional crop costs (enter farm total)			0.00	0.00
			---	---
CROP COSTS SUB-TOTAL =			$42.22	$42

LIVESTOCK: (all amounts are farm totals for all l/s units			Farm Total:	Average $/Ha.:
Breeding			$0.00	$0.00
Vet.& medicine			0.00	0.00
FODDER REQUIREMENT (t.DM):	Needed	0.00		
PRICES: Buy @ $0.00	Produced	1.08		
Sell @ $0.00	Balance	1.08	$0.00	0.00
ENERGY REQUIREMENT (t.DM):	Needed	0.00		
PRICES: Buy @ $0.00	Produced	0.00		
Sell @ $0.00	Balance	0.00	$0.00	0.00
Salt & minerals			0.00	0.00
Livestock supplies			0.00	0.00
Marketing			0.00	0.00
Labor ($/year) PAID?(Y/N): Y		0 p-d/yr.	0.00	0.00
Additional livestock costs (enter farm total)			0.00	0.00
			---	---
LIVESTOCK COSTS SUB-TOTAL =			$0.00	$0
TOTAL OPERATING COSTS =			$42.22	$42
TOTAL Annual Gross Margin or RETURN TO LAND =			$8.94	$9

As we review Result 2 a number of potential increases in productivity and income are apparent. For example, one might wish to consider the whole farm effect of modifying the charcoal enterprise assumption, e.g., the current marketing arrangement or

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the charcoal efficiency factor. These "what if" alternatives can be considered individually or simultaneously by making changes in the enterprise budget and the prices section.

Another set of alternatives is possible by adding one or more enterprises. The these trees are producing considerable biomass which cannot be marketed directly. One alternative therefore is to incorporate some combination of livestock through

	FORAGE:
OTHER CROP TYPE =>	Grass
Productive unit (sq.m.)	100
OUTPUT /year:	
Production cycles/year	3.00
Harvest amt./cycle	278
Harvest	Kgs. fresh
Processing efficiency	20%
Marketable amount/year	0.167
Market	t.DM
Additional crop income	$0.00
Fodder produced (kgs.DM	167.0
Feed grain equiv. "	0.0
INPUT /year:	
Seed/plants ($/yr)	0.00
Fertilizer & chemicals	0.00
Land prep.labor (m-d/y)	0.0
Planting labor	0.0
Weeding labor	0.0
Harvest labor	3.0
Post-harvest labor	0.0
Marketing & transport/2	0.0

Table 11: Crop Budget for Grass

LIVESTOCK TYPE =>	Goats
Productive unit =>	/nannie:
OUTPUT:	
Production cycles/year	1.5
Off-spring weaned/cycle	2.0
Replcmts & home use/cyc	0.10
Marketable animals/cycl	1.9
Mkt live wt.(kg)/animal	15
Live wt.(kgs) of culls	25
Culling rate (%/year)	25%
Yield (kgs)/year	49
Additional l/s. income	$0.00
INPUT: IMPROVED? (Y/N)=>	N
Breeding	$0.00
Vet.& medicine	0.00
Fodder 22% c.p.(t.DM/yr	1.00
Grain equiv. (t.DM/yr)	0.00
Salt & minerals	0.00
Livestock supplies	1.00
Marketing (tax, etc.)	0.50
Labor/group (p-days/yr.	6.0
Extra labor/UBT (p-d/y)	2.0

Table 10: Livestock Budget for Goats

which this production could be marketed. In order to add enterprises, underlying budgets for those enterprises of interest must be available. Budgets for goats and grass are extracted from the livestock and "other crops" budget sections of the model. These budgets are presented as Tables 10 and 11.

We are now in a position to consider increased productivity and net income resulting from a slight reorganization of the charcoal operation. Result 3 (Table 12) considers the same charcoal operation with goats and a small area of grass. The grass would be utilized in the rainy seasons and the Leucaena in the dry seasons. The user enters the number of goat and grass units, and all of the associated crop and livestock income and expenses will be calculated automatically.

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TABLE 12. RESULT 3. ANNUAL REVENUE:	Production Total	Marketable Units /Fm.:	Units: /unit:	a Price	Farm Total:	Average $/ha.:
TREE CROPS (agroforestry):						
Charcoal	2,250 trees	25.8	sacks	$2.00	$51.56	$51.56
Poles	0 trees	0.0	poles	$1.75	0.00	0.00
Fruit trees	0 trees	0.0		$0.00	0.00	0.00
Border trees	0 trees	0.0		$0.00	0.00	0.00
Additional tree-crop income (calculated)					0.00	0.00
INTER-CROPS:						
Leucaena	0 sq.m.	0	kgs.	$0.00	0.00	0.00
Maize-Pigeon P	0 sq.m.	0.0	kgs.	$0.21	0.00	0.00
Inter/c #2	0 sq.m.	0.0	kgs.	$0.00	0.00	0.00
Inter/c #3	0 sq.m.	0.0	kgs.	$0.00	0.00	0.00
Additional inter-crop income (calculated)					0.00	0.00
OTHER CROPS:						
Grass	1,000 sq.m.	1.00	t.DM	$0.00	0.00	0.00
Garden	0 sq.m.	0.0	0	$0.00	0.00	0.00
Ravine	0 sq.m.	0.0	0	$2.00	0.00	0.00
Other crop	0 sq.m.	0.0	780	$0.00	0.00	0.00
Additional other-crop income (calculated)					0.00	0.00
LIVESTOCK:						
Goats	3.0 nannie	147	kgs.	$1.10	161.70	161.70
Sheep	0.0 ewes	0	kgs.	$1.00	0.00	0.00
Cattle	0.0 cows	0	kgs.	$0.60	0.00	0.00
Pigs	0.0 sows	0	kgs.	$0.80	0.00	0.00
Additional livestock income (calculated)					0.00	0.00
OTHER FARM INCOME (enter farm total only)					0.00	0.00
					---	---
TOTAL GROSS REVENUE =					$213.26	$213

ANNUAL OPERATING COSTS (calculated):	PAID?(Y/N):	Man-days/yr: #:	Farm Total $:	Average $/Ha.:
ALL CROPS:				
Seed & plants (farm total)			$0.00	$0.00
Fertilizer & chemicals "			$0.00	0.00
Land preparation labor	N	0	$0.00	0.00
Planting labor	N	0	$0.00	0.00
Weeding labor	N	0	$0.00	0.00
Harvest labor	Y	67	$67.46	67.46
Post-harvest labor	Y	5	$5.16	5.16
TOTAL LABOR =		73 man-d/y	72.62	72.62
Marketing & transport (cost)			$0.00	0.00
Additional crop costs (enter farm total)			0.00	0.00
			---	---
CROP COSTS SUB-TOTAL =			$72.62	$73
LIVESTOCK:			Farm Total:	Average $/Ha.:
(all amounts are farm totals for all l/s units				
Breeding			$0.00	$0.00
Vet.& medicine			0.00	0.00
FODDER REQUIREMENT (t.DM):	Needed	3.00		
PRICES: Buy @ $0.00	Produced	2.75		
Sell @ $0.00	Balance	(0.25)	$0.00	0.00
ENERGY REQUIREMENT (t.DM):	Needed	0.00		
PRICES: Buy @ $0.00	Produced	0.00		
Sell @ $0.00	Balance	0.00	$0.00	0.00
Salt & minerals			0.00	0.00
Livestock supplies			3.00	3.00
Marketing			1.50	1.50
Labor ($/year) PAID?(Y/N): Y		10 p-d/yr.	10.00	10.00
Additional livestock costs (enter farm total)			0.00	0.00
			---	---
LIVESTOCK COSTS SUB-TOTAL =			$14.50	$15
TOTAL OPERATING COSTS =			$87.12	$87
TOTAL Annual Gross Margin or RETURN TO LAND =			$126.14	$126

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A relatively slight reorganization of resources causes Result 3 profitability (return to land) to increase dramatically. The difference between Result 3, the charcoal operation with livestock, and Result 2, the charcoal operation without the inclusion of livestock, is $114. In effect Leucaena in Result 1 and 2 had been substantially undervalued because the foliage had not given any value. This shortcoming has been corrected in Result 3.

Street assumes charcoal production returns about $208 every four years, allowing harvest and charcoal production labor to be ignored because it would be off-set by fodder benefits. The NPV of this arrangement (Result 1), including the investment in tree establishment but not for the goats to utilize the fodder, and discounted at 30%, is about $69.00. The NPV of Result 3, the same charcoal operation, but factoring in an investment of $51.50 for purchase of goats and establishment of grass, is about $143.00. The NPV of the Result 1 investment is $74.00 lower than it would have been had the livestock enterprise been properly reported.

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V. SUMMARY AND RECOMMENDATIONS

A. Summary

Financial analyses in the form of farm case studies are a potentially important farm-level economic indicator of progress toward achieving the AFIIa project goal to increase agricultural productivity and income on Haitian hillside farms. All case farm financial analyses to date have been capital investment analyses in the form of discounted cash flows to determine the NPV. Capital investment studies have a role, but they must be performed correctly, and they must be appropriate to the research purpose and the farming activity. All of these NPV analyses were performed incorrectly and none were appropriate to the situation. Furthermore, case studies require good data if they are to be useful and reliable indicators. To varying degrees all of these case studies utilized seriously deficient data.

Following earlier recommendations of Karch (1991) the current study designed a more effective methodology for rapid financial analysis of specific Haitian hillside farms. A spreadsheet economic model of a Haitian agroforestry farming system was developed as an integral part of the study and is available to ease the implementation of this methodology. Ease of use and practicality always necessitate some sacrifice of complete accuracy, but the resultant information functions as a useful farm-level economic indicator of progress toward meeting AFIIa goals and a powerful on-farm economic decision-aide tool.

B. Recommendations

1. Many more farm financial <u>case studies</u> need to be performed. In order to be useful economic indicators, they must follow an agreed upon methodology and be reported in a standardized fashion. This approach will facilitate limited longitudinal and cross sectional studies of farm productivity and income, for a particular farm, a region, or the whole project.

2. Use a <u>DCF</u> analysis only when it is called for by the need to make a decision about a longer range (over three years) capital investment. When it is necessary to determine the NPV of a proposal, follow standard capital investment analysis procedures. This procedure is appropriate for project analysis, but not appropriate for annual reporting of farm financial impact.

3. Use the NPV result to determine whether or not a project is feasible, but it is not recommended to use the Internal Rate of Return (IRR) for agroforestry projects (NFTA, forthcoming).

4. Focus on the <u>whole-farm operational budget</u>. If data is collected with this use 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,

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then partial budgets, DCFs, and other analyses as well as project monitoring can be performed adequately and with relative ease.

5. Use the two economic models developed. The farm financial model can be used as a guide to farm case data collection and as a farm-level economic indicator. Farm productivity and income can be evaluated before an intervention, with intervention(s), and with a proposed intervention. Increases in productivity and profitability can thus be demonstrated at each point of contact. This information can feed into the project level model.

Use the project economic model to report project level economic impact. The data used in the model can be updated by inserting annual goals achieved and by revising the economic coefficients.

6. Recognize the economic contribution of livestock to the overall productivity and profitability of agroforestry land-use systems. Livestock per se does not constitute an activity category on which CARE and PADF report, but failure to include the contribution (easily accounted for with the model) undervalues increases in production and income directly attributable to the project.

7. Field test the farm case model to familiarize selected project staff with its potential as a project evaluation tool and as a farm-level economic decision-aide. The model could be modified at this time. We do not see the model presented in this paper as necessarily in its final form. The model must be used to determine if it improves understanding of the farm level experience.

When this field test group is comfortable with the model, provide in-service training for extension and research staff as a whole. Gradually a subset of this group may take an interest in using the economic model or collecting quality data for use in the model. If in fact the model does improve our understanding of the economics of Haitian hillside farm production systems, widespread adoption of this economic indicator would improve the quality and timeliness of subsequent financial and economic appraisals of the AFIIa project. In the process many more agents will become sensitive to the economics of agroforestry and integrate economic concerns into their on-going production-oriented activities.

8. Integrate economics into as many farm-level (Level I) and project level (Level III) activities as possible. We are convinced that the AOP and AFII projects have had an extraordinary positive impact on the target audience. No doubt farm productivity and income have increased, and will continue to increase with AFIIa. However, these earlier projects have not included a strong economic component, and consequently there has been no farm-level economic research which can convincingly demonstrate these improvements.

There is an opportunity with the amended AFII project to integrate the economic perspective with all aspects of the project, including the training of agents and farmers in production and marketing economics. With a greater sensitivity to economic implications of farm-level production and marketing decisions, extension staff and producers will become better able to participate in the AGLINK project.

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