

ECUADOR FORESTRY SECTOR DEVELOPMENT PROJECT

(518-0023) -- MIDTERM EVALUATION

Revised Version

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ACRONYMS

AID	U.S. Agency for International Development
AIMA	Asociacion de Industriales Madereros (Lumber and Wood Industries Association)
ARD	Associates in Rural Development, Inc.
BID	Banco Interamericano de Desarrollo (Inter-American Development Bank)
BNF	Banco Nacional de Fomento
CESA	Central Ecuatoriana de Servicios Agricolas (Ecuadoran Agricultural Services Headquarters)
CONFENIAE	Confederacion de Nacionalidades Indigenas de la Amazonia Ecuatoriana (Confederation of Indigenous Nationalities of the Ecuadoran Amazon, includes FOIN, UNAE, OPIP, and others)
CREA	Centro de Reconversion Economica del Azuay, Canar y Morona Santiago, Cuenca (Center for Economic Redevelopment)
DINAF	Direccion Nacional Forestal (National Forestry Division, formerly known as PNF or PRONAF)
DRI	Desarrollo Rural Integrado (Integrated Rural Development)
EMDEFOR	Empresa Mixta de Desarrollo Forestal (National Forestry Development Company)
ENDESA	Enchapes Decorativos S.A. (Decorative Veneers Company)
FAO	Food and Agriculture Organization for the United Nations
FECUNAE	Federacion de Comunidades de la UNAE (Federation of Communities of the Union of Ecuadoran Amazonian Natives)
FOIN	Federacion de Organizaciones Indigenas del Napo (Federation of Indigenous Organizations of Napo)
FONAFOR	Fondo Nacional Forestal (National Forestry Fund)
FSDP	Forestry Sector Development project

FSP Forestry Support Program, OICD, USDA

GOE Government of Ecuador

GTZ German Agency for Technical Cooperation

IBRD International Bank for Reconstruction and Development
of the World Bank

ICI intermediate credit institution

IERAC Instituto Ecuatoriano de Reforma Agraria y Colonizacion
(Ecuadoran Institute for Agrarian Reform and
Colonization)

INECEL Instituto Ecuatoriano de Electrificacion (Ecuadoran
Electrification Institute)

INERHI Instituto Ecuatoriano de Recursos Hidraulicos
(Ecuadoran Hydraulic Resources Institute)

INIAP Instituto Nacional de Investigaciones Agropecuarias
(National Institute for Land and Cattle Research)

MAG Ministerio de Agricultura y Ganaderia (Ministry of
Agriculture and Livestock)

MBG Missouri Botanical Garden

MEC Ministerio de Educacion y Cultura (Ministry of
Education and Culture)

MFM Meals for Millions

OAS Organization of American States

ODA Overseas Development Administration, United Kingdom

OICD Office of International Cooperation and Development,
USDA

OPIP Organizacion de Pueblos Indigenas de Pastaza
(Organization of the Indigenous People of Pastaza)

PACD project assistance completion date

PASA Participating Agency Service Agreement

PCV U.S. Peace Corps volunteer

PMA Programa Mundial de Alimentos (World Food Program)

PNF Programa Nacional Forestal (National Forestry Program, now DINAF)

PP project paper

PREDESUR Programa de Desarrollo Regional del Sur del Ecuador (Regional Development Program for the Southern Region of Ecuador)

PRONACOS Programa Nacional de Conservacion de Suelos (National Soil Conservation Program)

PRONAF Programa Nacional de Foresteria (National Forestry Program, now DINAF)

PRONAREG Programa Nacional de Regionalizacion Agraria (National Agrarian Regionalization Program)

PVO private voluntary organization

UMACPA Unidad de Manejo de la Cuenca del Paute (Paute Watershed Management Unit, made up of INECEL, INERHI and DINAF, dissolved in 1985)

UNAE Union de Nativos de la Amazonia Ecuatoriana (Union of Ecuadoran Amazon Natives)

UNDP United Nations Development Programme

USAID U.S. Agency for International Development

USDA U.S. Department of Agriculture

USFS U.S. Forest Service

PREFACE

This report presents the findings and recommendations of a midterm evaluation of the U.S. Agency for International Development's (AID) Ecuador Forestry Sector Development Project (FSDP), project number 518-0023. The fieldwork in Ecuador was carried out by Dr. Timothy Synnott (team leader, protective forestry and agroforestry), Dr. Roger Popper (institutional strengthening, project design and management) and Mr. John Andrews (productive forestry component and agroforestry), all under contract to Associates in Rural Development, Inc. (ARD), and Dr. Jorge Uquillas (rural sociology) under a direct contract with USAID/Ecuador. Mr. Richard Donovan, a senior associate at ARD who specializes in natural resources management and administration, assisted in preparing the team for the fieldwork and revised the final report at ARD's headquarters in Burlington, Vermont, with input from Drs. Synnott and Popper. Ms. Lisa Beale Powlison and Ms. Laurie Eckels Gee produced the final revised version of this report at ARD.

ARD would like to acknowledge the assistance and support provided by USAID/Ecuador's management (Mr. Bruce Kernan and Mr. John O'Donnell), FSDP's principal forestry advisor (Mr. Peter Arnold) and administrative staff (Ms. Xochilt McIntyre and Ms. Rocio Cardenas), and Direccion Nacional Forestal (National Forestry Division or DINAF) personnel, especially the director, Mr. Manuel Kakabadse.

I. EXECUTIVE SUMMARY

A. Evaluation Objectives

This report presents the findings and recommendations of a midterm evaluation of USAID/Ecuador's Forestry Sector Development project (FSDP), project number 518-0023. The objectives of this evaluation were to:

- assess progress made toward achieving the project's outputs and purpose;
- determine the continued relevance of the various objectives and costs to achieve them; and
- formulate practical recommendations for AID and DINAF that will make the project function more smoothly and enable achievement of its original or modified objectives.

B. Project Description

According to the project paper (PP) (pp. iii and iv), FSDP's purpose is "to strengthen Ecuador's public- and private-sector institutional capacity to develop and utilize the country's forest resources in a rational manner. The project is expected to enhance the GOE's capability to assist and support private- and public-sector initiatives in the development and management of production forests and on-farm forestry, and initiate development of public-sector capacity to manage protective forests effectively." The project's three interrelated components are:

- institutional development of the National Forestry Program (DINAF) and other forestry institutions;
- productive forestry research and field demonstrations; and
- protective forestry and watershed management.

C. Summary of Project Performance

FSDP's long-term objective (goal in AID's logical framework terminology) is to increase the contribution of the forest resource to Ecuador's national economy, and the well-being of its population. It is too early to expect progress toward this goal, as it is a long-term goal.

FSDP's medium-term objective (purpose according to AID terminology) is to strengthen the institutional and technical capacity of Ecuadoran forest-sector institutions to undertake forestry activities. FSDP has made solid contributions to the technical skills within various forest-sector institutions. However, little has been accomplished in carrying out the central institutional objective in the PP and loan agreement of "strengthening DINAF's capacity to mobilize, coordinate and provide technical assistance in support of other forest-sector institutions." Unexpected institutional benefits of FSDP do include helping save DINAF from being abolished, and keeping EMDEFOR (a government-owned forestry company) from bankruptcy. As explained later in this report, the lack of progress toward institutional objectives is the result of a lack of emphasis on those objectives by both DINAF and AID technical assistance.

Achievement of FSDP's short-term objectives (outputs) is as follows:

First, in terms of institutional strengthening, solid experience and training were provided to DINAF and other organizations in many technical areas. However, little assistance was delivered to DINAF in one area of crucial importance--developing and managing forestry subprojects carried out by other organizations, forest protection laboratories and diagnostic facilities.

Second, in productive forestry, the PP provided for the establishment of 10,000 hectares of productive forestry, applied research and pilot demonstration activities. At the time of the evaluation, a total of 1,770 hectares had been reached, principally in pine and eucalyptus plantations in the mountains and in agroforestry plantings in the humid tropics. Other outputs include supplying equipment for a sawmill, and a botanical study still in progress.

Third, for protective forestry, the PP provided for strengthening the capability to delimit, classify and develop management plans for protective forests including 560,000 hectares of the Paute, Jubones and Daule-Peripa watersheds. Thus far, progress has been made in the preparation and implementation of a management plan for Pichincha, and the purchase of equipment used in mapping the forests of Napo and Esmeraldas provinces for Patrimonio Forestal. Field demonstrations of protection with natural vegetation and vegetation of degraded land in the Paute watershed were included in the PP, but have not been implemented.

With regard to project resources (inputs in AID's terms), as of June 1986, approximately 24 percent of project funds (US\$3.1 million) had been spent, while 65 percent of the project's life had passed.

D. Project Design and Implementation Problems

The design and implementation problems which have hindered FSDP progress are:

- The FSDP design, as spelled out in the PP and loan agreement, contained a shift in DINAF's role from implementation to coordination of forestry activities. According to the evaluation team's analysis, the weakness of FSDP at achieving its institutional strengthening objectives occurred largely because the technical assistance team and DINAF neither believed in this central idea, nor had the necessary background to carry it out. In particular, the background of the technical assistance team, including its leader, did not emphasize planning, management and institution-building.
- Institution-building was also seriously hampered because DINAF did not provide highly qualified counterparts to participate in FSDP management. The lack of satisfactory counterparts is due at least partly to a government austerity program.
- Since the project's inception, DINAF has changed directors frequently, each one lasting approximately six months. The project has suffered because of the lack of continuity in leadership and the fact that the leadership has not supported the subproject generation model, perhaps due to lack of understanding.

Noteworthy aspects of FSDP's financial management are as follows:

- slow expenditure of FSDP funds has taken place due to DINAF's inability and reluctance to take on subprojects;
- the project has spent US\$170,000 of loan funds for a principal advisor, whose major job is taking care of administrative, rather than technical, details;
- since 1985, the director of DINAF has been paid with AID funds through Fundacion Natura; and
- FSDP spent US\$375,000 on designing systems for forestry research, forest protection and watershed management, with little lasting result, although the forest protection effort has promise.

E. Technical Issues

FSDP problems are predominantly of a management, as opposed to technical, nature. Nevertheless, the evaluation team believes the following technical and sociological issues warrant attention:

- Pinus radiata and Eucalyptus spp., with their actual and potential disease problems, are still the main species being planted in the highlands, and progress towards testing other species has been limited;
- the importance of managing natural vegetation (including natural regeneration of degraded areas) for watershed protection and soil conservation is stressed in some project documents and deserves more consideration;
- insufficient attention has been given to establishing a field system for control of pests, diseases and fires;
- the growth rates and total production from existing and planned plantations are not known and have not been compared to future timber market demands;
- small landowners are afraid to take on debts using their land as security--this is more a problem for DINAF as a whole than it is for the FSDP-funded subprojects; and
- approaches to involving indigenous people in project activities, especially in the Amazon region, have been ineffective.

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F. Major Alternatives to Be Considered by AID and DINAF

FSDP has met some of the productive forestry objectives set out in the PP, but few of its protective forestry and institutional objectives. If the PP objectives are to be met, strategic decisions must be made regarding DINAF's role and management structure for FSDP. FSDP's problems cannot be solved by fine-tuning.

Currently, DINAF is given administrative responsibility for generating and managing forestry activities carried out by other organizations, but does not have the capacity (or desire) to carry out the responsibility. In general, FSDP must develop DINAF's capacity in this area (as stipulated in the PP), or stop doing forestry subprojects.

During its final week in Ecuador, the evaluation team discussed with DINAF and AID the major alternative courses of action open to the project. The most promising are presented below. DINAF's and AID's choice of, agreement to and commitment to an alternative are more important than which alternative is chosen. Deliberation regarding the alternatives should be combined with a full management review of FSDP.

Alternative 1

- Create a DINAF system for generating and managing forestry subprojects carried out by DINAF and other organizations. The Ecuadoran consulting firm being contracted by DINAF for management assistance may be able to create and install such a system.

This alternative must be undertaken only if both the Ministry of Agriculture and Livestock (MAG) and DINAF express a clear desire to the shift in DINAF's focus (spelled out in the PP) from direct implementation of forestry activities to a mix of direct implementation and coordination of subprojects carried out by other organizations. For the time being, emphasis must be on managing current subprojects, not generating new ones.

Alternative 2 (variant of Alternative 1)

- Use the financial and technical resources of the AID project to assure the success of Plan Bosque and/or Patrimonio Forestal.

Plan Bosque and Patrimonio Forestal present FSDP with the opportunity to contribute to the success of major forestry efforts already initiated by the Ecuadoran government. Plan Bosque's reforestation program and Patrimonio Forestal's forest conservation and management program will be the largest forestry activities ever undertaken in Ecuador if they proceed as planned.

Alternative 3

- Focus technical assistance on the traditional forestry extension system within DINAF.

On the one hand, choice of this alternative may be combined with the subproject generation model spelled out for DINAF in the PP. For example, if a percentage of FSDP were reserved for DINAF extension system subprojects, the subprojects generated by DINAF extension offices could strengthen both the subproject process and the extension system. On the other hand, AID and DINAF may wish to abandon the subproject generation system and DINAF's

coordination role in favor of traditional, direct implementation approaches.

Alternative 4

- Finance a semiautonomous forestry institute, including vehicles, furniture and computers; develop the design and plan for the institute, and calculate the costs of operation.

This alternative can be combined with any of the above alternatives. Obviously, this alternative can only be undertaken if DINAF acquires the role of semiautonomous institute. DINAF's top management has expressed high interest in this alternative. Efforts by FSDP to support such an initiative should not come at the expense of other positive, ongoing project activities such as the Napo agroforestry subproject.

Alternative 5

- Extend the PACD beyond March 1988 without increasing project funding.

The evaluation team believes that this alternative should be pursued only if, in a year's time:

- DINAF has provided a satisfactory project coordinator for a definite, prolonged period of time;
- FSDP has made satisfactory progress in creating a system for managing current forestry subprojects; and
- DINAF and FSDP have generated several new forestry subprojects.

II. INTRODUCTION

A. Evaluation Objectives

This report presents the findings and recommendations of a midterm evaluation of USAID/Ecuador's FSDP. The objectives of the evaluation were to:

- assess progress made toward achieving the project's outputs and purpose;
- determine the continued relevance of the various objectives and costs to achieve them; and
- formulate practical recommendations for AID and DINAF that will make the project function more smoothly and enable achievement of its original or modified objectives.

One objective of this midterm evaluation was to provide direction on mid-project changes that should occur to make FSDP more successful.

B. Project Description

The following is a brief description of FSDP, based on excerpts from the PP:

The purpose of the project is to strengthen Ecuadoran public- and private-sector institutional capacity to develop and utilize Ecuador's forest resources rationally. The project will enhance the Government of Ecuador's (GOE) capacity to assist and support private- and public-sector initiatives in the development and management of production forests and on-farm forestry, and it will initiate development of a public-sector capacity to manage protective forests effectively. (p. iii)

The project's three interrelated components are discussed next. The first is institutional development of the national forestry program and other forestry institutions. This component is intended to help reorient DINAF's priorities (previously called the National Forestry Program or PRONAF) so it can more effectively support other forest-sector institutions that will implement forest management/reforestation activities. Through technical assistance, training and material support, this component is intended to strengthen DINAF's capacity for forestry planning and programming, research coordination, information dissemination and technical services outreach.

The second component is protective forest and watershed management. A large part of Ecuador's remaining forest resource can provide maximum economic benefits by remaining in a protected state and serving to protect major infrastructural investments in hydroelectricity, irrigation and potable water. For this to occur, the component is intended to develop a capacity to ". . . delimit protective forests in critical areas and implement management plans for such protective forests in key watersheds."

The third component is productive forestry research and field demonstrations. This is FSDP's principal component and accounts for two-thirds of project resources. Applied forestry research (primarily silvicultural) and field demonstration activities will be coordinated by DINAF and carried out in collaboration with communities, groups, and private- and public-sector institutions to increase basic knowledge about native and promising exotic species, control of tree diseases, and nursery and planting practices. These activities will take place in each of Ecuador's major ecological zones--the Sierra highlands, arid coast and humid tropics--on a total of 10,000 hectares. Individual demonstrations should be large enough to prove commercial feasibility while simultaneously contributing to Ecuador's afforestation and reforestation needs.

C. Brief Project History

FSDP was approved in August 1982, the loan agreement with the GOE was signed in September, the first payment from AID to the project was made in August 1983, and the Project Assistance Completion Date (PACD), which was originally December 1987, is now March 1988. Project financing consists of US\$6.5 million in loans to the GOE and US\$1.6 million in grant funds. As of May 1986, the project's actual expenditures were:

- of US\$6.5 million in loans originally intended to support protective and productive forestry subprojects, US\$1.1 million (16 percent) has been spent;
- of the US\$1.6 million in grant funds, primarily designated for technical assistance, US\$0.9 million (55 percent) has been spent; and
- total expenditures (loans and grants) amount to US\$2.0 million or 24 percent of the US\$8.1 million total.

D. Evaluation Methodology

The evaluation began with a team planning meeting (attended by Dr. Synnott, Dr. Popper, Mr. Andrews and Mr. Donovan) to clarify responsibilities and coverage for the scope of work. In Ecuador, the team was joined by a rural sociologist hired by USAID/Ecuador to work on the evaluation. The team spent five weeks working together in Ecuador, starting 28 April 1986. A draft report was submitted to USAID/Ecuador on 30 May. Two team members (Drs. Synnott and Popper) spent an additional week in Ecuador debriefing DINAF and USAID/Ecuador personnel, and revising the report based on comments made by USAID/Ecuador staff.

All the team members worked together and contributed to all aspects of this report. However, for technical and administrative purposes, the following division of responsibility was made for a detailed examination of project components and preparation of the first draft:

- Dr. Synnott--team leader, agroforestry, protective forestry and botany;
- Mr. Andrews--productive forestry, reforestation, forest protection and utilization;
- Dr. Popper--management, organization and institutional aspects; and
- Dr. Uguillas--sociological implications of project activities.

The team members visited areas of Ecuador where fieldwork using FSDP funds has been carried out or is proposed. They conducted interviews and held discussions with people who are either directly or indirectly involved in project activities (Appendix B lists the individuals contacted) and reviewed documents related to or produced by the project. The interviews were intended to:

- acquaint the evaluation team with the processes used to devise and implement project activities;
- provide insights into constraints that prevented certain project proposals from being implemented and caused others to be abandoned; and
- seek suggestions for projects and mechanisms that would fulfill FSDP objectives.

Many technical matters were also discussed during interviews and in the field. The principal field visits made by the team included:

- alder (Alnus spp.) planting activities near Quito;
- Empresa Mixta de Desarrollo Forestal (National Forestry Development Company or EMDEFOR) nursery and plantations near Riobamba;
- the Palmira sawmill;
- Portoviejo Cordon Protector plantation and nursery;
- Conocoto research station facilities;
- the agroforestry subproject in Coca, Napo Province;
- forest protection diagnostic facilities at Loja University;
- Catholic University;
- proposed agroforestry sites in Santa Elena; and
- Instituto Ecuatoriano de Electrificacion (Ecuadoran Electrification Institute or INECEL) and the Paute watershed in Cuenca.

E. Focus of the Evaluation

The importance placed on institutional strengthening by this evaluation has caused some controversy. The reasons for such emphasis can be found in FSDP documents, the scope of work for the evaluation and instructions to the evaluation team from USAID/Ecuador. Section V discusses the treatment of institutional issues in project documents.

The items in ARD's scope of work for this evaluation that require an institutional focus are as follows:

An assessment of progress made toward achieving the end-of-project status, as stated in the logical framework, particularly with regard to the institutional development of DINAF. (Task I-2)

The progress of DINAF in adopting the role contemplated for it in the PP, including its effectiveness as a planning and coordination unit for the sector. (Task II-B2)

Basic design of the project, including the feasibility of the institutional strategy. (Task III-1)

In early May 1986, the evaluation team submitted a draft table of contents for the evaluation report to USAID/Ecuador. The major comment delivered to the team in writing was that the outline appeared to focus too exclusively on technical issues. The team was instructed to deal with broader institutional issues as well. The report outline and team activities were redirected in response to the instructions from USAID/Ecuador, and a revised outline was agreed on and accepted. The mission personnel who were involved included the FSDP project manager and the design and evaluation specialist. During the evaluation debriefing on 6 June, the USAID/Ecuador agricultural officer requested that the evaluation team also judge the validity of the subproject generation model for institutional strengthening and funding of forestry activities.

F. Organization of this Report

This report is organized according to the PP and thus, follows the project's main components. A summary of progress based on the logical framework for FSDP precedes the detailed analysis of project components. More specifically, this report is organized in the following manner. First, there are two sections that provide an overview of FSDP:

- Section III on overall project performance relative to the objectives of the PP and logical framework; and
- Section IV on project management.

Next, three sections are provided on FSDP's three principal components:

- Section V on institutional strengthening,
- Section VI on productive forestry, and
- Section VII on protective forestry.

At the end of each subsection are summary paragraphs that are titled "findings" and "recommendations." These are intended to summarize the evaluation material in a form that FSDP managers can easily use.

Section VIII presents FSDP's sociological implications. A separate section on this topic is provided because there are broad sociological issues that are of importance to FSDP which do

not fit within the discussion of individual project components. Section VIII was written by an Ecuadoran rural sociologist hired by USAID/Ecuador under a separate contract. The material prepared by him appears throughout this report as well as in Section VIII.

Section IX presents ideas for the future planning of FSDP and also reiterates all of the findings and recommendations found throughout the report.

III. OVERALL PROJECT PERFORMANCE RELATIVE TO PP OBJECTIVES

This section is organized around the logical framework presented for FSDP in the PP. Accordingly, the subsections are:

- goal and purpose,
- outputs,
- inputs, and
- project assumptions.

A subsection entitled "portfolio analysis" is also included.

A. Goal and Purpose

FSDP's goal is to increase the contribution of the forest resource to Ecuador's national economy and the well-being of its population. To date, there has been little progress toward this goal. Indeed, it is too early to expect such progress.

The project's purpose is to strengthen the institutional and technical capacity of Ecuadoran forest-sector institutions to undertake afforestation/reforestation activities and to manage productive and protective forests. According to the PP, FSDP's thrust was to move DINAF toward coordination of forestry activities undertaken by other organizations and away from direct implementation of such activities. As is discussed in great detail in Section V, the project has achieved this purpose only to a very limited extent, because neither DINAF nor the technical assistance team emphasized it.

FSDP has had the following institutional effects which are not mentioned in the PP:

- advice from the technical assistance staff helped save DINAF when MAG wanted to dismantle it and resulted in streamlining DINAF from eight to four departments; and
- business given to EMDEFOR through FSDP helped save that state-owned forestry enterprise from financial difficulties that might have led to its dissolution.

The first purpose indicator in the PP deals with planning and coordination. In the context of this project, this has meant establishing a system for generating, selecting, approving, funding and supervising forestry subprojects carried out by other organizations. It was expected that some planning and

coordination capacity would be acquired through training. Training in project design and analysis consisted of one two-week seminar, which was a good beginning, but there has been no follow-up. It was also expected that DINAF and other staff would gain direct experience with planning and coordination. In practice, over 30 subprojects have been seriously considered and six approved. Approximately 10 DINAF employees have been directly involved in this process. Many legal and bureaucratic problems have been debated and resolved. Unfortunately, in spite of these experiences, there has been little concrete progress in changing DINAF's mode of operation from implementation to a mix of implementation and coordination. However, it is possible that precedents which have been painfully set could serve as a basis for real change in the future.

The PP also expected FSDP to achieve the project purpose through the development of research capacities. In the Napo agroforestry subproject, the newly hired DINAF agronomists and foresters have had intensive firsthand experience in field data collection, and the foresters have had solid data analysis experience. An EMDEFOR forester conducts nursery and plantation research that has been enriched by contact with the project. The Flora del Ecuador botanical research project involves two counterparts in fieldwork and one in the laboratory, and has provided two of these counterparts with short-term research training in the United States. Personnel from the Catholic University have carried out periodic entomological diagnoses for the project.

The purpose stated in the PP also proposed the development of an improved training capacity. In general, although DINAF staff have delivered and organized periodic seminars under the project, the evaluation team believes that little progress has been made in developing its training capacity during the course of FSDP.

The PP purpose also indicated an enhanced capacity to deliver technical assistance through district offices. There has been a large increase in the technical assistance capacity in Napo due to the hiring of a team of nine agronomists, two foresters and two nurserymen, and the acquisition of four trucks and seven motorcycles. However, this increased capability may be temporary, and the Napo model cannot be generalized because the high manpower and equipment costs may prohibit implementing the model on a wider scale. Technical assistance has provided substantial training of district-level DINAF and other personnel in various technical areas related to productive and protective forestry. For example, the number of students multiplied by the number of courses totals over 200. Also, FSDP has provided 40 motorcycles, which have improved the field staff's ability to conduct extension work.

The PP proposed the development of an improved information dissemination capacity. A forestry bulletin published by DINAF included articles by three project advisors, and AID has financed the publication of several issues.

Project designers also expected that effective working relationships would be established between DINAF and other institutions. During the project, DINAF has developed working agreements with:

- EMDEFOR in Riobamba to carry out reforestation work;
- Instituto Nacional de Investigaciones Agropecuarias (National Institute for Land and Cattle Research) in Napo to carry out agroforestry work;
- Catholic University for entomological diagnosis; and
- Loja University for pathological and fire-danger diagnoses, and curriculum development in pathology and fire prevention.

Finally, it was expected that there would be increased technical knowledge available on forestry. The project has collected an entire library of reports on forestry issues in Ecuador that have been translated into Spanish. A major source of technical information in the future may be the Flora del Ecuador botany subproject. The evaluation team is concerned that the botany information being produced by the project is available to Ecuadorans only on a limited basis.

In general, progress toward attainment of FSDP's purpose-level objectives of improving both the management and technical capabilities of Ecuadoran forestry institutions has been mixed. Both management and technical improvements have been limited because:

- there has been no leadership continuity at DINAF-- since the project began, there have been eight directors, each staying approximately six months; and
- DINAF provided counterparts for FSDP only sporadically, especially in the central DINAF office.

Progress in planning and coordination, and shifting DINAF from an implementation to a coordination mode, has been poor because:

- both technical advisors and DINAF paid insufficient attention to creating a system for developing and managing forestry subprojects; and

- technical assistance expertise in management systems was neglected in favor of technical forestry expertise.

Upgrading technical skills has been limited because the forest protection, research and management systems developed by the technical assistance staff have found little support among Ecuadoran organizations.

B. Outputs

Solid experience and training in institutional strengthening were provided to personnel from DINAF and other organizations in many technical areas of productive and protective forestry. However, little effective assistance was delivered in the crucial area of designing and managing forestry subprojects.

The productive forestry component has planted approximately 2,000 hectares of trees (out of a planned 10,000) through the EMDEFOR reforestation and Napo agroforestry subprojects. Productive forestry planting is roughly on target relative to expenditures. Considerable progress has been made in developing agroforestry practices for combining grazing, trees and farming in the Amazon basin. Preliminary demonstrations with native alder in the Sierra should encourage diversification of plantations for EMDEFOR and DINAF. Additional accomplishments include solid progress by the botany subproject and the AIMA sawmill subproject.

The protective forestry activities undertaken by FSDP have been small in number. However, despite relatively low investments, there has been substantial progress by DINAF (Patrimonio Forestal and Plan Pichincha) and INECEL in mapping and physically delineating forests and watersheds for protection. Also, long-term overseas training in pathology and entomology is being offered to Ecuadorans through the project.

The evaluation team believes that accomplishments in the productive and protective forestry areas are unimpressive because FSDP did not prepare DINAF to handle subprojects and DINAF had legal, bureaucratic and incentive problems, particularly with regard to the coordination role. Initially, interest among collaborating organizations was high--they submitted over 31 proposals. Of those, only five have been funded, although one more subproject was approved recently.

C. Inputs

This subsection discusses the expenditure of project funds. The first payment from AID to the project occurred in August

1983. The PACD is March 1988. Therefore, approximately 65 percent of the project life has passed.

FSDP financing consists of US\$6.5 million in loans, and US\$1.6 million in grants. Sixteen percent (US\$1.1 million) of the loan funds and 55 percent (US\$0.9 million) of the grant money have been spent. Thus, total expenditures (loans and grants) amount to US\$2 million, or 24 percent of the US\$8.1 million total, even though 65 percent of the project life has passed. There is an additional US\$7.25 million in counterpart funds. U.S. contributions currently have greater purchasing power in Ecuador than when the funds were allocated, because recent devaluations in the Ecuadoran sucre have outstripped inflation.

Thus far, FSDP technical assistance has consisted of between one and three long-term advisors, and numerous short-term consultants. More than 20 advisors have participated in the project. Most of the advisors were contracted through PASAs with the U.S. Forest Service (USFS) and Forestry Support Program/Office of International Cooperation and Development (FSP/OICD) of the U.S. Department of Agriculture (USDA), while other advisors worked under personal service contracts.

D. Project Assumptions

Four important assumptions made during project design have turned out to be either erroneous or unrealistic. These design flaws have had a very negative effect on the achievement of FSDP objectives. These four assumptions are that:

- it was feasible and realistic, both bureaucratically and legally, to change DINAF's role to coordination;
- DINAF would be willing to relinquish implementation in favor of a coordination and policy role;
- DINAF and other GOE institutions would be willing and able to provide sufficient numbers of qualified counterparts; and
- DINAF would be able to provide continuous leadership at top administrative levels.

E. Portfolio Analysis

The purpose of the "portfolio analysis" presented in the following table is to give FSDP managers, and readers of this report, a simple, useful classification of how FSDP resources have been spent. In the evaluation team's view, FSDP managers need a classification of FSDP investments in terms intended

forestry benefits, rather than the project's official budget categories. The latter tend to be arbitrary and complex, which hinders clear management thinking. The evaluation team suggests that readers refer to the following table to see how the various FSDP components fit within the overall project investment.

The first column in the table presents FSDP investments by relative size in terms of money actually spent. The second column gives the intended benefits of the investment. The third column shows the amount invested thus far.

The intended benefits presented in the second column are of four types--institutional strengthening (inst), protective forestry (prot), productive forestry (prod), and management and use of forests (mgmt). Subcategories of protective forestry are watersheds (wat) and forest management (for), and subcategories of productive forestry are agroforestry (agf) and reforestation (ref). The difference between the latter two subcategories is that agroforestry occurs on working farms and is combined with agricultural activity, and, in this case, reforestation is done in the form of tree plantations.

Direct support of DINAF includes purchases used by DINAF as a whole, such as vehicles, computers and office equipment, as well as salaries for DINAF leaders. Project administration includes purchases dedicated exclusively to FSDP, such as the principal advisor's salary, project secretaries, accountants and evaluations.

Project Investments in Order of Magnitude (in US\$000)

<u>Investment</u>	<u>Benefit</u>	<u>Amount</u>
Direct support of DINAF	inst	430
Project administration	all	340
Napo agroforestry	prod/agf	255
INECEL watershed plan	prot/wat	150
National Forest Protection Plan	inst/prot	140
EMDEFOR	prod/ref	135
Mechanized nurseries	prod/ref	100
Short-term training	varied	100
Long-term training	inst/prot	68
Portoviejo greenbelt	prod/ref	60
Organizational plan	inst	55
Flora del Ecuador	mgmt	46
Seeds for Plan Bosque	prod/ref	42
Santa Elena agroforestry	prod/agf	40
Patrimonio Forestal	prot/for	36
Galapagos fire	prot/for	30
National Forest Research Plan	inst	30
Logging practices	mgmt	30
Plan Pichincha	prot/for	20
Palmira sawmill	mgmt	20
Paute watershed	prot/wat	15
Alder	prod/ref	<u>15</u>
Total		2,157

IV. PROJECT MANAGEMENT

This section on project management presents:

- a description of technical assistance activities, and
- an analysis of FSDP's project management, with a focus on the role of technical assistance.

A. Technical Assistance Activities

During most of the project, technical assistance has consisted of between one and three long-term advisors, and numerous short-term consultants. Most of the advisors were contracted through a PASA arrangement with the U.S. Forest Service (USFS) and Forestry Support Program/Office of International Cooperation and Development (FSP/OICD) of the U.S. Department of Agriculture (USDA), while others worked under personal service contracts.

Using both grant and loan funds, a total of 24 technical assistance staff have been employed. The advisors are listed below, with some notes on their activities. More details are given in the following sections. For convenience in presenting this information, they are divided by their tenure with the project:

- eight advisors spent six months or more with the project;
- nine worked on the project for three to six months; and
- seven spent less than three months on the project.

There names are provided here and, at times, used elsewhere in this report because FSDP technicians are numerous and it is difficult to distinguish among them by title alone.

In addition, approximately 30 USAID and GOE staff and consultants contributed to the project design and PP. Some, but not all, are named in the PP. The bibliography included in this evaluation report includes documents prepared by FSDP staff and during project preparation, as well as all the documents that the team was shown while in the field.

1. Long-Term Technical Assistance

Principal Forestry Advisor to DINAF (Mr. Peter Arnold)-- full-time from April 1983. He has a key role in the project, which is presented in greater detail below. By agreement with the project manager, he has been responsible for regular communication between USAID and DINAF. He has advised DINAF and subproject staff about many of their programs and plans, worked on many administrative and operating problems, and cooperated closely at the technical level on some subprojects.

Highlands Forestry Specialist (Mr. Glen Galloway)--full-time from August 1984. He has worked on courses, publications, research, agroforestry, nursery and plantation development, and collaboration with DINAF, EMDEFOR and other forestry organizations.

Agroforestry Specialists (Mr. Robert Peck and Mr. John Bishop)--part-time on Napo sub-project from mid-1984. They have focused on agroforestry, nurseries, research, and continuous collaboration with MAG and INIAP. They have been responsible for establishing an active extension system.

Botanists (Mr. David Neil and Mr. Mark Baker)--full-time on Flora del Ecuador project since 1984. They have concentrated on botanical collection (especially for forest trees and plants with local uses), course and on-the-job training of staff, and herbarium development.

Entomology and Forest Protection Specialist (Mr. Robert Gara)--three weeks in 1983, one year during 1984-85, three weeks in 1985-86 and two weeks in 1986. He has made substantial contributions to courses (including fire control) and undergraduate teaching at Loja and Catholic universities; fire fighting in Galapagos; and preparation of the National Forest Protection Plan, including the design of forest protection laboratories and diagnostic facilities now being established at Loja and Catholic universities, and proposed for elsewhere. DINAF's capabilities in these areas will be strengthened when trained staff are available, the Conocoto Diagnostic Center is equipped, and an implementation system is set up.

Nurseries Specialist (Mr. Charles Venator, USFS)--several weeks in 1983, six months in 1984-85 and six weeks in 1986. He has been active in courses and on-the-job training of nursery staff at DINAF and other organizations, and promoting mechanized nurseries and other nursery techniques, some of which are operational. He has written a manual and other reports.

2. Medium-Term Technical Assistance

Watershed Resources Specialists (Drs. John Corliss, Douglas Southgate, Earl Alexander and James Nations)--18 person-months total. They were intended to strengthen INECEL's capability in watershed management. Each prepared one report.

Organization and Management Specialist (Mr. William Edwards, USFS)--visits in late 1984 and late 1985. He wrote reports recommending separate institute status for DINAF as well as a reduction in the number of departments and purchase of equipment.

Arid-Zone Forestry Specialist (Mr. James Tolisano, USFS)--January to May 1985. He prepared technical reports, contributed to agroforestry training, and wrote a subproject proposal for plantations in Santa Elena that is planned for implementation by MFM.

Tropical Forestry Specialist (Mr. Peter Weaver, USFS)--four months in 1985. He wrote technical reports on rain-forest silviculture and management, and proposals for a national program of research. He also worked closely with Mr. Juan Salinas, who served as counterpart for the head of the management department.

Protective Forestry Specialist (Mr. Alan Moore)--several months, 1983 to 1984. He prepared a background report and management plan for Pichincha, which is now being successfully implemented, and worked in collaboration with DINAF staff.

Logging Specialist (Mr. Jeff de Bonis, USFS)--January to July 1985. He did some collaboration with staff members at logging companies and wrote technical reports.

3. Short-Term Consultants

Anthropologist (Mr. Theodore Macdonald)--visits in 1983 and 1984. He contributed to the design of the Napo subproject. There is no consultancy report by him, but other background reports are available.

Forest Pathologist (Mr. Willis Littke)--produced a joint report with Dr. Gara and contributed to training.

Forest Fire Specialists (Mr. Garry Benavides, Mr. A. Dremont, Mr. D. Quintana, all USFS)--organized a forest fire course in 1984.

Forestry Specialist (Mr. Dana Houkal)--three weeks in 1983. He compiled list of forest tree seeds required for a species trial program and visited for consideration of a longer assignment.

Forest Pathologist (Mr. Hernan Peredo)--three weeks in 1986. He also visited in consideration of a longer assignment, provided technical assistance to Catholic and Loja universities, and set the Loja University pact in motion.

4. Pre-Implementation Studies

Although not strictly a part of this project, it is instructive to note the number of studies commissioned before the PP was written and their impact. M. Stewart, C. L. Vega, G. B. Wetterburg, A. J. Ormassa, W. H. McCredie, B. B. Burwell, T. MacDonald, P. Harou, D. Deely, G. Guess and others wrote substantial papers on which the PP's proposals were based. The large number of contributors partly explains the great diversity of activities included in the PP.

B. Technical Assistance and Related Project Management Issues

Technical assistance certainly produced beneficial and practical results in agroforestry and reforestation, and these results are described in detail in Section VI. However, the evaluation team concluded that there have been three pervasive and far-reaching problems associated with the role of AID, DINAF and the technical assistance team in the management of the overall technical assistance effort, including:

- fragmentation of the technical assistance effort;
- neglect of management expertise in favor of technical forestry skills; and
- instances of poor or unproductive working relationships with Ecuadoran institutions and individuals at the senior level, although these relationships were often excellent at the technician or field level.

Fragmentation of Technical Assistance

The problems of too many small pieces with too few connections between them permeates both the design and management of the FSDP project. For example, approximately 20 different types of investments have been made (see the portfolio analysis table in Section III.E). While there was clearly some fragmented thinking in the PP, it is important to note that the object of the PP is to suggest ideas. The evaluation team believes that the purpose of project management is to select from and create coherence among those ideas. In the case of FSDP, such coherence has not been attained by project management. The evaluation team believes there are three reasons for this.

First, although the PP contains good ideas about the concept of "institutional strengthening," a clear focus is not presented and project staff have not been able to resolve this. Second, a cause of fragmentation would seem to be AID's management of the PASA agreements with USFS and OICD of USDA. The PASA arrangements appear to operate like a loose series of individual or personal services contracts, and no one at USFS or OICD seems to be responsible for the overall coherence and quality of the work. Furthermore, if AID is not satisfied with the work, it apparently has no recourse. A third cause of project fragmentation is the breadth of forestry issues that are included. At different times, FSDP has been drawn toward watershed protection at one end of the protection/production continuum and wood technology research at the other end.

Management Expertise Versus Technical Skills

The principal advisor's position can be understood on several levels. In both the official job description and actual description prepared by the principal advisor, it is an administrative position. However, in the minds of those hiring the principal advisor, it was apparently perceived as a forestry position. The evaluation team believes it should be neither an administrative (although this person must have administrative skills) nor a forestry position, but rather a management systems and training (institution-building) position.

In ARD's view, the principal advisor's job description should have focused on providing technical assistance and training in "technical and financial mechanisms for identifying, developing and implementing or arranging for the implementation of forestry activities" (PP, page 21). Thus, the appropriate background for the principal advisor would include expertise in management and project generation systems, management training, natural resources management, and institution-building. Based on the PP, the evaluation team believes that the principal advisor's job should be to help design and initiate subprojects, and establish systems, train staff and set precedents so that subprojects continue after the end of the project. In particular, the principal advisor should be able to design management systems and conduct much of the training in them.

The general absence of management expertise discussed above has created a number of smaller problems that hamper project progress and deserve mention. In particular, difficulties with accounting demonstrate this. Because of DINAF's noncompliance with AID requirements for accounting records, the NAPO agroforestry, EMDEFOR reforestation and Plan Pichincha protective forest subprojects have had to manage without funds already appropriated to them. According to the PP, FSDP was to build a "technical and financial mechanism within DINAF for identifying,

developing and implementing or arranging for the implementation of forestry activities." Thus, it would appear that due to the lack of such a mechanism, which AID was to provide, the records for AID's own subprojects do not meet AID requirements and do not qualify for AID funding. FSDP's inability to provide the management systems assistance necessary to establish such a financial management system (as envisioned in the PP) is depriving FSDP subprojects of funds.

Relationships with Ecuadoran Institutions and Individuals

Visits to work sites and numerous interviews with Ecuadoran project participants led to the following observations regarding the relations between FSDP and Ecuadoran institutions and individuals. In the instances of reforestation with EMDEFOR and agroforestry in Napo, such relationships have been productive. However, these strong relationships have been with organizations other than DINAF (e.g., EMDEFOR and INIAP) or new, possibly temporary, DINAF employees. Examples where good ideas have been carried out with weak collaboration at the institutional level are the Flora del Ecuador botany study and national forest protection plan. Extreme examples of technical assistance without productive counterpart relations include central FSDP management, the INECEL and Paute watershed management and rehabilitation work, and technical assistance on logging practices. In the case of central FSDP management, the principal advisor certainly collaborates frequently with DINAF, but such collaboration has not focused on the crucial issue of installing a system for developing and managing forestry subprojects.

When working relationships are weak, technical assistance may produce a large quantity of reports and proposals, but little can be accomplished in the area of institution-building. Due to weaknesses in the relationships between FSDP technical assistance staff and Ecuadoran institutions and individuals, learning-teaching relationships have been rare and there has been little institution-building within DINAF. DINAF, technical assistance and AID staff are all aware that the working relationships within DINAF have tended to be weak. Technical assistance and AID staff members explained that Ecuadoran institutions often did not provide promised counterpart personnel or submit proposals based consultants' work. On the other hand, DINAF staff claim that some of the consultants did not have clear or appropriate objectives. Of course, the reality is complex and varies depending on the situation.

An important component of solid working relations between technical assistance staff and host-country institutions is the provision of suitable counterparts by the latter. Technical assistance agreements with DINAF and INECEL required those institutions to provide counterparts, and directors of those

organizations participated in preparing the terms of reference. There are a number of possible reasons for DINAF's failure to provide satisfactory counterparts on a continuous basis:

- a possible conflict between the project's aim of promoting the "catalyzing" role of DINAF and the wishes of successive DINAF directors;
- DINAF may have had higher priorities than FSDP for scarce personnel resources;
- a government austerity program and hiring freeze; and
- FSDP apparently is not perceived as a high-prestige activity that DINAF personnel want to be closely associated or identified with.

There are also occasions where FSDP technical assistance staff have distanced themselves from DINAF. The possible reasons that technical assistance staff did not always work closely with DINAF include:

- DINAF is bureaucratic, which often can stifle productive work, so some technical assistance staff concentrated on fieldwork without emphasizing (and perhaps fully understanding) the project's institution-building objectives; and
- project leadership did not design and install a central project generation and management system, so advisors were forced to free-lance and initiate their own activities.

Finding: Poor overall project management, by AID, the technical assistance team and DINAF has been a principal limiting factor in FSDP's success. The principal problems and/or causes have been:

- a fragmented project design and technical assistance effort because of an unclear definition of institution-building, a PP that suggests a wide range of forestry activities across the broad protection/production continuum, and loose PASA contracts with USFS and FSP/OICD;
- a misplaced higher priority placed on technical rather than management expertise, because management systems development expertise was not specified by the PP and, consequently, no one was hired with the background, interest and mandate to develop, install and train DINAF to use a system for generating,

approving, funding and monitoring forestry subprojects; and

- many instances of poor or nonexistent working relationships among Ecuadoran institutions, AID and members of the technical assistance team.

Recommendation: Project redesign must be accompanied by a thorough management review. FSDP must place the highest priority on providing project management resources and skills. Alternative sources of management expertise include AID personnel with design and management experience, expatriate consultants and Ecuadoran consulting firms. By project management, the team means all the skills and techniques involved in converting ideas and resources into plans, budgets, action and results. Technical assistance personnel must be able to not only perform these tasks, but also teach them in seminars and by example. Project management includes strategic planning of the best ways to reach project objectives as well as scheduling and budgeting. Additional recommendations in the area of project management are presented in Section V on institutional strengthening.

V. INSTITUTIONAL STRENGTHENING

The institutional-strengthening nature of FSDP is emphasized in both the PP and the project loan and grant agreement (referred to in this report as the loan agreement). Institutional-strengthening topics that are covered in this section include:

- the institutional-strengthening concepts mentioned in FSDP documents;
- FSDP progress in generating forestry subprojects;
- the validity of the subproject generation model;
- training; and
- FSDP planning of general programs and approaches.

A. Institutional-Strengthening Concepts in FSDP Documents

According to the PP and loan agreement, FSDP is largely intended to strengthen forestry-sector institutions, in general, and DINAF, in particular. The loan agreement states that:

The project . . . consists of cooperating with the borrower in improving Ecuadoran public- and private-sector institutional and technical capability to efficiently develop and utilize Ecuador's forest resources by . . . strengthening the National Forestry Program's (DINAF's) capacity to mobilize, coordinate and provide technical assistance in support of other forest-sector institutions. (p. 1)

This component will help strengthen the National Forestry Program (DINAF) so it may more effectively support other forest-sector institutions to implement forest management/reforestation activities. Specifically, the National Forestry Program's capacity for forestry planning and programming, research dissemination and technical services outreach will be strengthened. (p. 1 of Annex 1)

Institutional-strengthening concepts are described throughout the PP. The following list indicates the PP's interpretation of "institutional strengthening" (the page number/location from the PP for each topic is given in parentheses, and elements that the evaluation team believes to be most important are underlined):

- coordination functions--coordination and support (19), catalyst (19), plan (19), project design (19), intermediate credit institution (ICI) approach (21), technical and financial mechanism for identifying, developing and implementing or arranging for implementation of forestry activities (21), linkages between public and private forestry institutions (21), mobilization of other external assistance (21) and working relationships (logical framework purpose);
- information dissemination functions--technical services outreach (iv), collection, ordering and dissemination of research findings, statistical data and other information, periodic bulletins, how-to guides (5), technical assistance outreach (5, 19), research (19), service organization supplying technical information and support (20), information dissemination (21) and technical knowledge (logical framework purpose);
- structural changes--reorientation of priorities (iv), reallocation of resources, both human and financial (vii), less direct involvement in planting (19), modification of structure and functions (19) and personnel reassignments (19); and
- institutional development methods--technical assistance (throughout), long- and short-term training (throughout), training in macro-planning, especially project design techniques (4), process learning approach (19), trial and error (19), institutional development model (20) and practical "hands-on" experience (20).

The evaluation team considers the following quote from the PP to be of particular importance:

Under the new forestry law, PNF (DINAF) is mandated to work with and through public entities and private organizations. Therefore, the project's institutional development model is akin to an ICI approach. In effect, the project will provide: (a) technical assistance, training and other support to improve PNF's institutional capacities; and (b) a technical/financial mechanism within PNF for identifying, developing, and implementing or arranging for the implementation of forestry activities. (p. 21)

Upon reading a draft of this evaluation, the FSDP technical assistance team asked, "why did the loan agreement fail to

include an emphasis on institutional development?" The inference was that institutional development is included in the PP, but not in the loan agreement with the Ecuadoran government. As the opening paragraphs to this section attest, the loan agreement places heavy emphasis on institutional strengthening of DINAF's capacity to "mobilize, coordinate and provide technical assistance in support of other forest-sector institutions." The evaluation team finds little difference between the PP and loan agreement in the treatment of institutional-strengthening components. The major differences are the following phrases, which appear in the PP, but not in the loan agreement:

. . . reorientation of priorities, reallocation of resources, less direct involvement in planting, an ICI approach, technical/financial mechanism within PNF.

The difference between the PP and loan agreement is one of specificity rather than emphasis.

Based on the above, the evaluation team is convinced that the PP and loan agreement contain the basis for a solid institutional-strengthening approach. However, in spite of the solidity of some of the concepts noted, there is no definitive description of an institutional-strengthening approach that can easily be followed in a step-by-step manner. For example, the loan agreement, logical framework and job descriptions say nothing about the technical/financial mechanisms and/or ICI model that are mentioned in the PP, nor do they give concrete meaning to such vague terms as plan, project design, coordinate, support, catalyst and effective working relationships. This lack of specificity has created both implementation and management problems. The following subsection evaluates FSDP's progress at interpreting and implementing the institution-building concepts presented in the PP.

B. Generation and Selection of Subprojects

The loan agreement describes the major process by which DINAF will "mobilize and coordinate" forestry activities as follows:

Project activities in Component B (productive forestry) will be implemented by a means of a series of subprojects which will involve collaboration between the National Forestry Program (DINAF) and communities, groups, private or mixed enterprises and/or public-sector entities. (p. 2)

On 9 May 1983, DINAF's executive director sent a letter to a list of agencies with the potential to carry out forestry subprojects.

By October, 31 subproject proposals or inquiries had been submitted by potential implementing agencies.

The list on the following page shows the status of 27 of the original proposals as of May 1986. This list was based on written records and conversations with those involved in decision-making. It does not include subproject proposals and queries submitted since October 1984. It should be noted that only five have been approved and are underway, while the remaining subprojects appear to be in varying stages of postponement or abandonment.

A few observations regarding the system used to generate subprojects are justified. First, the principal project advisor arrived in April 1983, and the letter inviting proposals was sent out the following month. Thus, there was little time to design a project generation system. Second, the letter inviting proposals gave no instructions about the type of document to be submitted. The accompanying descriptive document was voluminous and resembled the project description (Annex I of the PP)--it indicated what the project was about, but did not tell those submitting proposals what to do. Third, and probably as a result, there was no uniformity in either the issues addressed or the proposals' format, so comparing them and making decisions was difficult. Fourth, a course in project design was offered in January 1984, but there were problems with it in terms of both timing and design (discussed below). Finally, the project has only had a full-time coordinator at DINAF from April 1983 to January 1984 and January 1984 to May 1985 for a total of approximately 15 months. In his quarterly reports, the principal advisor notes that the lack of a continuous, full-time coordinator is a "solid piece of evidence for the lack of DINAF attention to the project." The evaluation team believes this contributed to the disjointed link between generation and the subsequent approval and implementation of subprojects.

Finding: The subproject proposal process was poorly designed. Some subproject applicants submitted full proposals in areas that were ineligible for funding under the project. The instructions to applicants were so vague that there was no uniformity and, hence, comparability among the submissions. There were no formal selection criteria.

Recommendation: If DINAF and USAID/Ecuador decide that a subproject generation model is worth continuing, then:

- identification and selection procedures must be part of a clearly articulated, step-by-step process-- there should be a preliminary query stage to establish that there is sufficient commonality of objectives to warrant further work;

1984 Subproject Proposals and Their Status

Underway

1. Reforestation, EMDEFOR, government enterprise, Riobamba
2. Agroforestry, INIAP, MAG, Napo, Oriente
3. Protection Reforestation, Municipio, MAG, DINAF, Portoviejo, Manabi
4. Protection, DINAF, community, Pichincha
5. Plan Maderero Palmira, DINAF, cooperatives, German Technical Assistance, Palmira

Awaiting Action by DINAF or FSDP

1. Existence of nurseries study, Fernando Escobar, DINAF
2. Leucaena plantations, Jorge Vizcarra, DINAF
3. Evaluation of plantations, investigaciones y forestacion, DINAF
4. Sawmills for campesino communities, Nelson Toledo, DINAF
5. Agroforestry, Pastaza District Chief, Peck and Bishop
6. Reforestation, agroforestry, Guayllabamba, Peck
7. Reforestation, Cayapas Indians, Esmeraldas, Alan Moore, Angel Paucar
8. Agroforestry, Galapagos, Dr. Miguel Cifuentes

Awaiting Action by Implementer

1. Promotion of forest protection, Fundacion Natura
2. Promotion of forest products, AIMA
3. Balsa products, pest control

Lack of Implementers' Interest

1. Varied research and demonstration, Universidad de Loja PCVs
2. Brick production, CREA, Sinincay community
3. Reforestation, Santo Domingo Indians
4. Reforestation, DRI Salcedo
5. Species provenance trials, ENDESA

Rejected as a Matter of Policy

1. Watershed protection, Rio Paute, UMACPA, no rehabilitation
2. Nursery, plantations, CEPE, no non-DINAF nurseries
3. Rubber plantation, assistance not needed
4. Bamboo, jojoba, Zenit Pacifico
5. Firewood/native species, INE Provincia de Bolivar, no land title
6. Agroforestry, Empresa Mixta Cayapas, owes GOE 50 million sucres

- the system must include instructions to applicants, criteria for subproject identification and selection, mechanisms for project approval and disbursing funds, monitoring and evaluation systems, and training in the use of these systems; and
- potential selection criteria mentioned by the principal advisor include social benefits (number of beneficiaries and "rich-poor" equity criteria), total cost, requirements for DINAF staff time and fit with objectives put forth in the PP--the team would add to this list the ability of the applicant or forestry activity to sustain itself both financially and managerially after the life of the subproject.

1. Training Course in Project Design

A training course in project design for 20 participants from DINAF and potential implementing agencies was conducted by Ecuadoran and AID experts between 16 and 27 January 1984. The topics addressed included planning, technical and market analysis, species selection, social analysis, population, employment, land tenure, legal aspects, financial analysis, budget, income, shadow costs, profitability, cost-benefit, economic analysis, project selection, implementation and administration, and PERT diagrams. The seminar was intended to produce fundable subproject proposals but this objective was not fulfilled.

A memorandum from a representative of the participants at the seminar expressed general satisfaction with the course, but then made several observations. First, complex topics were treated too rapidly. Second, the objective of reformulating proposals to the satisfaction of DINAF and AID was too ambitious. Third, there must be simpler exercises and cases in future courses. Fourth, the formulation of real projects should be left for the period following the seminar. Finally, the field visit should include not only site observations, but also practical work, such as interviewing or environmental impact analysis.

The project design course should have been offered before, rather than after, proposal solicitation. Nevertheless, it was clearly on the right track. The criticisms by the participants' representative are precisely what one would expect following a first attempt at a project design seminar. Initial attempts at this type of training are generally too academic and ambitious. The participants' critique states that:

High-level PRONAF (DINAF) executives have suggested the advisability of such seminars, and I support the carrying out of their suggestion.

In fact, there were no more seminars or activities in project design. AID and project officials said this was because DINAF never appointed a training coordinator to undertake the enormous amount of work required to organize such seminars, and management training proposals from the project were rejected by DINAF directors several times. On the basis of much past experience with the design and implementation of project generation systems, the evaluation team believes that seminars, workshops and tutored practice in the generation and management of subprojects are of crucial importance to the project's progress and success.

Finding: The one attempt made to train DINAF and other organizations in subproject design was criticized as being too complex and academic, and did not lead to any subprojects. However, the evaluation team believes that these problems were minor compared to the fact that no follow-up training was conducted to take advantage of lessons learned during the first seminar.

Recommendation: In future, FSDP should:

- include project design seminars and workshops for staff from DINAF and other institutions that address the philosophy and value of moving from implementation to coordination, as well as the mechanics of subproject generation and management;
- employ a teaching system at all seminars and workshops that is not as complex and academic as the one used at the January 1984 seminar; and
- assure that seminars and workshops include follow-up tutoring or, possibly, on-site work while participants work on individual project plans.

2. Subproject Decision-Making

Key subproject decision-making took place at a DINAF meeting in October 1983. The principal advisor's account of that meeting in his quarterly report for October to December 1983 states:

In October, PRONAF's Consejo Tecnico, consisting of both directors and the chief of each department, reviewed the list of subprojects together with the advisor. In this and a subsequent meeting, nine were rejected as unacceptable or unfeasible, another six were given priority for execution, and the

remaining 18 were put on a waiting list pending further information. The technical director expressed a strong desire to see subprojects actually being executed. In gentle terms, he accused both AID and PRONAF personnel of having failed to get things moving, and said he wanted some action.

A year later, although five projects were struggling through approval and implementation, the subproject generation process remained stalled. The following are excerpts from the principal advisor's June and October 1984 quarterly reports:

Another problem is the lack of requests for new subprojects for 1985. The various Integrated Rural Development (DRI) entities are mentioned in the agreement and are supposed to be extremely interested in demonstration reforestation work. Certainly, the minister (who under a previous administration had been in charge of Ecuador's DRIs) wishes to see action in this area. Although contacted and visited by PRONAF (DINAF) people, none has yet presented a proposal for consideration.

The advisor and coordinator were working on a system for allocating priorities to subprojects presented for consideration as the quarter ended. There has not been much urgency in developing such a system because of the lack of proposals submitted.

Pressure has been applied on the coordinator to view acceptance and implementation of new subprojects for inclusion in the operating plan. Unfortunately, as the quarter ended, it appeared that he might be unavailable for as much as two months of the fourth quarter. No substitute has been named. The priority allocation system mentioned in the last report has made little progress.

In the view of the evaluation team, the list of potential subprojects, of which only five are being implemented, may represent a major missed opportunity. The team believes that many of them could have been converted into active subprojects. Organizations with forestry activities that DINAF is supposed to assist or coordinate may have had their expectations raised and not met.

Interviews with participants from all facets of the subproject generation process produced a long list of reasons that so few proposals were funded. The following comments regarding subproject selection were made by project participants

from DINAF, AID and implementing agencies. After the comments, the conclusions drawn by the evaluation team are presented.

Project participants made the following remarks concerning the nature of proposed subprojects:

Some proposed subprojects were ineligible due to land-tenure problems among participants and beneficiaries.

Some subprojects proposed research with no obvious practical implications.

Proposals in the area of wood-marketing projects were not considered because they did not fit within the guidelines from the PP and loan agreement.

In fact, if not in theory, the project is elitist and favors large landholders over small landowners and communities.

In reference to legal problems, participants made these comments:

There was a belief among some DINAF employees that DINAF would be responsible for paying back the loan money, so they were reluctant to disburse it. This problem became the subject of legal judgments by AID and Ecuadoran legal authorities.

There was a feeling that FSDP put DINAF in the position of both awarding funds and benefiting from the award. In the minds of some, this situation conflicted with the concept that one cannot be both judge and litigant in a legal proceeding.

In one case, there was legal doubt whether an international private voluntary organization qualified for support under the project. In the same instance, the DINAF lawyer felt that a commercial loan, rather than a contract to pay for work performed, was proper. Finally, a contract for work performed was agreed on.

Participants also commented on the lack of training and experience:

DINAF and many proposal writers lacked experience, expertise and confidence at project development.

Some proposal writers felt they would get technical assistance from DINAF in proposal preparation and when it was not forthcoming, decided not to proceed.

Most of the approved subprojects were prepared and submitted with the help of FSDP-financed technical assistance.

Regarding DINAF attitudes, participants said:

DINAF, especially the production department, interprets the shift from implementer to coordinator as a loss of power. Therefore, DINAF resisted approval of funds to projects interpreted as duplicating DINAF capacities.

The amounts of money involved in the subprojects were larger than DINAF employees were accustomed to handling, and this scared them.

From DINAF's point of view, funding and managing FSDP subprojects means more work in exchange for nothing. There is little incentive for taking on subproject responsibility. (Consider that a mid-level DINAF employee may make US\$200 to US\$250 per month.)

Finally, participants made these comments about AID bureaucratic requirements:

On the one hand, AID professes to have been favorably disposed toward funding a number of the proposed subprojects. On the other, DINAF feels that AID is very bureaucratic and lacks agility.

DINAF was offered substantial money to spend according to AID requirements, and the result was no money spent.

Payment of loan money to subprojects that are already approved is continually held up because DINAF is extremely late and sloppy about turning in accounting records.

We needed someone who was an expert on both DINAF's and AID's bureaucratic requirements, preferably an Ecuadoran.

A number of applicants went straight to AID instead of MAG. Often, AID would discuss their applications at length without referring them to DINAF so that we did not know what was happening at AID.

In the evaluation team's view, there are three interrelated causes of poor subproject generation results. First, there is insufficient understanding, confidence and willingness within DINAF regarding the change in its role from implementer to coordinator of forestry activities. Second, the leadership of the technical assistance team and USAID/Ecuador did not emphasize installation of the subproject generation model. Thus, in spite of the number of proposals received, DINAF funded and followed through on only a small proportion of them. Third, as a result of the first two causes, a system that would continue to attract, develop, evaluate and implement subprojects over the long term is lacking.

Finding: The project's coordination of forestry activities is stalled due to the lack of a long-term, working system for generating and managing subprojects. This is because there is a lack of belief and training in such a system among AID, DINAF and the technical assistance team.

Recommendation: If DINAF and USAID/Ecuador agree that a coordinating role for DINAF is desirable, then DINAF and the project must devote resources to the development of a subproject generation and management system as well as training in that system. For the time being, emphasis must be placed on DINAF's management of current projects generated by FSDP.

Finding: Of the more than 30 subproject proposals submitted to DINAF, only five have been approved. Some of the unapproved applications may represent major opportunities for FSDP.

Recommendation: If DINAF and USAID/Ecuador decide to continue with the subproject generation model, an attempt should be made to respond to selected subproject applications that have been submitted to FSDP but not approved. Potentially viable subprojects should be considered for funding, and those which are not should be formally disapproved.

C. Validity of the Subproject Generation Model

On 6 June 1986, at a debriefing for this evaluation, USAID/Ecuador's agricultural officer requested that the evaluation team judge the validity of the subproject generation model for institutional strengthening. This task responds to the following specific phrase in the evaluation scope of work, "analyze . . . the feasibility of the institutional strategy, and . . . the proper and feasible role for DINAF" (tasks III.1 and III.2).

The PP justifies DINAF's switch from the implementation to coordination of subprojects carried out by other organizations as follows:

PNF . . . is an institution which for the foreseeable future will have limited human and financial resources and which, therefore, is not in a position to undertake primary responsibility for implementation of many of the activities included in this project. . . . Therefore, project activities will be implemented to a very large degree in conjunction with those forest-sector institutions (private and public) which are likely to play important roles in the implementation of forest-sector activities. (p. v)

The evaluation team believes that the success of the subproject generation model depends as much on what DINAF and GOE want DINAF to become as on the model's validity. The evaluation team believes that DINAF and GOE have never conclusively decided that DINAF's long-term role would be to emphasize the coordination of forestry activities at the expense of implementation.

Another problem is that project planning did not focus enough on ways for dealing with the bureaucratic, legal and incentive aspects of developing interinstitutional agreements. The PP seriously underestimated the difficulties of initiating a subproject generation system. For example, in the PP, legal and bureaucratic problems were dismissed in this way:

. . . Such interinstitutional agreements are common implementing mechanisms within GOE. In fact, PNF (DINAF) has already executed similar agreements with organizations such as PREDESUR, the Provincial Council of Pichincha and DRI Secretariat." (p. 61)

Similarly, in the PP, attitudinal and incentive problems were dismissed with:

The change (from implementer to coordinator) will be implemented through the positive incentive provided by project funding for interinstitutional agreements with public- and private-sector forestry entities." (p. vii)

Arguments in favor of continuing with the subproject generation model are as follows:

- as detailed earlier (Section V.B), the subproject model has not been given a fair chance in FSDP because technical assistance has not focused on its mechanics and philosophy;
- it appears that with or without FSDP, Plan Bosque and the social forestry program will require that DINAF develop a system for generating and evaluating

programs in much the same way as they would subprojects; and

- "joint ventures" between government organizations and implementing agencies are common in Ecuador and throughout the developing world--government organizations typically give funding and technical assistance to projects where organizations, especially communities, do the work--examples are particularly numerous in such efforts as building schools and roads, digging wells, etc., which would seem to indicate the value of such a model.

Arguments against continuing with the subproject generation model include:

- there are no incentives to motivate DINAF to take on subprojects--it receives no "management fee" in monetary or other form;
- without incentives, turning bureaucrats into risk-takers (rather than risk-avoiders) is difficult, if not impossible; and
- it is not clear what technical role DINAF can and should adopt regarding the subprojects it is funding and monitoring, in particular, the role that DINAF provincial offices should play.

Interviews suggest that USAID/Ecuador suspects that catalyzing forestry activities through the generation and funding of subprojects carried out by other organizations may be a flawed strategy which is not feasible. This suspicion is based on experience with two other recent, non-forestry projects that used such a model and failed. This requires scrutiny, including an answer to whether the non-forestry applications failed because the model is flawed, or because it was not clearly understood and given a fair trial? Unfortunately, a careful study of other experiences with the subproject model was beyond the scope of work for this evaluation.

The obvious alternative to the subproject generation model is the traditional implementation and extension system approach. However, the issues raised by this approach are at least as worrisome as those surrounding the subproject generation model. They include a lack of training, resources, vehicles and motivation within the extension system, and distrust of the system among the people who are supposed to learn and benefit from it.

Finding: On the one hand, the subproject generation model for institution-building and leveraging scarce resources has

weaknesses. On the other, the problems of a traditional extension system are at least as serious. The evaluation team believes that the subproject generation model has not been given a chance because the technical assistance for the project has not focused on it. The team also believes that acceptance of the subproject generation model depends as much on DINAF's and GOE's belief in or support of the model as its validity.

Recommendation: AID and DINAF need to decide immediately whether to start applying the subproject generation and management model seriously, or give up on it. Such a decision should be preceded by a careful analysis of experiences with the model (i.e., FSDP and other USAID/Ecuador projects) as well as an analysis of the alternatives. If a decision is made to continue using the model, then imaginative ways to motivate DINAF staff to assume subproject activities must be found. These must not be limited to monetary incentives and may include access to vehicles for fieldwork or training activities.

D. Training

The PP prescribed a large number of training courses without specifying their objectives or contents in detail. Based on information received by the evaluation team, the following table shows the short courses, seminars and study visits funded by the project up to April 1986.

<u>Date</u>	<u>Subject</u>	<u>Location</u>	<u>Number of Participants</u>
1983	English language	DINAF	
6/83	institutional and legal aspects of forestry projects	Quito	20
7/83	course for technical forestry staff	Conocoto	23
8/83	training in environmental interpretation	United States	1
9/83	study tour of mechanized nurseries	United States	6
10/83	agroforestry	Costa Rica	2
1/84	project design	Conocoto	21
6/84	arid-zone reforestation	Arizona	1
7/84	arid-zone watershed management	Arizona	1
7/84	forest seeds	Conocoto	
9/84	study tour in forestry practices	Colombia	6
10/84	fire management	Arizona	2

3/85	seed collection tour for <u>Pinus muricata</u>	California	1
4/84	arid-zone reforestation	Santa Elena	
4/85	mechanized nurseries	Conocoto	14
5/85	fire management	Conocoto	17
6/85	nursery management	Cuenca	12
7/85	nursery management	Portoviejo	12
12/85	Sierra reforestation and management	Conocoto	30
12/85	fire course for national park guards	Galapagos	17
4/86	workshop on Amazonian dendrology	Coca	

These courses were attended by professional and technical staff from a wide variety of forestry organizations, including EMDEFOR, CREA, AIMA, CESA, PREDESUR, Catholic and Loja universities, and especially DINAF and other parts of MAG.

In addition to the short courses, Dr. Gara conducted lectures and seminars on forest entomology as a component of the undergraduate forestry curriculum at Loja University and also taught a course on forest entomology at the Catholic University in Quito. Several overseas training programs were funded by the project. More were planned, but there has apparently been ministerial opposition to government employees studying abroad. The following studies abroad are or will soon be in progress:

- Mexico--one DINAF staff member, Mr. Eduardo Martinez, is studying forest pathology from January 1985 to mid-1987, and he is expected to head the national forest protection program;
- Idaho--one DINAF staff member, Mr. Jaime Enrique, is studying forest pathology from 1985 to 1987;
- University of Washington--two students from Catholic University are working on two-year M.S. degrees;
- Missouri Botanical Garden--one biology graduate from Catholic University has a 10-month scholarship to study botanical collection and herbarium management, and a DINAF staff member (annual contract) from the Flora del Ecuador study is working on herbarium techniques for one to two months; and
- New York Botanical Garden--a biology graduate from Catholic University has a 10-month scholarship to study the economic botany of palms, and a DINAF staff member (annual contract) from the Flora del

Ecuador study is working on herbarium techniques for one to two months.

Finding: Many FSDP courses have responded to the technical needs of different forestry-sector organizations in Ecuador. However, training has not been directed at DINAF management weaknesses that are currently limiting the success of both DINAF and FSDP.

Recommendation: Training emphasis must be placed on developing DINAF's management skills, particularly in the areas of accounting and the generation and management of forestry subprojects. Continued training is warranted in the areas of forest protection and nursery management.

E. Planning of General Programs and Approaches

One of the major elements of the FSDP institutional-strengthening strategy has been the planning of general forestry programs and approaches. Approximately US\$375,000 has been spent on planning general programs and approaches. Examples include organizational planning for DINAF (US\$55,000), the national forest protection plan (US\$140,000), INECEL watershed management plan (US\$150,000) and national forest research plan (US\$30,000). Voluminous reports have been produced. However, the institutional-strengthening results vary

For example, FSDP has spent US\$55,000 on organizational planning for DINAF, primarily to hire a short-term administrative specialist from the USFS. At the time of his work, DINAF was about to be dismantled by MAG, as had already occurred with PRONACOS (the soil conservation department). Therefore, the specialist's thrust was to help DINAF plan the acquisition of a certain degree of autonomy from MAG. His advice contributed to the saving of DINAF. In addition, his work resulted in streamlining DINAF from eight to four departments.

At the time of this writing, the decision to establish DINAF as an institute has just been taken by the Minister of Agriculture. The next step is to send the proposed change to congress, where it will be submitted in such a form that it becomes law if congress does not act. The evaluation team has no way of knowing what the results of this action will be.

Interviews with personnel from INIAP, which already has institute status within MAG, indicate several advantages to acquiring a degree of autonomy:

- DINAF would be able to pay higher salaries and thus, attract high-quality staff;

- there would be less need for ministry approval for expenditures;
- DINAF's director would be able to sign international agreements; and
- DINAF would have its own accounting and pay offices, warehouse, guards and information distribution system.

Becoming autonomous from MAG would also seem to have disadvantages, including:

- operating costs for a number of items would have to be carried--no one in DINAF or the project seems to have a budget for how much autonomy would cost, which is of great concern to the evaluation team; and
- collaboration with other departments of MAG may become more difficult--collaboration with MAG is especially important for agroforestry, which is becoming the most successful, if not the major, thrust of FSDP.

Finding: The FSDP administrative specialist provided valuable assistance in streamlining and saving DINAF. He also assisted DINAF in its efforts to acquire a degree of autonomy from MAG. However, the autonomy sought by DINAF will likely be a mixed blessing--the slightly improved ability to pay staff and potential improvement in administrative flexibility may be offset by added costs, such as the capital investment required to set up elsewhere and recurring costs of separate administration and logistics. At this time, no one knows what these costs will be.

Recommendations: First, since the project played a role in moving DINAF toward autonomy, it must also help DINAF determine the costs involved. Hence, the next job of organizational technical assistance must be to work with DINAF to determine the capital investment required to set up an institute as well as the recurrent costs DINAF must pay if it becomes an institute. Second, FSDP should consider using portions of the remaining project funds to capitalize the forestry institute. The current DINAF director suggests that paying to set up the institute would be a much better use of AID money than the present use. Setting up the institute would be an accomplishment that AID and taxpayers could be proud of, the project is having difficulty spending funds, and DINAF can cover the institute's operating costs out of national park and forestry revenues. The evaluation team suggests this option for serious consideration, but any action taken should not be at the expense of subprojects that are having positive effects.

The national forest protection plan has a budget of US\$140,000, plus some equipment that was in customs at the time of the evaluation. The objective of the plan has been to establish a network of organizations throughout Ecuador that protects the nation's forests. The plan is primarily of an organizational, rather than technical, nature and proposes two phases. The first is to train personnel, and the second proposes establishment and staffing of the national forest protection system, including:

- a forestry protection center at the DINAF nursery and research station in Conocoto near Quito; and
- research stations at peripheral centers such as the Loja and Catholic universities, and MAG's Department of Plant Quarantine (Sanidad Vegetal)--Loja University would specialize in pathology and fire prevention, and Catholic University in entomology.

Catholic University personnel already operate an entomological diagnostic center on behalf of FSDP and receive travel and per diem for their efforts. Some diagnostic equipment had been purchased, but had not yet arrived when the evaluation team conducted interviews at the university. It is not clear whether there are concrete plans to convert Conocoto into a diagnostic center or the government will pick up the development budget for all the centers proposed in the national forest protection plan.

The watershed management-related planning consultancies for INECEL had a budget of US\$150,000. The objective of this work was strengthening INECEL's watershed management capacity through collaboration and training. A 225-page report was produced, but the effort was surrounded by misunderstandings and bad feelings. On one hand, project staff say that INECEL never provided satisfactory counterparts. On the other, during their interviews, the evaluation team heard criticisms of consultants' contributions from DINAF and INECEL personnel.

The rational forestry research plan had a budget of US\$30,000. Although the content of the Plan was technical, its objectives were primarily institutional. Its intent seems to be to provide a research plan, the implementation of which would establish an Ecuadoran forestry research network. The plan is based on a questionnaire study and resulted in long lists of research topics and designs. The plan was carried out with good counterpart collaboration, but at this time, it appears that there are no intentions or resources for carrying out the proposed research.

Finding: Overall, investment in the planning of general strategies and approaches has produced little institutional strengthening and has been a poor investment. Unless it is

carefully planned with the active involvement of agency counterparts and a detailed analysis of short- and long-term financial costs, the planning activity is a waste of FSDP resources.

Recommendation: FSDP should invest in more planning of general strategies and approaches only if a clear need exists, and counterpart support and financial resources are available to implement them. Current efforts should concentrate on making investment in past planning efforts (e.g., the national forest protection plan) pay off.

F. Bottom-Up Institutional Strengthening

Institutional strengthening can occur from the top down or bottom up. An example of top-down institutional strengthening is FSDP's attempt to make DINAF more responsive and agile by turning it into a semiautonomous institute. The bottom-up approach starts with a field project that explores the limits of possibilities in the field, then spreads what has been learned throughout the system.

The Napo agroforestry subproject may turn out to be a good example of a bottom-up approach to institutional strengthening that the project could pursue in the future. Key elements of the Napo agroforestry approach to institutional strengthening have been:

- focused technical assistance,
- a demonstration objective that is of interest to local people,
- a legal and working relationship with the local INIAP branch, and
- a team of DINAF counterparts.

In Napo, the technical assistance team has a clear mission--to test and demonstrate whether trees, pasture, livestock and cash crops are a viable combination in both economic and environmental terms. Urgency comes from the knowledge that colonists in the jungle will undertake the activities, especially livestock, whether they degrade the soils or not.

The Napo legal agreement between MAG and INIAP was worked out by DINAF lawyers, and represents an important institution-building precedent. However, a legal agreement is of no use unless it is accompanied by a working relationship. The working relationship between project agroforestry experts, INIAP and the provincial MAG office consists first of mutual respect and trust,

based on living and working together in the same region. Second, each party contributes to and receives something from the arrangement. MAG contributes human, material and financial resources, and receives from INIAP technologies to test in the areas of pasture, forestry and livestock. INIAP contributes the technologies, and receives field tests of its research findings, and expansion of its role from research to extension. FSDP contributes expertise in technology transfer, money and equipment, and receives the chance to carry out the objectives set forth in its PP.

To carry out the fieldwork, DINAF has used project funds to hire a team of counterparts, including agronomists, foresters and nursery technicians. The agronomists manage the contacts with farmers and carry out technology transfer activities. The foresters collect data and exercise quality control. The U.S. technical experts spend only three out of every eight weeks in Napo, so the agronomists and foresters are actually in charge of operations.

Finding: The Napo agroforestry subproject has demonstrated that collaboration at the local level between FSDP and other organizations is often much easier than at the central level. Other institutional-strengthening elements of the agroforestry subproject (e.g., strong local involvement and interesting scheduling of technical assistance) establish valuable precedents for FSDP.

Recommendation: The project should consider adopting an institutional development strategy that simultaneously strengthens the central capacity to approve and fund subprojects, and outreach capabilities to generate and supervise them. The evaluation team does not believe that either a top-down or bottom-up approach alone is sufficient. Also, FSDP project staff should analyze for themselves why the Napo agroforestry subproject has been successful to date and apply the lessons learned to other subprojects.

VI. PRODUCTIVE FORESTRY

A. Overview

Productive forestry applied research and pilot demonstration activities, as described in the PP and loan agreement, were designed to provide:

- answers to many research needs, including species elimination trials, plantation establishment and management techniques, disease, insect problems and nursery practices; and
- field tests for a variety of reforestation alternatives, such as agroforestry and on-farm forestation, institutional arrangements for reforestation, and forest extension techniques relating to individual farmers, communities and Indians.

In the humid tropics, highlands and arid coastal areas, commercial-size plantations were intended to serve as pilot demonstrations of planting and management technologies, while contributing to the production of wood products and assisting in soil and water regime stabilization. Applied research was to be conducted to generate technical information about native and exotic species, which would then be transmitted to industries, farmers, communities and development institutions. The field demonstrations that were set as an objective and the actual results are shown in the following table.

<u>Demonstration</u>	<u>Area Proposed (hectares)</u>	<u>Area Achieved May 1986 (ha)</u>
Sierra plantations	4,000	1,150
arid-coast plantations	500	400
humid-tropical enrichment plantations	1,000	0
Sierra natural regeneration	125	0
arid-coast natural regeneration	300	0
humid-tropical natural forest mgmt.	1,600	0
Sierra on-farm tree planting	225	3
arid-coast on-farm forestry	600	0
humid-tropical agroforestry	1,000	200
species elimination trials	25	0
other demonstrations (Caribbean pine, <u>Juglans neotropica</u> , rubber, balsa)	<u>625</u>	<u>0</u>
total	10,000	1,770

The Sierra plantations established by EMDEFOR fit the criteria established in the PP by using a variety of planting methods, different species and intercropping agricultural products.

The arid-coast plantations are the protection/production plantations established in the hills around the city of Portoviejo. These plantations are a substitute for the PP proposal of 500 hectares in units of at least 10 hectares to be established in 20 communities.

As the table shows, no natural regeneration areas along the arid coast or in the Sierra have been undertaken, nor have enrichment plantations been started in the humid tropics. Sierra on-farm tree planting has just started with alder, and the redirection of EMDEFOR's activities into agroforestry will work toward this objective during the rest of the project. Likewise, arid-coast, on-farm forestry has not been done, but the proposed agreement with MFM on the Santa Elena peninsula, to provide assistance in introducing agroforestry into their program for community and small-farm improvement, would satisfy this aspect of the project's objectives.

The humid-tropical agroforestry program is progressing well with 200 hectares of direct intervention. It is expected that these demonstration areas will increase and induce the adoption of agroforestry techniques by proprietors of at least 1,000 hectares by the end of the project.

Formal species elimination trials were not conducted during the past two years (1984 and 1985), but have been initiated in 1986. This could be one of the more important aspects of the project--introducing a greater variety of species with more uses than eucalyptus and pine, which are commonly planted. Investigations of alder are underway, and this species shows promise for both agroforestry and industrial plantations. No work was done on investigations of Caribbean pine, nogal, rubber or balsa.

Experiments have been carried out on nursery techniques and management, including the introduction of mechanized nurseries. Some trials on planting methods have also been conducted, and comprehensive manuals prepared on mechanized nurseries and planting methods.

Elements of the forest protection plan started to function in January 1986, but this subproject still lacks a coordinator at DINAF. The entomology and pathology diagnostic centers at Loja and Catholic universities should prove adequate to carry out their forest protection responsibilities, but the center at

Conocoto and a procedure for actually combating diseases are not yet established.

With financial assistance from AID to purchase the equipment, a sawmill has been built at Palmira and is now operating. The whole issue of log-extraction methods in the humid tropics depends on timber-cutting and settlement practices as well as DINAF's conservation and control policies. At present, these are inadequately developed.

B. Reforestation Subprojects

1. EMDEFOR

The PP included provisions for productive forestry field demonstrations of applied research activities for the Sierra. This work was to be carried out under cooperative agreements with public-sector agencies, landholders, private industries, community groups and other interested parties. The PP included demonstration reforestation activities involving a variety of species suitable for various sites to encourage landholders and community groups to undertake reforestation on marginal land. In addition to reducing erosion, the proposed plantations were intended to produce fuelwood, be large enough to contribute to future industry in the highlands and provide new sources of income and employment.

EMDEFOR was already carrying out reforestation and applied research, and had a nursery, trained staff and experience with previous reforestation activities. It is a company of mixed ownership with 99 percent owned by public entities, of which the main stockholder is the Banco Nacional de Fomento (BNF), together with three provincial councils and a private stockholder. The contract for planting was awarded to EMDEFOR, partly to strengthen the capabilities of this institution as well as to take advantage of their experience with large-scale planting.

A contract was signed on 26 June 1984 between MAG and EMDEFOR for the reforestation subproject in the Chimborazo, Bolivar and Tungurahua provinces. This contract stipulated that EMDEFOR would plant 2,000 hectares in four years, with the actual planting to be done in two years, and replanting and protection during the second two years. The practical research element incorporated in the planting was utilization of a variety of species placed at different spacings using a number of planting methods.

The total cost for this contract was 56,827,646.20 sucres, of which 44,074,439.50 was to be paid from FSDP loan funds and 12,753,206.70 by EMDEFOR. Payments for work done were to be made

every three months on presentation of proof of expenditures and receipts. An advance of 8,576,354 sucres was made immediately.

Properties to be planted are located through EMDEFOR's extension department and belong to private landholders, communities or cooperatives. The property title is searched, a technical examination made on the ground and a map prepared. A technical plan is then formulated, including a description of soils, type of planting, species, fencing, objectives and economic analysis. Acceptance by IERAC, a land titling agency, is next obtained for social compatibility. This information is finally sent to DINAF in Quito for approval before planting. DINAF may have the local district office inspect the property or send someone from Quito. Based on DINAF's input, EMDEFOR then proceeds with field activities.

EMDEFOR has several years of experience working with Indian communities in the central Sierra of Ecuador. According to a former manager, the decision to work with peasants was made after EMDEFOR realized that there were only a limited number of large landholders that they could work with on reforestation. Initially, EMDEFOR employed a contracted sociologist to make contact with Indian communities. To facilitate this task, the sociologist sought the collaboration of IERAC officials as well as schoolteachers and community extension workers from MEC. EMDEFOR did not want help from the provincial MAG office in Chimborazo because it did not think MAG had much acceptance among peasants due to its many unfulfilled promises. The EMDEFOR sociologist (who claims to understand 60 percent of Quechua) has had contact with Indian communities for approximately three years, and about seven communities have agreed to participate in the project's reforestation activities. However, no plantations have been started on communal lands thus far. EMDEFOR states that it has established relations with Indian communities in three different ways:

- providing jobs for women, who are contracted to make paper containers for tree seedlings (approximately 25 women work at this task separately and get 10 cents per container);
- contracting with communities for reforestation work on private plots; and
- engaging people in reforestation in their own communities.

The EMDEFOR interim manager stated that there are two contracting communities for reforestation work. He added that participating members are obliged to save part of their earnings in saving accounts opened for them by the sociologist and this money was allowing them to buy land, but the evaluation team

could not verify this statement. However, from other information gathered by the team (in interviews with one contractor and EMDEFOR's sociologist), it appears that the contracting communities have dissolved and now EMDEFOR deals with individual contractors, who hire laborers from different communities at a rate of 100 to 150 sucres a day plus meals.

Visits by the evaluation team to the La Merced and La Pacifica communes indicated that the sociologist's preliminary work has been successful. Residents in the communes have been persuaded to participate in reforestation activities through frequent contacts with the EMDEFOR sociologist and a series of incentives, such as obtaining legal documents regarding organizational recognition and land tenure. Also, an important short-term incentive is payment for reforestation on private, non-communal lands, about 5,000 sucres per hectare. The indigenous people interviewed by the evaluation team also indicated that they believe the land has no other use and reforestation will help the soil and provide future returns.

During the 1984-85 planting season, nine properties totaling 931.45 hectares, all belonging to private landowners, were planted. The 1985-86 planting was cancelled because of drought, leaving 1,068.55 hectares to be planted in 1986 (out of a total contracted amount of 2,000 hectares). This year, proposals were sent to Quito for planting 813 hectares, of which 397.03 were approved and 416 were not. This season (1986-87), 216.62 hectares have been or are being planted, which leaves about 852 hectares still to be planted during the wet months from October to December.

DINAF rejected a number of properties that were considered to be protective, rather than productive, sites because they were located on steep slopes. An agreement has since been reached to include these properties, so that this season, 475.71 hectares on properties that were previously rejected will be planted, leaving the remaining 376.17 of 2,000 hectares to be found on properties now being examined. These final properties will include both private owners and legal communities or cooperatives.

EMDEFOR has a well-run nursery with the capacity for eight million seedlings and recent annual production of four million. The nursery is neat, well organized and employs some innovative procedures. One of these is the use of paper pots fabricated by local people in their homes from newspapers at a unit cost of 0.25 sucres. Another innovation is a plastic mesh cover placed over seedbeds to protect them from birds and rodents. Trials are continuing on systems for operating the nursery and the problems that remain are recognized. Research is being conducted on herbicides and optimum seedling size for transplanting into the field.

The evaluation team examined six properties which were planted during the 1984-85 season. A three-month delay in the planting program resulted from cash-flow problems when a request for payment was submitted to DINAF for 15 million sucres for the plantation work that had been done, but EMDEFOR was paid only five million sucres. DINAF discounted five percent, as allowed in the contract, and then an additional 15 percent for replanting, which was not in the contract, and also disallowed transportation costs, although these are allowed in the contract. This amounted to a total discount of 66 percent. The remaining 10 million sucres has been paid back in small amounts ever since. EMDEFOR is now doing a financial study to determine how much DINAF still owes.

The plantations have good survival percentages and healthy seedlings. Some showed a high proportion of root deformities and foxtailing, but it appeared that out of the 1,100 trees planted per hectare, there should be an adequate crop of not less than 400 final crop trees in almost all areas seen by the team. An experiment on dune control on the La Ermita property used an intercropping of chocho (*Lupinus*) between the rows of trees. This plant grows for two years and provides a crop of edible seeds. The plantation on the Molina property used three species--*Pinus radiata*, *Pinus patula* and *Cupressus*--on a dry, exposed hilltop. The two pines were doing fairly well, but the cyprus was yellow, indicating that the site is not appropriate for this species. It would greatly increase the practical value of the research component of the plantations if permanent sample plots were established to obtain quantitative results for the different species and planting methods.

Planting techniques that were used included preparation of the soil; marking and making holes by hand, leaving a depression to collect water; making planting holes by machine; and using a planting tube called a "pottiputki." In some cases, two small canals were made to channel water into the hole. In other cases, furrows were run along the contour using a tractor and plow. Replanting was done the following year to ensure that the survival rate was 90 percent or more.

Technical assistance, provided by Mr. Glen Galloway, amounted to 44 person-days, plus eight days in the EMDEFOR nursery training course, 11 days in preparation of the EMDEFOR agroforestry subproject and 10 days on plantation research, for a total of 73 person-days.

Finding: FSDP financial and technical support have made an important contribution to the capabilities and practical experience of EMDEFOR, while at the same time, fulfilling the FSDP objective of establishing two-thirds of the area stipulated in the PP for productive forest demonstration plantations as well as utilizing applied research methods. However,

misunderstandings and a sense of competition have prevented DINAF from benefiting greatly from this experience. The potential for continuing with EMDEFOR is limited by uncertainties about funding, the impact of Plan Bosque, and future markets for the products of pine and eucalyptus plantations.

Recommendation: Technical collaboration between DINAF, AID and EMDEFOR should be maintained, and they should work toward resolving uncertainties about management and markets. EMDEFOR should be supported in the proposed changes to agroforestry activities that would have a positive impact on a greater number of people in the Sierra. Species trials would greatly assist in this work and should be expanded. Permanent plots should be considered for more definitive research on different species and planting methods.

2. Portoviejo

A total of 500 hectares of plantations was originally planned for the arid coast. However, the project took advantage of the decision to reforest the hills surrounding Portoviejo under the emergency plan after the disastrous flooding of the city caused by El Nino in 1983. Heavy rains produced erosion in the hills as well as water and mud that clogged drains and caused serious damage to the city. The DINAF district officer decided that reforestation of the hills around Portoviejo would mitigate this type of problem if it occurred again, and that it would be prudent to take advantage of the moist conditions for planting in an area which is usually very dry. Like Plan Pichincha, the stimulus for this activity was DINAF's response to a natural catastrophe. The Save the Children Federation put up 0.5 million sucres, and MAG and AID three million each, for a total of 6.5 million sucres.

The area planted was 400 hectares, 80 percent to Leucaena and 20 percent of a mixture of other species, including algarroba, guachepeli and guayacan, at a cost to AID of US\$65,000. These have grown well, and the area is supporting herbs and shrubs, which are providing good protection for the soil and will improve soil moisture conditions. There has been some encroachment by settlers and some illicit firewood cutting, but the settlers have left the planted trees and the area around them is being used for grazing or crops.

DINAF plans to complete the remaining 100 hectares and possibly more, and has proposed that the mayor declare the plantation a civic heritage area because about 80 percent of the land is municipal property. DINAF would then declare it a protective forest and thus doubly protect it from people cultivating the land or cutting the trees. However, no agreement has yet been reached with the mayor.

The plantation now represents both a productive and protective activity in the arid-coast region. When the trees reach maturity, they will doubtless provide useful wood products. Since Leucaena seeds prolifically and can also sprout, it will keep the hillside populated with trees and preserve the plantation's protective role.

Finding: The Portoviejo plantation is fulfilling its soil-conservation objectives, but does not yet serve as a model that can be recommended for other areas because the city of Portoviejo has not yet agreed to protect and manage it over the long term. However, it has set a valuable precedent for FSDP by demonstrating a rapid response to local needs.

Recommendation: The experiences of this subproject should be analyzed to learn lessons in the areas of collaboration and publicity for use in protective forests and other productive, protective and city-greenbelt plantation projects. In addition, a determined effort should be made to reach an agreement with the municipality of Portoviejo that satisfies their political and social requirements, and when such an agreement is reached, the plantation should be extended. To permit the Portoviejo plantations to maintain their integrity and prevent invasion by settlers and fuelwood cutters, the Mayor should be convinced to have the hills surrounding the town declared a civic heritage area. When this is done, DINAF should designate the area a protective forest, and assist in planting the remaining 100 hectares and perhaps more.

3. Plan Bosque

Under Law No. 182, the Fondo Nacional de Forestacion y Reforestacion (FONAFOR) was created at BNF on 10 August 1984 for the purpose of financing forest plantations using a percentage of oil revenues. Plan Bosque is the name of the program that utilizes these funds for planting. This program is implemented by DINAF and corresponds to one of the PP's major technical objectives, but AID involvement is limited to providing seed, vehicles and equipment. In addition, it has provided technical assistance and training in nursery techniques and management. However, to date, DINAF has not sought technical assistance from AID for actual implementation of other aspects of the Plan Bosque program.

Landowners apply to DINAF district offices for funds. Depending on the experience of the interested party, they may be required to employ a forester or agronomist to guarantee the results of the planting. After the application has been sent to DINAF and analyzed, and a field inspection is done, planting costs are calculated based on the proposed system and species. The technical person gets four percent of the value of the

planting for supervision. In the Sierra, seven percent is paid for an insurance policy against forest fires, pests, etc., for two years, the maximum period for final approval of the plantation. A contract is signed between the proprietor and DINAF, which is forwarded to BNF for a credit check. When the bank has agreed, it dispenses part of the money after the area is cleared and the holes prepared. After the plantation is complete, it pays a second installment. The third step is replanting, maintenance and protection for two years. The proprietor pays back the principal at the time of harvest. If the plantation fails, the proprietor is required to pay back the principal with interest.

Implementation of Plan Bosque will be started this year with the area approved for plantation set at 14,500 hectares. This is a very ambitious program as it will involve costs on the order of 362 million sucres and 15 million seedlings. It is reported that hundreds of hectares have already been planted in various provinces, but exact data were not available at the time of this evaluation. Approved species are intended for furniture, pulp for paper, construction lumber and firewood, including such multipurpose species as Leucaena, algarroba, nogal and inichi.

Initially, the Plan Bosque program was heavily advertised, and a large number of applications were received, but DINAF has not yet geared up to follow through. The result has been that because the two nurseries in Portoviejo and Santa Elena were not advised soon enough, planting stock was not distributed at the appropriate time, and each nursery is now faced with throwing out a half-million trees. Promotion and nursery production will have to be synchronized with the planting seasons and loan distributions if the project's objectives are to be achieved.

Most of the seedlings produced for planting in the Sierra are Pinus radiata, with Pinus patula now entering production. It appears that this trend toward the use of pines will continue as DINAF has begun to mechanize some of its nurseries, and pines are the primary species suited for this method. The high anticipated demand for seedlings justifies some mechanization of plant production. However, experience in Ecuador and other parts of Latin America indicates that bare-rooted seedlings transported over rough roads for relatively long distances (i.e., 30 to 40 km) and planted by unskilled laborers have suffered high mortality rates. Thus, it remains to be seen whether this approach is viable. Originally, pines were planted with the expectation that a pulp-and-paper mill would be built, but there are no immediate prospects for such construction. Such a mill is reported to be economically unfeasible because of the size of the investment, small local market and competition from low-cost producers, such as Chile. However, the large-scale planting of pines continues, despite the uncertainty of a future market for all this material.

Finding: Plan Bosque has the potential to be an extremely important program for wood production. However, it is encountering severe administrative and technical uncertainties, including problems with species selection and marketing.

Recommendation: FSDP should make a major attempt to assist in resolving Plan Bosque's administrative problems, and also focus on developing new species and marketing outlets. Plan Bosque will require streamlining of its administrative procedures if it is to accommodate the greatly increased planting rate being contemplated. Coordination of land approval, nursery production and planting seasons will have to be closely synchronized. Pines should be planted on selected production and industrial plantations, and a greater variety of species at protective and agroforestry sites. Production of bare-rooted seedlings in mechanized nurseries should be limited to situations where adequate care during transportation and planting can be assured.

4. Alder

The PP includes a component for on-farm demonstration activities. In this effort, 75 farmers were to be chosen to participate in a program of on-farm tree planting for the production of food, fuel, shade, fodder and construction lumber. Trees were to be planted for windbreaks, boundaries and live fences. Where appropriate, linear plantings across slopes were to be established with grasses (e.g., penco) and fruit trees (for instance, capuli) to retard soil erosion and produce fodder and food. The farms were to be from one to five hectares in size, and species of Eucalyptus, Cupressus, Casuarina, Acacia, Juqlans, Salix, Alnus, Populus, Prosopis and native fruit trees considered. There was funding in the loan agreement for 225 hectares.

Trials of indigenous species with varied useful characteristics are necessary to provide a selection of species that are naturally adapted to soil and climatic conditions, and resistant to insects and disease. In this case, alder (Alnus jorullensis) was selected because of such desirable characteristics as fairly rapid growth, ability to fix nitrogen in the soil and a number of uses, such as the production of lumber and firewood and being a good shade tree for cattle. During the project, research has been conducted on the collection of alder seed as well as methods for sowing and propagation in a small nursery in Conocoto. Field trials were also carried out on the farm of Mr. Jose Maria Trueba on the old road to Santo Domingo and the Pasachos farm owned by Mr. Carlos Montufar, which the evaluation team visited.

The Trueba plantation was established on a steep slope by planting healthy eight-month-old seedlings grown in plastic

containers at a spacing of three meters by three meters. Dense scrub, including bamboo, was cleared by hand before planting. The planting costs were reported at 26,200 sucres for two hectares.

The Montufar plantations were established using a spacing of 10 meters by 10 meters and three meters by three meters on gently sloping fields of approximately three hectares each. The objective of the wider spacing was to take advantage of the nitrogen-fixing ability of alder. The seedlings used on these plantations were eight months old and healthy in appearance.

The costs of this project consisted mainly of 25 person-days of Mr. Galloway's time for research and planting, and two person-days for preparation of an article on alder for FORESTAL INFORMATIVO. The planting costs were borne by the landowners.

Finding: The promotion of alder is a successful and valuable contribution to farm improvement. However, it is only a small portion of the component outlined in the PP and funded in the loan agreement.

Recommendation: The project should continue to support the propagation and distribution of alder and other useful species to farms and communities, and DINAF's collaboration in these activities should be encouraged. Expansion of the alder program should be encouraged to increase the number of useful species planted in the Sierra from the two that now predominate, eucalyptus and Pinus radiata.

5. Other Reforestation Activities

Mechanization of DINAF Nurseries

Early in the project, DINAF requested technical assistance to improve nurseries and seedling production. The consultant for this activity, Mr. Charles Venator, examined the idea of mechanizing DINAF's nurseries during his trip to Ecuador in May to June 1983. Loan funds were used to buy nursery equipment and send six persons to the United States for demonstrations of mechanized nursery techniques to enable them to use the new equipment.

The equipment arrived at Conocoto on 5 December 1985 and consisted of a seedbed former, seeder, lateral root pruner, soil sterilizer and bark chipper with ancillary equipment. Three nurseries were initially slated for mechanization--Conocoto, Riobamba and Cayambe. The sowing program began in the spring of 1986 with the seeding of some 500,000 pine in Riobamba, 350,000

of which were for the Belgian project in Palmira. The machinery has since been moved to Cayambe.

The total cost for this program was US\$103,636, which included:

- Mr Venator's visit from May to June 1983;
- Mr. Venator's eight-month consultancy in 1984-1985 (agriculture PASA);
- trip to visit U.S. nurseries; and
- equipment.

The evaluation team believes that the work of the mechanized nursery consultant proved valuable in providing insights into ways of improving utilization of the equipment purchased by FSDP. However, costly inputs and strict quality control are needed for highly mechanized nursery operations, and neither is likely to be easily replicated in Ecuador.

Finding: The mechanized nurseries consultant provided valuable assistance in setting up the nursery equipment purchased by FSDP. However, the emphasis on sophisticated nursery technology is inappropriate as it is not likely to be replicated elsewhere in Ecuador.

Recommendation: The team does not believe FSDP should place great emphasis on disseminating such technology at this time. Future nursery-related consultancies should focus on better overall quality control and more efficient utilization of the equipment now in place at the mechanized nurseries.

Native Plant Nursery

The native plant nursery subproject arose from the need to test alder species in field trials. During the period from July to September 1985, Mr. Galloway located a source of seed and set up a small section of the Conocoto nursery to grow seedlings. After extracting seed from the fruit, it was dried and sown on a variety of seedbed preparations. By the rainy season in April, he had produced about 15,000 seedlings in plastic containers which he then planted in a number of experimental areas. The seedlings were mainly alder, with smaller quantities of quishuar and pumamaqui. The nursery has the capacity for about 60,000 to 70,000 seedlings and will be improved with a new irrigation system. It now has the status of an AID-approved subproject with an expanded scope of work, including planned trials for a large number of exotic and local species. The nursery has an approved budget of 764,325 sucres for making improvements.

Finding: The native plant nursery at Conocoto is an important subproject for FSDP in that it is examining the value of existing trees in Ecuador for wider propagation.

Recommendation: The production of native plants at Conocoto and elsewhere should be continued, and the diversity of species being tested should be increased.

Reforestation Manuals

Two manuals on reforestation have been prepared during the course of the project. The first deals entirely with mechanized and semi-mechanized nursery practices and the second with plantation techniques.

The Manual de Viveros Mecanizados para Plantas a Raiz Desnuda; v. Sistema Semimecanizado con Recipientes de Volúmenes Menores a 130 cc. was written by Mr. Charles R. Venator and Mr. Leon H. Liegel, and published in Quito, Ecuador, in May 1985. This manual is 223 pages long, including the appendices. It contains a discussion of types of planting tubes, cultivating media and basic equipment, such as mixers, tube fillers and semiautomatic seeders, and is directed at small nurseries. It also covers sterilization of the medium, water, fertilization, protection, control of pests and inoculation with mycorrhiza. Finally, it describes control of growth for roots and tops, packing and transportation to the planting site.

This manual is well written and complete, but could use pictures or diagrams to illustrate some of the procedures. Time constraints probably precluded such extra work. The manual should prove very useful in the mechanization of DINAF's nurseries for the expanded planting schedules that are expected from Plan Bosque.

The second manual on planting methods is Guia sobre la Repoblacion Forestal en la Sierra Ecuatoriana, prepared for FSPD by Mr. Glen Galloway in May 1986. It has 307 pages, an extensive bibliography and nine appendices. This reforestation manual first discusses the species used and systems under consideration, followed by planning of planting activities, such as the area to be planted and available human, physical and financial resources.

This manual is a clearly written guide to planting methods for the Sierra with many useful diagrams illustrating the text. It is suitable for use as a text in universities and should be widely circulated to persons contemplating a plantation program, such as farm owners, communes, cooperatives and industrialists.

Finding: The two reforestation manuals produced by the project are well-written, high-quality documents that deserve wide circulation in Ecuador.

Recommendation: These manuals should be widely distributed to universities, agricultural schools and other organizations involved in tree planting.

Cotopaxi

FSDP has not been involved in DINAF's Cotopaxi plantations. However, there are many references in the PP to plantation management as well as funds for 36 months of technical assistance in plantation management. One of the project's objectives has been to increase the forestry sector's capability for management (among other activities), and Cotopaxi is DINAF's largest managed forest.

The Cotopaxi forest was started in 1929 with four groups of landholders and MAG. Since the late 1960s, some 5,487 hectares have been planted to conifers, almost entirely Pinus radiata. The planting was carried out under a tripartite agreement--the proprietors put up the land, DINAF supplied seedlings and technical assistance, and the army provided manpower. The purpose of the plantation was to supply pulpwood for a proposed pulp-and-paper mill, and the proceeds from cutting were to be divided with 70 percent going to MAG and 30 percent to the proprietors. In 1976, approximately 45,276 hectares were established as a park, of which 25,425 hectares were designated as a "Boliche" or recreation area that included the plantations.

The area was planted at three different spacings--three meters by three meters, four meters by three meters and four meters by 2.5 meters. Parts of the plantations have been thinned and others pruned. Some 52 species trials have been set up, and for 38, there are data on age, height, diameter at breast height (DBH), survival percentage, origin of seed and species.

According to DINAF's technical director, four years ago, DINAF decided there would be no pulp-and-paper mill in the near future, and an inventory and management plan were undertaken with the idea of putting in a sawmill. New investigations and sample areas were established to obtain more information on the growth of the plantations and behavior of various species. During 1983 to 1985, the plantations were attacked by a needle blight, Dothistroma pini, and a moth, Leucolopsis pulverolenta, which caused damage and reduced growth rates. These agents could cause further destruction if control measures are not developed. Since these plantations were not thinned at the appropriate times, they probably would suffer from wind-throw if they were heavily thinned.

Finding: In spite of being DINAF's largest (and most visible) plantation, the Cotopaxi forest has not received assistance through FSDP.

Recommendation: FSDP should seek ways to contribute to management and research in Cotopaxi, including pine silviculture, disease control, and collection and analysis of growth data. More specifically, the evaluation team suggests that a series of light improvement cuttings, as already prescribed in the management plan, should be done to improve the appearance and growth condition of the stands.

6. Rain-Forest Silviculture and Enrichment

Rain-forest silviculture was included in the PP and funded under the loan agreement. Suggested techniques and recommendations were included in reports by Mr. Vega and Mr. Weaver, but discarded for a combination of social, technical and economic reasons. The evaluation team believes it is appropriate to assess why this component has not been implemented and whether something should be done, in view of widespread concern about the future of the rain forests.

It appears that rain-forest silviculture and enrichment plantations have been given a low priority because AID and DINAF staff perceived them as being:

- irrelevant to the social and economic needs and wishes of the colonists and Indian communities;
- a "silvicultural" failure in terms of past attempts such as the ENDESA plantation, which was plagued by unsatisfactory survival and growth rates;
- excessively expensive for commercial interests; and
- unrealistic so long as forests and long-term timber contracts cannot be protected from clearing and settlement.

Forestry As Part of Colonists' Land-Use Systems

The first essential aspect of forestry in the colonists' land-use systems has to do with their perceived needs, primarily for food and critical materials, as well as a regular source of cash for important purchases. In this context, the evaluation team believes that the agroforestry advisors are correct in their assessment that techniques for extensive rain-forest silviculture are not yet developed to meet these needs.

The second essential role of trees is protecting soils, maintaining soil fertility, and ensuring the sustainability and long-term viability of tropical agricultural systems. In this case, the project has attempted to focus more on cleared areas that are now being cultivated, rather than managing existing rain forests. In addition to the reason mentioned above, the existing (and increasing) extent of crop and livestock production in the Ecuadorian Amazon, and resulting danger of exhausting the soil, are valid justifications for the major emphasis on agroforestry in the project.

The very small number of timber tree plantations in Napo and their young age make it impossible to draw firm conclusions, but accentuate the need to study the existing ones and establish more trials. For instance, in 1978, DINAF established species trials in Napo Province with ODA assistance. The team did not visit this site, but was told that one of the most promising species, Terminalia ivorensis, began to show dieback symptoms at four to five years old.

Another example is the timber company ENDESA, which bought a property north of Coca and started a timber plantation program in 1981. The planting program has been reduced in recent years, but the team was informed that over 300 hectares have been planted, mainly in Schizolobium parahyba. A typical area was inspected by the evaluation team. The survival rate was low, although in many parts there are enough trees to form a closed canopy at maturity. Tree heights of eight to 10 meters are common, but the crowns are poorly developed and the trees do not appear healthy or vigorous. They have certainly been affected by a shoot-boring insect that causes crown dieback and side-branching, and may also be affected by local soil conditions, but this has not been studied. Regrowth of understory vegetation is vigorous, and weeding (up to three to four times annually) has been expensive. Furthermore, there is no sign as yet of the tree cover suppressing the competing vegetation. This plantation is clearly not successful. However, the species is a colonizer, and it is quite probable that it would succeed in plantations with other spacing, techniques or soils, including enrichment planting in lines within a forest matrix, as recommended by Mr. Weaver.

The other species seen, at ages of four to six years, were Terminalia ivorensis, Acrocarpus fraxinifolius and Gmelina arborea. They showed substantial variation, probably caused by genetic variability from an unselected seed source, as well as damage of various kinds. The small areas planted had closed canopies and were suppressing ground vegetation. They included many individuals with good form and vigor, and had enough well-formed trees to produce a timber crop. Growth rates were comparable to those seen on commercial plantations in the African and Asian tropics. They certainly show enough promise to justify measurements and trials of thinning, provenances and

establishment techniques. FSDP could contribute to its project objectives by working with ENDESA staff on these studies, perhaps in collaboration with the German Forestry Mission, which is promoting enrichment plantation trials in Lumbaqui.

While the plantation of Schizolobium has incurred very high weeding costs, the labor requirements of the Acrocarpus and Terminalia plots have been much lower and are now negligible. Experience in many other regions has shown that fully stocked plantations of tropical hardwoods can be established cheaply. There are private commercial plantations of Terminalia in Ivory Coast and Gmelina in Sierra Leone, and such ventures are often funded elsewhere by IBRD as viable investments. Many techniques can be used to reduce establishment costs. In this region, the vigorous growth of several species suggests that enrichment planting (in widely spaced lines within a forest matrix) could be both technically and economically feasible. Systems that involve clear-cutting are not suggested for these soils.

Taungya systems, where local people are allowed to clear and cultivate the land for a few years while the tree crop develops, are successfully used by forestry enterprises to reduce establishment costs, though almost always in regions with very high population densities to take advantage of the extreme hunger for land. Such a system will probably not work in Napo, where farmers have hopes of obtaining their own land for cultivation and arable land is still available. Also, taungya systems usually succeed because they utilize cheap or unpaid labor for an important portion of the work required in forestry enterprises, thus reducing the cost of the timber in relation to its selling price. It should be noted that the apparent economic advantage of agroforestry practices over block plantations lies mainly in the fact that they are producing timber with unpaid labor.

The insecurity of land tenure is undoubtedly a major factor in discouraging timber companies from engaging in rain-forest silviculture, management and timber plantations. However, it is certain that large areas of the Amazon will remain rain forest for many years to come, and it is expected that land-use planning and management may eventually give some legal basis and protection to substantial forest areas (presumably on the least fertile soils). If this occurs, these areas should be available for controlled use, planned management and even increased production.

Finding: The absence of tried and proven technical rain-forest management systems, secure land tenure and a clear indication that plantations would be financially successful have been deterrents to FSDP in its attempts at rain-forest management, particularly in terms of plantations. FSDP staff were probably correct in deciding not to concentrate on this component, given the prevailing circumstances.

Recommendation: The evaluation team believes that much more effort is justified, at both the experimental and demonstration levels, to develop systems for rain-forest silviculture, which will be needed as soon as extensive management becomes feasible. However, at this time, FSDP is not the appropriate agency for such work. The team recommends that FSDP apply some of its resources in Napo to do quantitative studies of existing plantations and demonstration enrichment-planting trials, preferably in collaboration with ENDESA and the DINAF/GTZ project.

C. Acroforestry

1. Acroforestry Subproject in the Humid Tropics of the Northwest and Northeast

The PP and loan agreement prescribed several activities for the humid tropics, specifically agroforestry, species trials and, within the rain forest, enrichment planting, silvicultural treatments and management activities. Mr. Peck and Mr. Bishop were contracted to work approximately half-time as agroforestry advisors. This subproject was approved in 1984, and a detailed general plan (Peck, August 1984) was approved. The principal aims defined in the general plan were to carry out on-farm field trials and demonstrations of agroforestry, silvo-pastoral practices and forest management as well as to strengthen DINAF by training personnel and developing agroforestry nurseries. The plan described the techniques, location and areas for the proposed activities in detail.

Activities in Esmeraldas Province were included in the general plan and accounted for about half the budget, but were later excluded and activities concentrated in Napo. This decision was made by the DINAF director. Rain-forest management activities, which constituted the majority of the proposed interventions, were also shelved. The main achievements of this subproject have been:

- a functional field operation, including two foresters, nine agronomists, two nursery supervisors and a number of workers;
- field demonstrations of agro-silvo-pastoral techniques covering 200 hectares on over 100 properties;
- an active agreement with INIAP for research, demonstration and training, including established field trials;

- training and development of the MAG infrastructure and excellent working relations with MAG (but not always with DINAF) at the level of provincial and Coca offices, as well as courses and demonstrations; and
- plant production and nursery development.

On-farm demonstrations are organized into seven sectors, each managed by one agronomist. They are carried out mainly on 50-hectare farms belonging to colonists, although some are being done on army or school properties, but none on communal land. They cover the three main soil types--fertile volcanic alluvial soils, sandy alluvial soils and old red clay soils that are typical of much of the Amazon. The Coca location was chosen because of its easy access to all three soil types and INIAP.

The main agroforestry techniques being introduced and demonstrated are related to the region's primary land uses (in terms of area)--coffee plantations, cattle grazing and mixed forest cover. The principal plants being promoted are a pasture grass, Brachiaria humidicola (kikuyu amazonico); a leguminous nitrogen-fixing ground cover, Desmodium ovalifolium (trebol), which protects and improves the soil, but is not desirable as fodder; fast-growing timber and shade trees (including laurel, pachaco and jacaranda--see Appendix C); and bushes for live fences, including pinon, lechero and mata-raton. Several other plants are also being introduced or disseminated on a smaller scale, such as a low ground-cover fodder plant (mani perenne), some improved banana varieties and other fodder grasses. According to the agroforestry advisors, these plants have shown very successful results over many years in similar areas and are being introduced partly to demonstrate their value, but also to try them out on different farms with varying management intensities, to prove them at the farm level and find solutions for problems encountered. The main systems observed by the evaluation team consisted of planting trebol ground cover and timber tree seedlings on coffee plantations, growing a mixture of trebol and kikuyu with tree seedlings in clear grazing areas, and thinning established trees and/or enrichment with tree seedlings in secondary forest.

Distribution of tree seedlings, trebol, grasses and other plants began in early 1985, to farms where the owner opted to participate. Existing demonstrations range from one to about 18 months old, so it is too early to judge their technical, social and financial success, and much too soon to determine the demonstrations' multiplier effect. However, the initial technical results look extremely promising and suggest that the techniques introduced thus far will succeed. There have been problems, but the system is designed to identify and handle them. In a few cases, the trebol has become too vigorous, suppressing

more palatable fodder plants, but different planting or management techniques are expected to solve this difficulty. Pachaco and cedro have been widely damaged by shoot-boring insects, but they may recover or be replaced by other fast-growing trees, such as laurel and jacaranda. The kikuyu grass appears to be successful on all the sites visited. Other plants and also West African hair sheep are being tried and will be more widely distributed when their performance and suitable techniques have been proven. The strategy adopted is to distribute plants and promote techniques only when their success is almost certain.

At the INIAP station, project staff have established a large nursery, which is still under development, but already producing a large variety of plant material for distribution. After clearing the forest, a 30-hectare silvo-pastoral demonstration was established on steep slopes of red clay soils using kikuyu grass, trefoil and tree seedlings. A large area for species trials of local trees in quarter-hectare plots is under preparation. In the agreement, these and other activities are or will be under INIAP's administrative control.

With the general plan as a basis and allowing for exclusion of the northwest, there are two areas in which the subproject has fallen short of its aims. First, no significant progress has yet been achieved on communal land. Second, 710 hectares of interventions were planned for 1984-85 (principally in forest management), whereas the total reported in April 1986 was approximately 200 hectares--in other words, the forest management component of the subproject is not being implemented. Nevertheless, the number of farmers cooperating in agro-silvo-pastoral activities and the area of those interventions (over 100 farms and approximately 200 hectares) correspond closely to the original plan for this subcomponent in the northeast. The general plan proposed 1,520 hectares of interventions in the two regions for 1984-85.

In October 1985, a two-person team spent three weeks evaluating this subproject. However, only two-and-a-half pages of their report are devoted to describing its field activities. Furthermore, one of the items in their terms of reference was to "evaluate the subproject on the basis of objectives as set forth and those attained in the general plan and implementation schedule." Curiously, their report does not mention the subproject's objectives nor quantify its achievements, although they did report that it was "functioning well."

Given the intentions of the agroforestry advisors, as understood by the evaluation team, the technical components and progress with individual colonists have come close to expectations and are considered successful. The prime initiative for the size, orientation and strategy of this subproject came from the advisors, who were given a relatively free hand to do as

they felt best within prevailing constraints, rather than responding closely to requests from DINAF, local people or a preset schedule. Among the disappointments are the failure to obtain permanent positions for the technical staff, the foresters' late arrival, unproductive relationships with DINAF's district chief, and the uncooperative attitude of indigenous communities and their organizations.

The evaluation team attempted to assess the subproject's success in satisfying colonists' wishes from indications given by participating farmers. Farmers are encouraged to start with just trials on a limited extension of their farm and prove their usefulness before expanding the area. So far, this work has not been complemented by providing assistance in the areas of cattle-raising and coffee production. Seven participating farmers were interviewed on their farms and gave the team the clear impression (allowing for their natural politeness in the presence of project staff) that they are convinced of the benefits they expect from some or all of the techniques they are applying. A few are already receiving substantial benefits, as older areas of kikuyu grass are being grazed, but others have been disappointed by the unpalatability of the more vigorous trebol and some have had their pastures damaged by capibara. Two aspects of the subproject are deemed to be of the utmost sociological importance--the effective extension service, provided by the agronomists, and the decision to work within existing farming systems, based primarily on coffee production and cattle pastures. However, in general, the farmers seemed satisfied with the techniques implemented and collaboration with the project.

In most cases, the response of colonists on 50-hectare plots has apparently been up to expectations, and people are continuing to join the scheme at a steady rate. However, there are many reasons why more colonists have not participated. The evaluation team was informed that some are suspicious that interventions by MAG on their land, especially planting trees, will in some way allow the government to take the land or timber, and others doubt the plants and techniques being offered will succeed or benefit them. There are presumably many farmers who are not interested in the available options, especially those who do not have cattle, are satisfied with their coffee production and soil fertility, do not perceive erosion as a problem and are not interested in investing their labor in expectation of a yield of commercial timber early in the next century. Timber production is high on the list of project objectives, and this subproject is a major successful contribution toward this end, but it is substantially different from the main goals of many small farmers. From the team's limited contacts, there appear to be many perceived needs that rank higher--improved seed for food crops; veterinary advice and medicines for cattle, pigs and chickens; agronomic advice concerning coffee and other crops; and fruit trees (at least 10 species were seen in cultivation).

An anthropologist, Mr. Macdonald, touched on several of these points in his 1983 report. He mentioned the dangers of neglecting fruit trees, concentrating on timber-producing species and of responding to the expressed needs of local farmers (Macdonald, 1983, pp. 5 and 69-70). The agroforestry advisors are concerned that certain options, such as citrus trees, are not yet technically secure because of disease and offering more attractive options will detract from timber production. Nevertheless, improved bananas and sheep are gradually being included. In discussions at INIAP, many more improved plant resources were identified as being ready after programs of trials, including coffee, maize, cowpeas, yucca, rice, peach palm and, within five years, cacao. All these can be included in the subproject and follow-up activities under the MAG-INIAP agreement. The evaluation team strongly commends the progress that has already been made in broadening the range of techniques offered by the project. A still wider range may attract more participating farmers and, thus, increase benefits to them as well as to the region and subproject.

There have been serious problems with DINAF staff contracts. During the evaluation team's visit, the project staff had stopped working because they had no employment contracts. (They were reportedly on strike, but actually, they were not even employed.) The technical staff--nine agronomists (some of whom had been working for over 18 months) and two foresters (who were belatedly recruited in November 1985)--are awaiting annual contracts. It was understood at the beginning of the subproject that all would be given permanent positions. The general uncertainty about job security and the lack of graduate supervision have greatly reduced the results which could be and have been achieved.

If DINAF staff members do not receive permanent contracts, and efficiency in accounting and purchasing is not improved, the subproject will not be able to take full advantage of the capabilities of its advisors and cannot be expected to leave a functioning extension system when FSDP funding ceases. This component is one of FSDP's most conspicuous areas of progress, and it should be possible to resolve the contracting and accounting problems, including permanent positions for the agronomists and foresters. Only with a solution to this problem will it be reasonable to expect a continuing program.

Finding: The Napo agroforestry subproject has progressed very well with its extension system and demonstration trials on over 100 colonists' farms. Its main technical systems for timber trees, grass fodder and leguminous ground cover are working well. Its collaboration with INIAP and MAG provincial staff are commendable. However, the forest management components of the original general plan have not been implemented, so the total area of intervention falls far short of the area that was planned and budgeted.

Recommendation: Administrative problems must be resolved immediately to establish a durable extension system that will continue after the end of FSDP. The existing system, in collaboration with INIAP staff, should extend the range of techniques and species it offers, especially with regard to fruit trees, to correspond more closely to farmers' wishes and attract more of them to participate. A new, more sensitive approach should be made to organizations of indigenous people in order to understand and allay their suspicions and find ways of attracting their interest and contributing to their needs.

The project has been unable to reach the bulk of the Indian population. There have been some modest attempts to get their cooperation, but the situation seems to have gone from initial suspicion to later rejection for a number of reasons. Their adverse reaction was due to the Indian leaders' belief that MAG and AID were trying to impose a project on the indigenous people of the Ecuadoran Amazon which had been formulated by outsiders, where they would play no part and that did not address their basic needs.

Second, some Indian leaders (the presidents of CONFENIAE and FOIN) indicated that they felt intimidated and even suspicious when they found "too many foreigners were pushing the project." This attitude needs to be seen in the temporal context of the fear and hostility related to the presence of oil companies and other outside interests in Ecuador.

Third, despite recommendations to the contrary (Macdonald, 1983), the project disregarded Indian organizations and tried to work directly with individuals.

Fourth, when the leaders reviewed project documents, they saw no significant benefits for the native population or their organizations. All major expenses were for technical assistance and MAG's infrastructure, equipment and training facilities.

Finally, some official policies, reflected in ministerial agreements, subproject documents for Patrimonio Forestal and letters, were considered by Indian leaders as inimical to indigenous land rights and, thus, Amazon natives. These policies favored the expansion of oil-palm plantations into lands occupied by indigenous people and even areas already demarcated and titled by IERAC.

Finding: According to the PP, ". . . the sociocultural feasibility of the project rests not on whether it will benefit the recipients, but whether the intended beneficiaries can be sufficiently motivated to participate in the project" (p. 48). Nevertheless, the subproject has done little to motivate organizations of indigenous people to participate. For instance, CONFENIAE indicated to the evaluation team that they felt the

agroforestry subproject does not respond to the basic needs of Amazon Indians, and they were asked to cooperate in a scheme where they did not have any input and thus, suspected it as "an imposition."

Recommendations: To reduce the mistrust existing among Indian organizations of the Amazon region and eventually get their collaboration, FSDP needs to work at the levels of both CONFENIAE and organizations such as FECUNAE. CONFENIAE needs to be convinced that the project does not intend to negate or in any way reduce their legitimate rights, rather it could be beneficial to Ecuador's indigenous people. At the same time, some assistance could be given to CONFENIAE in such areas as land titling and demarcation for native communities (through collaboration with IERAC) and establishing objectives and planning for agricultural development. Organizations, such as FECUNAE, could be approached to find areas of mutual interest, where both the organization and DINAF (plus a third party, such as INIAP) could collaborate.

Instances of possible areas of collaboration, which have already been informally suggested by people from CONFENIAE and FECUNAE as well as MAG and INIAP officials, are the implementation of INIAP training courses covering previously agreed-on topics (e.g., improved pastures and cattle management) and extension activities with participation by members of organizations that are oriented toward solving specific production problems, such as diseases affecting cattle or the improvement of coffee plantations. Once confidence has been established and there is an ongoing dialogue between DINAF and the Indian leadership, the possibility of developing forestry activities with a large degree of control by a given organization should also be explored.

2. Santa Elena Meals for Millions

MFM is a nonprofit organization based in Davis, California, that is dedicated to nutrition-oriented self-help projects in nine countries. For the past 14 years, they have been working to help villagers on the Santa Elena peninsula with a variety of projects, such as raising chickens, beekeeping, and growing fruits and vegetables.

MFM's principal long-term goal in Ecuador is to help the population during the eight- to 10-year waiting period until Daule-Peripa irrigation water is available on the peninsula and, at the same time, teach them to use irrigation water from local sources. They employ a threefold strategy--demonstration, research and assistance to individual farmers. At present, the demonstration is Comuna Pajiza, with nine members who grow fruits and vegetables on two-and-a-half hectares, using irrigation water

from a well. They produce pineapples, melons, bananas and a variety of vegetables, such as tomatoes and yucca. During their first year of operation, they paid back half of their loan of 500,000 sucres from MFM's revolving fund and still had a number of crops to be harvested. Research is being carried out in cooperation with the Colegio Tecnico Agropecuario of Manglar Alto, and 100 individual farmers are being given technical assistance and seeds.

MFM technicians have realized that their demonstration farm could be improved with the application of agroforestry methods. An FSDP consultant, Mr. J. Tolisano, prepared a planting plan which included a windbreak of Leucaena on one side to provide forage for a goat-breeding experiment they have started. They also have plans for a number of fruit and timber trees that will be strategically located to reduce the speed of irrigation water flowing down one fairly steep slope. To incorporate agroforestry in their overall rural development strategy, MFM has been negotiating since early 1985 with DINAF and AID for funds under a new FSDP subproject, portions of which deal with agroforestry along the arid coast.

MFM has developed one critical dimension in operating a rural improvement program--public confidence. It has achieved this through successful demonstrations over the past 14 years in working with nine communes, seven satellite communes and 100 farmers. MFM believes its success in the fields of public health, nutrition and agriculture would continue with the development of an agroforestry component in its program. From a sociological standpoint, the most interesting aspect of MFM's work in Santa Elena has to do with the contacts and trust it have developed among people in different communities. MFM officials are aware that to be successful, community development projects should motivate people to self-help and -determination, rather than imposing a system of paternalism or the importance of outside schemes.

The MFM organization consists of a director, three agronomists, two nutritionists, a secretary and a driver. The volunteer staff includes one forester, four rural development specialists and two part-time staff members, an infrastructure lawyer and a small-industry specialist. Besides its own staff, it has been able to obtain the collaboration of about nine PCVs, some of whom work exclusively on MFM projects. MFM also has a good relationship with the caretaker of DINAF's nursery in Santa Elena. Project vehicles are two four-wheel-drive vehicles and a motorcycle. The head office is currently located in a small building in Santa Elena, where it has sufficient space to run the project. A new office has been set up in Quito.

In terms of assistance from FSDP, MFM would like an agroforestry specialist for at least six months to a year to help

them design and carry out their program. This individual could work full-time or come for a series of two-month periods. They would also need funds to buy another vehicle and such items as pumps, hose and fencing.

MFM has been negotiating an agreement for over a year. At first, DINAF insisted on a contract, but apparently, the legal difficulties implied by this procedure have been overcome and an agreement is expected soon. The budget allocated by AID for this project is US\$130,000, but the amount provided in the agreement is not yet known. According to MFM, their experience in Pajiza is having an effect in the area. Other groups have expressed interest in obtaining help to start their own plots.

Finding: Because of its established presence in Santa Elena, past and present field-demonstration experience, and interest in agroforestry, MFM seems to be an ideal extension agency in Santa Elena.

Recommendation: For this potential agroforestry subproject to be successful and contribute to the objective of strengthening the forestry sector in Ecuador, the evaluation team suggests that MFM develop more lines of coordination and cooperation with MAG dependencies, both in the region (including DINAF/Guayaquil and INIAP in Boliche and Portoviejo) and at the central offices in Quito. The Santa Elena MFM agroforestry subproject appears to have every chance of success and should be supported with technical assistance, vehicles and funds.

3. EMDEFOR's Shift in Focus Toward Agroforestry

EMDEFOR should have completed their contract for planting 2,000 hectares by the end of the 1986-87 planting season. An additional 2,000 hectares in the Sierra that were originally contemplated for planting by EMDEFOR will now be completed under Plan Bosque. Their relationship with peasant organizations could be helpful in the proposed agroforestry subproject. People in La Merced, La Pacifica and Galte Jatun Loma have expressed interest in the agroforestry subproject. They have received little or no technical assistance from MAG extension agents, except in Galte Jatun Loma, where people have received some technical assistance through an agreement between the government of Belgium and MAG.

This aspect of EMDEFOR's program has four main objectives:

- the change in focus will be from establishing plantations of very few species for production of industrial wood to integrating trees with agriculture on small parcels of land;

- the principal aim is to set up small plantations with multiple uses to supply the needs of the rural population and increase their income;
- protect the soil and agricultural crops, and improve microclimates; and
- provide other crops, such as fruit, honey and forage.

In general, the evaluation team found that EMDEFOR has done a good job in establishing links with Indian communities, and the sociologist has developed a good rapport with local people. However, he expressed certain doubts about staying with EMDEFOR for a long time because of the relatively low pay and a sense of job instability.

The FSDP highlands forestry specialist collaborated with EMDEFOR on the preparation of this particular agroforestry subproject. He has written most of the subproject paper and will help EMDEFOR carry out the proposed activities. However, the subproject is not something that one individual can or should do alone. EMDEFOR has apparently neither the agroforestry background nor personnel for the required positions. Besides, the reluctance of EMDEFOR to work with MAG extension agents, which has already been noted, could be detrimental in an agroforestry subproject where interinstitutional cooperation is essential.

Another important factor to consider for the success of the agroforestry subproject is that EMDEFOR will be dealing mostly with female heads of households, since men often migrate to other rural areas or cities. While the men are away, women care for the family's small plot and animals. Thus, to work with Indian women, who often speak only Quechua, it is important to have bilingual, female extension agents. A soil conservation project in the central Sierra has already used bilingual female workers with much success (Nations, 1985, p. 17).

Agroforestry plantings will be intended for multiple uses, such as fuelwood, posts, poles and construction materials, and may take the form of windbreaks, live fences, blocks and other agro-silvicultural or silvo-pastoral systems, depending on the circumstances. The projected cost will be 52,439,760 sucres for FSDP (80 percent) and 13,109,940 sucres for EMDEFOR (the remaining 20 percent), for a total of 65,549,700 sucres. DINAF's director has sent the project document to Mr. Salinas for revision, as he will administer the subproject. It still has to be approved by the director and MAG lawyers, and an official request to prepare an agreement has to be sent to EMDEFOR and then signed, which will require approximately four months.

Finding: The agroforestry project would be critically important to EMDEFOR in keeping their personnel occupied and aiding cash flow. This subproject would also meet FSDP's basic objectives of soil improvement and increased production for a higher standard of living.

Recommendation: The evaluation team supports the proposed EMDEFOR subproject. However, the present EMDEFOR project document does not include baseline studies, which could be used for future comparisons, and should do so if its success or failure is going to be measured. EMDEFOR's involvement in agroforestry should be supported in terms of both strengthening the organization and the need to provide material benefits to a large segment of the agricultural population in the Sierra.

D. Other Productive Forestry Activities

1. Central Maderera Palmira

The PP and loan agreement included provisions for small-scale demonstrations of portable, low-cost, small-scale sawmill, chipping and woodworking machines. These were to be located in areas where pine and eucalyptus plantations were reaching maturity. The demonstrations were intended to determine the classes of machinery that are suitable for the type of small wood production expected from plantations in the Sierra, and also to serve as an incentive to communities to plant trees by demonstrating an operating unit which would be a market for roundwood. The chipping machinery was included because at that time, there were expectations of a pulp industry.

The sawmill was established on the property of the Palmira Forest Cooperative in 1985 to utilize thinnings from the 1,000-hectare pine plantations served by the cooperative. The plantations were started 20 years ago and are still in progress under a tripartite agreement between the landowners who supplied the land, the government which provided seedlings and technical assistance, and the cooperative that did the planting. When it was organized, the cooperative had 50 members. However, during the lengthy interim period, many people left the area, so there are now only 24 members. Those who remained hoped to receive some benefit for the land, time and effort they have invested in the project. Their hopes were raised when DINAF bought the sawmill in September 1985. Since then, there has been some additional activity, such as building the infrastructure for the mill and the installation of different pieces of equipment. However, people are anxious to see the mill in operation, as their expenses are running as high as 13,000 sucres per month (7,000 for electricity and 6,000 for the caretaker).

The sawmill consists of an open-sided, roofed structure that houses the head rig and four-saw multiple circular gang. The other building is enclosed and of suitable size to house lumber-finishing machines and space for air-drying lumber. The sawmill is equipped with a circular saw and hand-operated carriage running on rails. The gang saw is equipped with live-roll feed, and all movement of lumber is done by hand. The secondary equipment consists of an edger, cut-off saw, side planers and tongue-and-groove machine.

AID paid for most of the equipment. The German Forestry Mission assisted by purchasing the rest of it, setting it up and plans to supervise mill operations until cooperative members can run it themselves. As there is no saw-sharpening equipment, the saws are sent to Quito once a month for sharpening. All the equipment was bought in Ecuador. DINAF's technical staff, the German Forestry Mission and evaluation team believe that the mill is now completely equipped.

The supply and quality of the logs observed in the pile behind the mill is satisfactory, with few defects and diameters of up to 50 centimeters. The machinery and equipment appear to be adequate for the purpose of utilizing thinnings from the plantations and suited to the cooperative members who will run the mill.

An important unsolved problem is distribution of the returns from thinnings. The original agreement stipulated that the owner of the property would get 25 percent, the government 10 percent and the cooperative 65 percent when standing trees are cut. Under the law, the government's 10 percent must be put up for auction. The only other possible bidder beside the cooperative sawmill would be one of the fiberboard manufacturers, who could only offer about 30 sucres per cubic meter. The estimated stumpage value of the wood is between 250 and 300 sucres per cubic meter. To address these difficulties, an agreement among the three parties has to be negotiated on the basis of the stumpage value of logs delivered to the mill, and these negotiations are currently underway. According to various members of the Palmira Forest Cooperative, they will continue to need technical assistance from DINAF.

The main difference between the expected and actual results of the project was that a permanently installed sawmill was established instead of portable machinery for conducting demonstrations in different areas. No portable sawmill equipment is available locally, and all the equipment was bought locally to reduce costs and strengthen the capability of local industry to supply the country's future needs for this type of equipment. Chippers were not purchased because there is no market for chips.

Project loan funds totaling US\$25,000 were provided to buy the equipment. The projected capacity of the sawmill is 2,500 cubic meters per year, given an eight-hour shift. If tongue-and-groove lumber and boards are milled in equal proportion and full production is attained (2,500 cubic meters), the operation's gross income would be approximately 19,600,000 sucres. Although it is doubtful that the sawmill will reach full capacity during the first year, this figure gives an order of magnitude to expect for returns. No figures were available to calculate a cost-benefit ratio. If a small drying kiln was added to the plant in the future, an increase in prices of 25 to 30 percent on the Quito market could be expected.

Findings: The Palmira sawmill fulfills the project's purposes and goal by providing an operating example of a small sawmill that can serve as a demonstration to other plantation owners of the kinds of equipment that can be obtained locally and types of products which can be made using them.

Recommendation: Cooperative members should continue to receive technical assistance from FSDP on both sawmill operation and marketing their wood products.

2. Technical Assistance on Logging Practices

This project originated from a perceived need for a road-layout specialist for management of the Sierra plantations. Mr. Jeff de Bonis was hired for this position, but on arriving in Ecuador, found that the DINAF reforestation department did not want his assistance. Thus, instead of working on the highlands plantations, he spent his two-month consultancy investigating logging methods in the tropical lowlands. His report emphasizes the destructive logging methods employed in the lowlands and the resulting heavy erosion. The techniques he observed and describes in his consultancy report are destructive not only of the land, but also residual timber, and are financially wasteful as well. In his second report, Mr. de Bonis offers suggestions for changes under a government-controlled system of licensing.

In the absence of much enthusiasm from AIMA or DINAF, Mr. de Bonis worked with a number of large plywood companies and visited logging operations to develop his reports. He advised loggers on techniques for reducing damage to vegetation and soils, particularly by not using their log-extraction machinery during wet weather. The principal forestry advisor distributed a number of copies of the reports, and Mr. de Bonis gave a seminar on his findings to AIMA. In a discussion at AIMA, a representative from that organization felt the report findings were not given enough publicity and there was a poor turnout at the seminar partly because AIMA was late in sending out the invitations. There was no further reaction or subproject activity. It is possible that

some companies have followed the consultant's advice by restricting their wet-season logging, but the team could not confirm this. The cost for this input was approximately US\$20,000.

AID proposed sending two groups of Ecuadoran industrialists, government personnel and logging contractors to learn about environmentally sound and economically advantageous logging practices in Surinam.

Finding: Due to a lack of receptivity in Ecuador's forestry sector, the logging practices consultancy was of little value. The consultant's report is valuable as documentation of poor logging practices, but nothing was done to address the problems noted.

Recommendation: No further FSDP inputs are recommended in terms of logging practices until there is more assurance of achieving useful results.

3. National Forest Protection Plan

The PP provided for technical assistance in forest entomology and pathology, but did not specify required activities. During his first short-term consultancy in 1983, a forest protection specialist (Dr. Gara) proposed a substantial expansion of this component to develop a national capability for detecting, diagnosing and controlling disease. The objective of this subproject and the forest protection plan, which was produced by the end of 1984, is to develop this capability. Its long-term success will depend not only on the existence of staff and laboratories, but also on whether they function as part of an active system for protecting forests from disease.

Ecuador has an investment in some 53,000 hectares of plantations and is planning to increase this amount by over 10,000 hectares annually through Plan Bosque. It is only sensible that this investment be protected in the future against fire, insects and disease. Of course, fire protection would include the remaining natural forest and shrubby growth that protects steep slopes from erosion. Recent attacks by Leucolopsis pulverolenta on Pinus radiata in the Sierra point to the urgent need for an organized forest protection plan.

The plan was designed to function through a DINAF department, located in the Forestry Centre at Conocoto. It was divided into two phases, the first of which was to set up diagnostic units at three institutions. The centers were to be located at Loja University, the Catholic University of Ecuador and Tumbaco Phytosanitary Unit.

During the first three years, while the Conococo center at was being developed, the diagnostic centers were to analyze entomological and pathological attacks, causatory agents and suggest control methods, while training students in these disciplines. The diagnostic unit at Quito is to be established under the direction of an entomologist, Dr. Giovanni Onore, who will be assisted by a PCV specializing in forest entomology or pathology. The diagnostic unit at Tumbaco would be under the direction of a pathologist, Mr. Abraham Oleas. The Loja University center would be headed by Mr. Francisco Sarmiento and Mr. Alfredo Samaniego, who specialize in entomology and pathology. The fire-protection specialist running the course at Loja was to design a questionnaire to determine the fire history for the forest districts, set up a forest-fire danger rating, establish a system of reducing fire risks on plantations, organize a system for fire detection and a training system for fire suppression, and initiate short courses for workers and forest rangers, technicians and engineers. In addition, Loja was to set up a course in fire protection.

Once there were enough trained technicians and Conocoto could take full control of the forest protection plan, the diagnostic centers would become strictly investigative units under an agreement with DINAF. The forest fire control program was to be under the direction of a PCV, Mr. Joseph Peters. Sufficient laboratory equipment was purchased to equip the three diagnostic centers and Conocoto.

The second phase envisioned a permanent organization as part of DINAF with a department chief, training coordinator, pathologist, entomologist and fire specialist. Each district would also have a chief whose duties were to include inspections to detect and evaluate insect and disease problems, set up an extension service, organize fire-fighting units and establish forest-protection courses.

According to the plan, in 1985 and 1986, Dr. Eduardo Martinez would study in Mexico, while DINAF, with the assistance of FSDP, would coordinate the diagnostic center and forest fire control activities, and prepare pamphlets on pest control. From January to September 1986, DINAF and other FSDP personnel are supposed to formulate a forest extension program, prepare guides to forest insects and diseases, finish the investigation projects and publish the results, present short courses on forest protection and coordinate programs at the diagnostic centers.

The two university diagnostic centers began work in January 1986, allotting space for the laboratory equipment and organizing their staff members. At Loja, the Dean of Forest Engineering, Mr. Sarmiento, is the center's administrative head. Mr. Samaniego, an entomologist, is head of the department. Mr. Napoleon Lopez is the pathologist, and Mr. Peters, a PCV, teaches

fire protection. Three graduate students work with the three professors. Three large rooms have been assigned to house the equipment for the entomology, pathology and fire-protection laboratories, and also serve as classrooms. There are 22 students in their third year and 18 in their fourth who will be taking the three courses, and it would appear that about the same number will do so in future years.

A beginning has been made on collecting and identifying insects that are considered serious pests on plantations, an inventory of insect infestations has been undertaken, and an entomology course is being prepared. Collections of tree fungi have also been started, a text is being prepared and classes taught on the subject. A number of studies have been initiated on fire protection and control, such as the effect of fire on soil and vegetation, a forest fire danger index, identification of species that come up after fires on sample areas (this work is being done in cooperation with the army), results of a 1,200-hectare fire in the Podocarpus National Park and the Galapagos fire. In addition, a questionnaire has been prepared to develop a fire history for the forest districts.

Controlled experimental burns have been initiated to teach rural people safe, efficient methods for clearing land and improving pasture. A text is being prepared on fire prevention, detection and suppression. Also, various courses have been given, such as a three-week course for 21 district foresters and other technical personnel from Conocoto, another on Galapagos, a two-day workshop conducted with CARE in two indigenous communities and a course offered under an agreement with civil defense.

Dr. Onore of the Catholic University in Quito has space in his laboratory for the new equipment and has developed a large library of entomology specimens. He began work in January 1986 with his graduate assistant, Ms. Joy Wolfson, collecting specimens and inspecting areas (on request) to identify insect infestations. His fourth-year entomology class usually numbers 15 to 20 students, but there is no pathology professor as in the case of Loja.

The Tumbaco Phytosanitary Unit has not signed an agreement. They say they are waiting for Mr. Gara to return on 16 June for two months.

The following technical assistance costs (mainly from grant funds) have already been disbursed or committed:

- Mr. Gara's visit--US\$4,000;
- one-year contract with Mr. Gara--US\$84,000;

- short tours for the pathology entomologist-- US\$10,000; and
- Mr. Gara's work for June to August--US\$15,000.

These costs total US\$113,000. Grant fund payments of up to US\$150,000 have been approved. In addition, loan funding of US\$210,000 has been allowed for hiring another consultant for two years. However, after withdrawal of the candidate, Mr. Peredo, there is no immediate prospect of filling this position.

The major difference between expected and actual results has been that the Forestry Centre at Conocoto has not been set up, and it appears that nobody is now responsible for coordinating the project until Dr. Martinez returns from Mexico. A Chilean pathologist was slated to go to Loja to assist in setting up the course in pathology, but decided not to come. Mr. Peters, the fire protection expert, is going to leave in December 1986, and no replacement has yet been found. There is no PCV forest pathologist assigned to help Dr. Onore at the Catholic University center. The forest protection plan did not include provisions for protection activities between the start of work at the diagnostic centers and the director's return from Mexico.

This work has been severely hampered because all the laboratory equipment has been in customs for over three months. The professors have borrowed microscopes from other departments and have only limited amounts of glassware, purchased locally. In addition, transportation problems have limited the ability of researchers to examine infestations or fires, or make field trips to collect samples. The subproject originally envisioned renting cars, which proved impossible in Loja and too expensive in Quito. On 28 May, DINAF's director turned down the purchase of two Ford trucks. The director of the Loja center has borrowed a MAG vehicle, at their convenience, four times over the last three months for a total of five days. There are few texts in Spanish for teaching the three subjects and no reference materials, such as technical journals. AID could buy these on receiving a request from DINAF. No one at DINAF has been assigned responsibility for the project, and thus, there is no one to coordinate the forest protection plan and help solve problems.

The project's most immediate need is for someone to be given responsibility for coordinating the project as well as to recognize the value of setting up action plans for the control of fires and insects by DINAF. Dr. Gara plans to work on an agreement with the National Civil Defense to gain access to military personnel for developing forest-fire combat teams, which will partly address the lack of a forest-fire action program. The evaluation team assumes that the basic prevention and suppression effort will be based in the forest districts, including the training of staff and workers in fire detection and

suppression. Such an effort would also include caches of fire-fighting equipment placed strategically at the ranger's residence and local transportation for teams. The new teams may be summoned when a fire is detected, but in the interim, DINAF must have some capacity for fire control.

There is some question about the adequacy of funds in the budget for the agreement, especially for items purchased locally. The pact was signed when a dollar was equivalent to 77 sucres, but it is now equal to 110 sucres, a drop in value of 43 percent. This means there is far less money for glassware and chemicals in the budget than planned. In addition, the Loja and other diagnostic centers need vehicles to carry out the fieldwork associated with fire protection and collect field samples for entomology and pathology studies.

Finding: Though good progress has been made in terms of developing and beginning to implement a national forest protection plan, basic resources are still needed to translate the plan into action. Still lacking is a clearly defined mechanism for putting the resources of trained students and new laboratories to work. The establishment of laboratory facilities and continued undergraduate training at the Loja and Catholic universities will be a direct contribution to institutional strengthening only if a mechanism is set up for coordination and implementation of the forest protection plan.

Recommendation: FSDP must find ways of turning the plan and diagnostic laboratories now being established into a functional system for the control of diseases, pests and fire. This will require a coordinator, control center, communications network and field system, all of which should receive immediate attention.

4. Flora del Ecuador

This subproject arose from initiatives at the Missouri and New York Botanical Gardens to carry out botanical studies in rain-forest areas. AID was asked to help, and DINAF agreed that loan funds could be used. Like some of the other subprojects, this activity was not prescribed in the PP, but arose from subsequent ideas and may be justified by wording in the PP that refers to the lack of botanical information and its importance in forest management. The study was funded for two years, until February 1987, by FSDP, AID and the botanical gardens.

Two U.S. botanists and a number of DINAF staff on annual contracts have made very substantial progress in collecting and annotating botanical specimens. One set of specimens is being incorporated into the Conocoto herbarium, and duplicates will be placed in the proposed Ecuador National Herbarium, Missouri, New York and elsewhere. The two main orientations of this study are

dendrology, leading to publication of a guide to the trees of eastern Ecuador, and ethno- and economic botany to accumulate information about useful plants in lowland forest areas. The ethnobotanical information is recorded on herbarium sheets and will be stored in a computerized data base.

The two DINAF foresters working on this subproject will soon be going for short periods of practical herbarium training to Missouri and New York. Two biology graduates from the Catholic University are also each being funded for 10 months of training in herbarium management in Missouri and the economic botany of plants in New York.

According to their reports, the botanists were originally working in complete isolation from other FSDP activities as well as other ethnobotanical studies. Gradually, they built up confidence in certain communities and developed contacts with botanists working in other locations who may be able to extend their areas of study. In recent months, they have begun working in the Napo agroforestry subproject area in collaboration with the staff of that program.

Inevitably, much remains to be discovered about the trees and ethnobotany of the country's eastern regions, but the botanists will now have to concentrate most of the remaining time on herbarium work, if the project is to end on time. They wish to continue until early 1987 to take advantage of their increasing contacts, if funding can be provided. Their current contract has no provisions for compiling and reporting the ethnobotanical information, which will be located only on herbarium sheets in Ecuador, and on sheets and in computer storage in the United States. Compiling and publishing this information will not be possible within the current subproject period.

In discussions with the agroforestry subproject advisors, it has been proposed and agreed that Flora del Ecuador staff members should continue part of their work in very close collaboration with the agronomists, training and motivating them to collect information from colonist farmers, thus resulting in better trained field staff and more data. The team feels that in this way, the botanists could make more progress toward the objectives of both their subproject and the main project.

Finding: The Flora del Ecuador subproject is still collecting basic information and is producing a book that will be of great long-term value for forest management, botanical science and economic production.

Recommendation: This subproject should be extended until the project completion date, under the condition that provisions be made for publishing a substantial part of the ethnobotanical

data and integrating the agroforestry extension staff into the information collection system. The Flora del Ecuador study will be most useful if this work is more closely integrated with the agroforestry subproject, taking advantage of the agronomists' close relations with farmers and any improved contacts with indigenous communities. The ethnobotanical results must be published if they are to be useful. With these stipulations, it is recommended that this subproject be extended for at least one year.

VII. PROTECTIVE FORESTRY

A. Overview

This section deals with watershed and protective forest management, the third component of the project. It was designed to be smaller than the productive forestry component at a cost of US\$1,950,000. Its design recognizes the importance of conserving and managing forests whose primary function is environmental protection. Watersheds, soil conservation and mangrove forests are specifically mentioned in the PP. Apart from the value of the forests themselves, resources that require protection include dams and hydroelectric schemes with forested catchments; agricultural soils vulnerable to flooding, erosion or sedimentation; and the shrimp industry, which is dependent on the productivity of mangrove forests.

The purpose of this component was to increase the practical capabilities of DINAF, INECEL and other agencies to map areas (including interpretation of aerial photographs, field verification, land-capability classification and other techniques), physically demarcate them on the ground, prepare and implement management plans, and carry out soil conservation and revegetation measures, as required. The three principal efforts prescribed in the PP were:

- strengthening the capacity of PNF (DINAF) to delimit, classify and develop management plans for areas specified as protective forests, including 60,000 hectares of the Paute River watershed, followed by 500,000 hectares of the Jubones and Daule-Peripa watersheds and coastal mangroves;
- watershed management and rehabilitation field demonstrations indicated for funding by this project included protection of degraded land in the Paute Watershed with natural vegetation and revegetation; and
- technical assistance to INECEL's watershed management unit.

FSDP's contributions in protective forestry do not precisely parallel those mentioned in the PP (listed above). Project contributions to protection of forests and watersheds are summarized below and analyzed in detail throughout the rest of this section.

- Short-term technical assistance and funds have been provided for the Pichincha protective forest and management plan. The protective forest in the

Pichincha Province has been mapped and demarcated, and a management plan is now in operation.

- Funds and equipment for mapping and interpretation of remote sensing have been provided to DINAF's Patrimonio Forestal program for surveys of potential protective forests. This equipment has not been accompanied by technical assistance. Approximately three billion hectares of forest in the Napo and Esmeraldas provinces have reportedly been mapped and demarcated, but there is no classification or management plan yet.
- Technical assistance has been provided for the Paute watershed, where some areas have been declared protective forests. However, these areas are not yet mapped, demarcated or managed.
- Eighteen months of technical assistance have been provided to the INECEL watershed management unit. The concrete results of this contribution have been small.

The evaluation team was told of two major conceptual difficulties that apparently arose before project activities began and have had a strong effect on implementation of the protective forestry component. The first concerned the meaning of the term "delimit," which was understood as either marking the boundaries of forests and other protective areas on maps or their physical demarcation in the field, such as cutting survey lines and building boundary markers. In the context of the PP, both meanings are logically included, and both activities have been carried out (albeit on a small scale). Mapping and map interpretation are essential components of land-use planning and management. Likewise, the goal of a "strengthened capacity" to manage and present a model of "hands-on learning-by-doing" (PP, pages 19 to 20) must mean implementation of field management activities by DINAF or other project staff, which necessarily involves the physical marking of protective forest boundaries. DINAF apparently understands this, as the Patrimonio Forestal subproject has concentrated on mapping thus far, while the Plan Pichincha subproject includes both mapping and demarcation.

A second difficulty arose when DINAF's director made a decision to place the main protective forestry priority on conserving existing forests with protective value, rather than rehabilitating areas that are already degraded. This decision was explained to the team as arising from an empirical conclusion that expenditures on protecting existing forests yield far greater benefits than an equal amount spent on rehabilitation, in terms of plant resources conserved and avoiding soil erosion. The situation was further complicated by contradictions between

the responsibilities and capabilities of PRONAF, PRONACOS, DINAF and INECEL to manage different elements of water catchments. Thus, the field demonstrations prescribed for the Paute watershed were not carried out.

B. Plan Pichincha

The Pichincha range is a major feature along the western margin of Quito. In recent years, housing and agriculture have been extending rapidly onto lower slopes and valleys. In some areas, housing has already been constructed beyond the zone mapped as the urban limit for the year 2020. These activities, combined with road construction, grazing, mining and fires, have greatly increased not only the damage caused by occasional floods and landslides, but also the intensity of flooding and erosion, especially when houses, roads, mines and the destruction of vegetation have interfered with local drainage. Indeed, recent events (most notably in 1976 and 1983) have resulted in deaths and extensive property damage.

Because of the concern about such damage, the eastern slope of the Pichincha volcano was declared a protective forest, under the responsibility of DINAF's Departamento de Areas Naturales y Vida Silvestre. A working group was formed by DINAF, Fundacion Natura, the provincial council and MEC to prepare proposals for the Plan Pichincha subproject and participate in management decisions. FSDP provided technical assistance and other funding to prepare and implement a management plan, and there has been active collaboration between AID and DINAF personnel.

In the subproject implementation letter, this subproject was defined as falling under component C.2, field demonstrations. In reality, the evaluation team believes it is closer to C.1, a demarcation and management activity, which has strengthened DINAF's capabilities, rather than serving primarily as a demonstration. The initiative for this subproject came from DINAF and other authorities as an emergency measure in response to recent flood damage. It was not specifically mentioned in the PP, but fits objectives of the PP exactly and could clearly be used as a management learning experience when DINAF designs plans for other areas.

According to documentation and the activities carried out, the subproject's objectives were to evaluate and describe the resources and land-use practices in and around the Pichincha volcano, prepare a management plan in collaboration with other interested parties and involved organizations, and implement the plan as the beginning of long-term practical management. The management plan was designed to maintain certain valuable protective functions of the area (e.g., flood and erosion control, flora and fauna), while permitting other activities

within limits that are consistent with the area's main protective function and legitimate interests of land users (for instance, agricultural crops, livestock, recreation).

The principal achievements of this subproject have been:

- a long report providing background information used in preparing the management plan (INFORME FINAL DEL ASESOR PARA EL PLAN DE MANEJO BOSQUE PROTECTOR DE PICHINCHA, A. Moore, R. Quesada and M. Corbut, April 1984);
- the management plan, containing many maps (PLAN DE MANEJO, A. Moore, R. Quesada and M. Corbut, December 1984); and
- management in action--a surveyed boundary has been demarcated on the ground with wooden and concrete stakes, around approximately 90 percent of the area, and this work is continuing.

The protective forest is regularly patrolled by guards, each of whom has his own territory and lives in a community adjacent to the boundary. The area is visited every two weeks by the responsible DINAF official, who also maintains regular contact and discussions with local residents and representatives. Arrangements have been made for dealing with fires and new settlements, including an agreement with the army.

A large measure of agreement and cooperation has been obtained with some, but not all, of the committees representing local communities about the principles of limiting the intensity of cultivation and grazing. Some communities are still negotiating or resisting demarcation of the boundary, but earlier experience suggests that their cooperation will be assured when they realize that land ownership will not be affected. Cultivation will not be prohibited, and grazing and other issues are subject to negotiation. No general agreement has been reached about managing grazing intensities, but the ARD evaluation team was informed that owners of the largest herds are not economically dependent on their livestock and are believed to be open to persuasion, whereas poorer owners with small flocks are not a cause for much concern. Land invasions for housing developments for the poor have been and will continue to be a problem, particularly at the northern and southern ends of the mountain. Control of squatters will not be easy because of their numbers and support from certain political groups.

The problems encountered here are found in most regions--the social and economic necessity to protect vegetation and soil resources in the reserve and the city of Quito outside the area from deterioration or destruction, established legal rights of

landowners, and basic needs of land users. To solve these problems and achieve the conservation objectives, DINAF staff and others have resorted to discussion, compromise and agreement with many interested parties, aiming at an adequate, but realistic, level of conservation. Ideas are being developed for a visitors' center with exhibits and marked trails of various lengths for recreation and education, thus creating a resource of great value for the people of Quito.

Unfortunately, administrative delays have prevented the implementation of some activities planned for 1986, including buildings, equipment and staff for fire control and soil conservation interventions. Certain owners of land, plantations or buildings within the protective forest are reported to be planning further construction, which will reduce both the protective and recreational value of the reserve. Agreements about grazing intensities still need to be worked out.

Finding: The evaluation team was very favorably impressed by the philosophy behind Plan Pichincha, as well as the success, energy and enthusiasm with which it has been implemented. Continued support for improving management will not only help DINAF achieve its local objectives, but will also develop the practical capabilities of the staff involved and improve the prospects for sound management in the many other protective forest areas that are now being delimited. A failure to solve the administrative problems and/or to deal with the outstanding land-use issues in this conspicuous project will discourage the staff and reduce the capability of DINAF to implement protective forestry activities elsewhere. This makes it crucial to ensure its continuing success.

Recommendation: Given the success of Plan Pichincha management to date, the probability of failure if designated funds are not made available, and benefits to the people of Quito should sound management continue, it is recommended that AID funding continue to support this DINAF project. It is recommended that funding be continued to support management activities, increased official support be given for negotiations with owners of crucial properties which are most vulnerable to damage or most valuable for conservation purposes, and FSDP provide further funds to improve access (e.g., vehicles, tracks), publicity materials and visitor facilities.

C. Patrimonio Forestal

Patrimonio Forestal is the name for a program of forest demarcation and reservation that is being carried out by DINAF. It is still in its early stages, and at the time of this report, the forests surveyed have not yet been legally reserved. AID and technical assistance staff have not been involved in the

fieldwork or mapping, and the expenditure of loan funds has been small. However, in the opinion of the evaluation team:

- this program has potentially enormous importance for the conservation and management of Ecuador's forests;
- faces some serious problems in terms of acceptance, especially by indigenous communities and settlers without legal land titles; and
- through FSDP, AID could make a much larger contribution to its success.

For these reasons, Patrimonio Forestal is discussed in some detail here.

DINAF's Patrimonio Forestal program has been implemented through the management department, in collaboration with IERAC, INERHI and PRONAREG. The objective is to map, demarcate on the ground, and provide legal and physical protection for principal areas of the remaining intact forest throughout Ecuador. According to current regulations (e.g., Acuerdo Ministerial, R.O. 204, 11 June 1985), forests that are not in national parks or other reserves, and not on private lands (with titles issued or in process), can be included in Patrimonio Forestal. Land occupied by indigenous communities, with or without legal title, can also be included in Patrimonio Forestal to give them and communal land greater protection against unauthorized logging or settlement and land speculators. However, forestland settled by colonists is not included in Patrimonio Forestal. The team was told that logging and cultivation may also be authorized by the GOE, as appropriate. Indeed, some forestland, that is currently unoccupied, but with high agricultural potential, has been excluded from Patrimonio Forestal to allow for continued settlement and avoid future conflicts with settlers.

The project's official specific objectives (DINAF, August 1985) are to:

. . . determine the limits and borders of forests belonging to the state, using technical studies and other adequate methods; establish areas of better use, exploitation, management and conservation of vegetation as important components of the country's renewable natural resources; identify specific zones for the planning and rational use of existing forest resources and those which should be set aside in the future; identify zones appropriate for future human settlements and those where there are existing settlements; acquire knowledge of the geographical location of forests and vegetation which protect

. . . watersheds, with a view toward implementing conservation activities; and utilize information on the potential of the land for its better use and exploitation.

Article 2 of the Acuerdo Ministerial prescribes that DINAF, with IERAC, "delimit lands that are in the possession of indigenous communities with the purpose of guaranteeing their territorial integrity, assuring their survival and conserving existing natural resources."

The delimitation procedure has three steps. The first phase includes a study of existing maps and aerial photographs, with ground checks, and inquiries of all interested organizations, such as IERAC, which results in the production of a preliminary map. The second step involves a field survey and the physical marking of boundary lines with surveyors, along with production of a provisional map and printed report on the areas, boundaries and methodology. Finally, there is to be very widespread publication of boundary details in the press and public places in the provinces concerned, followed by a six-month period during which any protests must be reported. The protests will be investigated immediately, and any necessary changes incorporated in the maps and survey data. At the end of the prescribed period, a definitive map will be prepared and legally registered.

As of the writing of this report, the first two phases have been completed, in Napo and Esmeraldas provinces. Provisional maps and reports were prepared in August 1985. After some delays, it is expected that the details will be published soon, followed by the six-month period for evaluating protests. The mapping and surveys have yielded the information in the following two tables.

Napo Province

<u>Status</u>	<u>Hectares</u>	<u>Percent</u>
forestland	2,595,940	50.6
occupied land	1,116,204	21.8
parks and reserves	1,271,708	24.8
rivers	20,000	2.4
non-delimited area	<u>124,124</u>	<u>0.4</u>
total	5,127,976	100.0

Esmeraldas Province

<u>Status</u>	<u>Hectares</u>	<u>Percent</u>
forestland	473,920	31.5
occupied land	866,240	57.6
parks and reserves	<u>164,680</u>	<u>10.9</u>
total	1,504,840	100.0

In four other provinces (Pichincha, Imbabura, Pastaza and Carchi), the first stage has nearly been completed and will result in preliminary maps soon.

The principal advisor has presented his critical comments on the Patrimonio Forestal reports, but there is no regular collaboration between DINAF and technical assistance staff members. FSDP has contributed equipment valued at US\$33,000 for mapping and interpretation, as well as funds for fieldwork and publicity. The disbursement of extra FSDP funds is being held up partly because DINAF has not accounted for money already disbursed. However, DINAF has continued with fieldwork and mapping as well as efforts to obtain more money and technical assistance, in spite of acknowledged shortages of staff and funds. The evaluation team cannot explain why DINAF has not shown more interest in obtaining advice and technical assistance from FSDP, but it is clearly not because it does not wish to get on with the program.

It was not possible or appropriate for the evaluation team to spend time in the field checking the precision of the provisional maps for Napo and Esmeraldas provinces. In theory, any important errors will be corrected during the six-month period for protests, particularly the inclusion of privately owned land. However, there are several issues which require comment.

The first is the principle of giving legal status and protection to natural forest areas that have not yet been allocated to private ownership or conservation. The evaluation team considers this to be a sensible and necessary step towards rational land use and resource conservation. The forests, soils and water resources are of regional, national and permanent importance, and the government has a duty to determine that they are well used and managed. Thus, a legal definition of forest boundaries and status is required, although it does not, as such, ensure rational use.

The six-month review period is designed to cope with disputes and mapping errors. The future will show whether the mechanisms for dealing with disputes resolve or aggravate

problems. The fact that many of the mapped boundaries are a series of straight lines suggests that patches of forest are excluded and some non-forest areas are included in Patrimonio Forestal.

At present, the management department does not have the human resources to patrol and protect the proposed Patrimonio Forestal or to prepare and implement management plans. The team was told of plans to recruit 300 forest guards, although no funds are currently available for additional staff. In view of difficulties already experienced in protecting and managing existing national parks and conservation areas, there are major doubts about DINAF's ability, as currently financed, to fulfill its objectives for Patrimonio Forestal.

Patrimonio Forestal is a controversial program with the following implications for native communities:

- it incorporates areas already adjudicated to Indian communal land, some of which were already in the process of receiving title (e.g., San Pablo of the Siona-Secoya);
- initially, it denied the existence of native and colonist settlements in areas of Loreto and Limoncocha (where some of the best lands are found and thus eagerly sought by agribusiness);
- it limits Indians' right to utilize their land as they want and puts them at a disadvantage compared to colonists--there are also doubts about whether Indians will be reached by the proposed widespread publication of boundary details, and their ability to protect themselves against unjust decisions in the time available; and
- some DINAF officials have openly declared their interest in favoring oil-palm plantations for proposed Patrimonio Forestal areas, such as Loreto and Limoncocha--a DINAF official confirmed that two concessions to oil-palm companies are being processed, and the team learned through indigenous leaders that an oil-palm company formed by high-ranking military officials is in possession of a large tract of land in the Shushufindi-Panayacu area.

The suspicions of Indian communities about this and other MAG activities (including the Napo subproject) have been increased by several official documents, which are summarized below.

According to its 1985 technical report, one of the objectives of the commission for delimitation of Patrimonio Forestal was to determine an area called Reserva del Patrimonio Forestal to be set aside for African palm cultivation.

By Acuerdo Ministerial No. 0431 of 8 August 1984, MAG declared as forest reserves for delimitation and incorporation into Patrimonio Forestal three areas of 11,000, 10,000 and 35,000 hectares, the first of which is located in Parroquia Loreto and the other two in Parroquia Limoncocha of Napo Province. After a field visit, MAG's technical director for African Palm (memo 750 SSA/DT, 17 December 1984) indicated that he had found much unrest in the Loreto area because all land titling and credit had been suspended for native and colonist settlers in the area. He also noted that the area was occupied by different settlements, a fact overlooked by the commission (apparently because its report was based solely on office work), and he did not think it was practical to resettle the natives and colonists living in Loreto. Then, he suggested that the declaration of Loreto as a state preserve be lifted and African palm projects be carried out, taking into consideration existing land tenure as well as natives' and colonists' preferences regarding crops.

On 16 December 1984, the leaders of some native and colonist organizations in the Loreto area wrote a letter to the Minister of Agriculture. They had learned of different official projects to use the land for African palm and requested that such projects not be implemented because to do so would violate their rights. Then, the head of the commission for delimitation of Patrimonio Forestal (memo 66, 9 January 1985) stated that the technical report was based on all the documentation available, particularly that provided by PRONAREG and IERAC. He added that soils in the area of Loreto are suitable for agriculture and ranching, although currently covered by forests, and once cleared, should be used for various forms of cultivation, especially African palm. In response (oficio 66, 12 January 1985), DINAF indicated that about 11,000 hectares in the Loreto area had been declared Patrimonio Forestal and after the natural forest is exploited, the land will be turned over to IERAC so that it can carry out colonization activities oriented toward tree crops, agroforestry and especially palm plantations.

The organizations of natives and colonists wrote to MAG again, this time to the DINAF director (letter dated 9 February 1985) stating, among other things, that delimitation of Patrimonio Forestal has not taken into consideration the fact that the area was occupied and already incorporated in IERAC colonization plans. They questioned DINAF assertions that the area can first be declared Patrimonio Forestal and then given back to IERAC for colonization as well as agroforestry and palm plantations. Finally, they demanded that their rights be respected.

By Acuerdo Ministerial No. 0177 of 11 June 1985, the Minister of Agriculture decided to invalidate the previous Acuerdo Ministerial (No. 0431) because of contradictions found in the original report, the implication that the intention was not to preserve forest resources, but expand African palm plantations, and opposition from native and colonist organizations in the Amazon region. On 18 July 1985 (memo 180), the commission reported that after making some field visits, of the 11,000 hectares of the Loreto area declared as Patrimonio Forestal, only 3,920 were not occupied by natives or colonists. The report recommended that these 3,920 hectares be colonized through special projects. Regarding land in the Limoncocha area, the report is inexact concerning the area legally occupied by Indian communes. For instance, it states that the Siona-Secoya have only 3,700 hectares, when in fact, they have legally been adjudicated over 7,000 hectares.

Some errors have been made in the Patrimonio Forestal program in handling matters that affect natives and colonists in the Amazon region. These errors might have been avoided if DINAF had requested technical assistance from an anthropologist/rural sociologist with ample knowledge of and contacts in the region to improve communication and reduce misunderstandings. The natural unrest caused by the first Acuerdo Ministerial (No. 0431, dated 24 August 1984), which declared state reserves for eventual African palm plantations on some large tracts of land in the Loreto and Limoncocha zones, could have subsided with the second Acuerdo Ministerial (No. 0177, dated 11 June 1985) that repealed it. However, DINAF missed this opportunity to gain the collaboration of indigenous people by not using the change in policy to dispel their fears and eventually persuade them to participate in an agroforestry project or perhaps propose a new one.

Finding: Patrimonio Forestal has made substantial progress in the demarcation of forest boundaries in two provinces, but has a long way to go to achieve its objectives. It is severely restricted by a lack of vehicles, staff and practical management experience as well as a functional mechanism for resolving sociologically based and land-tenure disputes. The evaluation team considers this program to be of critical importance for assuring the future sound management of forests that are not yet assigned to private or communal ownership.

Recommendation: Noting the potential value and problems of the Patrimonio Forestal program, closer FSDP collaboration is recommended, leading to funding and technical assistance for the work done by DINAF-Manejo, especially the preparation of management plans. This program should place special emphasis on resolving the contradiction caused by including oil-palm objectives and occupied communal land in Patrimonio Forestal, and make use of the experiences of the Plan Pichincha and Portoviejo

subprojects. Equipment, vehicles and specialized support (particularly management planning) should be provided to ensure successful identification, demarcation, protection and management of Patrimonio Forestal. An arbitration mechanism (including sociologists* and IERAC) should be established to settle disputes and clearly determine the limits of communal and indigenous rights.

D. INECEL--Watershed Management

Under an agreement between AID and INECEL (not part of the DINAF and AID agreement), 18 person-months of consultancy services were provided by Drs. Corliss, Alexander, Nations and Southgate, with the objective of strengthening INECEL's watershed management capability. These consultants produced several separate technical reports (see the bibliography), which were presented in a combined 225-page volume in February 1986. Of several recommendations made by the consultants, one of the most significant was that INECEL should participate in, but not lead, activities in soil conservation and watershed rehabilitation and planning.

Interviews with DINAF, INECEL and AID personnel revealed dissatisfaction with the collaboration between the consultants and INECEL. There was clearly a major lack of mutual understanding and collaboration. Among several problems mentioned by AID and INECEL officials, the most critical was that INECEL staff and the consultants spent very little time working together, principally because INECEL staff members were not available to the extent specified in the agreement.

It was not possible for the evaluation team to determine, after the fact, how and why the initial collaboration broke down. Too many diverse elements played a role, and the team was not present to observe them. However, the conclusion remains that the teaching and learning process that was originally planned did not occur. The team suspects that the collaboration of INECEL staff with the consultants failed when it became apparent that the principal consultant was in favor of no more than a coordinating role for INECEL, leaving much of the practical soil conservation work to other organizations. However sound that recommendation may be, it did not correspond to INECEL's intention to take a leading role in implementation, nor to the kind of advice INECEL wanted from its consultants.

The Paute watershed is one of the main areas of interest for the INECEL watershed management unit, UMACPA. Both INECEL and

*Please also note the recommendation at the end of Section VIII on FSDP's sociological implications.

DINAF are working on forest and soil conservation in Paute, which is one of the main areas indicated for intervention in the PP. Thus, some additional information about INECEL's activities and FSDP's potential role are appropriate.

The agreement between INECEL, CREA, INERHI and DINAF that formed the first UMACPA came to an end in November 1985 and was not renewed. UMACPA now exists as a management unit within INECEL and has been active in soil conservation and tree planting. INECEL is conducting precisely the sort of watershed-management and soil-conservation demonstration activities described in the PP. However, the previous director of DINAF did not want DINAF to become involved in these activities.

At present, INECEL and MAG are about to finalize a new agreement concerning protective forests in the Paute watershed, including their definition, demarcation, protection and management. The district chief in Cuenca (with a total staff of three forest technicians) and DINAF's management department are actively involved in this effort. This activity corresponds exactly to FSDP's main protective forestry component, but FSDP is not involved.

Proposals have been prepared for a project of more than US\$20,000,000 for management activities in the Burgay, Jadan and Gualaceo (Santa Barbara) sub-watersheds and Paute Valley. Negotiations with BID are well advanced, and funding is expected in late 1987. Meanwhile, INECEL has applied for technical assistance from FAO and funds (several hundred thousand dollars) from UNDP for pilot-scale and demonstration activities in the Jadan micro-watershed.

INECEL's UMACPA unit has a field staff of three agricultural extension workers and two agro-foresters, who have implemented extension activities, including planting herbs and bushes for biological soil stabilization, raising seedlings, tree planting, soil conservation with terraces and absorption ditches, gully control, and the protection of small watercourses and riverbanks. They have engaged in some collaboration with MAG, CREA and CARE, but their resources are very limited. However, they appear to have good relations with many communities, and their soil-conservation activities have been carried out on hundreds of small properties (mostly at sites of a few hectares, distributed among several village communities, each of 40 to 60 families). The areas involved are very small in relation to the size of the watershed, but do indicate a serious intention.

In collaboration with DINAF, INECEL has identified large areas of potential protective forests on old maps. These will require demarcation and management as part of the watershed protection program.

Finding: INECEL is engaged in practical soil-conservation and land-reclamation work on a small scale with promising results. DINAF staff are collaborating locally with INECEL on the protection of forests. The evaluation team perceives these activities as an extremely important start toward resource conservation and watershed management, corresponding closely to FSDP objectives.

Recommendation: Since the MAG-INECEL agreement is imminent, FSDP should be ready to seek ways to support forest delimitation and field demonstration programs in the Paute watershed. One option would be to have DINAF take the initiative in protecting existing forests, and promoting tree- and shrub-planting in critical parts of the Paute watershed, in order to develop practical techniques, experience and management plans in preparation for the subsequent BID-financed project. FSDP could finance the fieldwork, vehicles, nurseries and equipment. Technical assistance, if required, must concentrate on close and practical collaboration in field activities.

E. Mangroves

The PP description of the watershed and protective forest management component includes a mention of coastal mangroves among the economically important areas requiring protection (see Section VII.A). Under FSDP, no activities have yet been carried out in terms of mangrove protection, although a proposal has been accepted, in principle, to send one or two DINAF staff members to study mangrove management systems in Southeast Asia. This proposal may be refused at the ministerial level, if current policy continues to discourage training abroad.

DINAF and INERHI have prepared a proposal for demarcating, protecting and managing the mangrove forests, including details of particular areas, based on recent aerial photographs and some ground checks. Mangroves are included in AID's centrally funded Coastal Resources project. Fundacion Natura and other organizations have also expressed their interest in and concern about mangrove protection because these forests are important environments for shrimp breeding, the basis of one of Ecuador's major industries, which is now threatened by a decline in the production of shrimp larvae.

Finding: Mangrove protection is included in the PP and is also an area in which DINAF has shown substantial interest because of the great environmental and economic importance of these forests.

Recommendation: The evaluation team recommends that FSDP contribute to developing a system for mangrove protection, delimitation and management which has been proposed by INERHI and

DINAF. Particular needs include vehicles, surveys and management planning.

F. Galapagos Fire

This subsection is included here because the area affected is mainly dedicated to the environmental conservation of flora and fauna, as opposed to production, although fire fighting is clearly an important part of both productive and protective forestry. This activity was not anticipated, but deserves mention because it produced practical results and experience for some DINAF staff. The evaluation team did not visit the Galapagos Islands, so the comments here are based on reports from the USFS and FSDP staff involved.

A fire broke out on 28 February 1985 during drought conditions in an agricultural area on Isabela Island in the Galapagos Islands. Within 10 days, several separate fires were burning. Dr. Gara, the FSDP forest protection specialist, who is experienced in fire fighting, and the senior forestry advisor went to the area on 5 March. During the following days, several AID, DINAF, USFS and other personnel with fire-fighting experience arrived on the scene. They directed and implemented the early phases of the fire fighting, and some continued on the job until early April. In late March, the Army Corps of Engineers took over the lead role in fire fighting. By mid-April, the fires were largely under control or no longer dangerous, although the last remnants were not extinguished until the rains fell in June and July.

In mid- and late March, AID provided large quantities of tools, equipment and supplies, valued at approximately US\$75,000. These were later handed over to National Park and DINAF authorities. A comparable amount was spent on salaries and support for U.S. personnel. (Costs incurred by DINAF and other Ecuadoran organizations were not available to the evaluation team.)

The presence of technical assistance staff with fire-fighting experience and DINAF personnel whose training was paid for by project funds (see Section V.E) were products of the project and major contributions to controlling the fire. Furthermore, their presence (with other U.S. inputs) turned the actual fire fighting into a "learning-by-doing" experience, with close collaboration among U.S. personnel, DINAF, the army and other organizations. Thus, the Galapagos fire resulted in a technical achievement and a contribution to the project's main objectives.

Finding: FSDP's role in fighting the Galapagos fire was very appropriate and overall, a highly beneficial activity. FSDP's ability to act quickly in such a situation set a valuable precedent for future work.

Recommendation: FSDP should maintain the flexibility needed to respond rapidly to pressing forestry needs in Ecuador (i.e., fires or natural catastrophes). Such flexibility can be positive in terms of both long-term contributions as well as its short-term public relations value for FSDP.

VIII. SOCIOLOGICAL IMPLICATIONS

Many aspects of FSDP are concerned with the relationship between people, land and trees. A number of problems have arisen when the attitudes of officials and staff members have conflicted with those of indigenous people. These topics are discussed at several places in this report, and the sociologist team member contributed to many aspects of the evaluation. This section is included to specifically consider the sociological implications of the project, an assessment which is called for in the sociologist's terms of reference, and it presents perspectives on the FSDP's effectiveness in addressing sociological issues. As will be noted in the following subsections, there have been some serious shortcomings in this regard.

A. Human-Land (Forest) Relationship in Ecuador

Except for some national ethnic groups in the humid lowlands that maintain a traditional subsistence agricultural system based on shifting cultivation and live in relative harmony with the rain forest, Ecuadorans have an uneasy relationship with their country's forests. Population growth, the expansion of agricultural frontiers, and greater needs to use trees for fuel, construction and industry are long-time processes that have been reducing the area covered with forest. It is apparent that many Ecuadorans see the forest as a natural resource which must be exploited rapidly. Unfortunately, most of the time, they do so without taking into consideration the idea that forests represent more than just trees to be cut.

A useful approach in attempting to understand human-land (and by extension, human-forest) relationships in Ecuador is to analyze the nation's agrarian structure. Elements of its agrarian structure that have a direct impact on FSDP include land distribution, tenure and use. Complementary and important processes to be analyzed are the organization of agricultural production, circulation patterns for agricultural goods and the formation of social classes in rural areas.

1. Land Distribution

Although land-distribution patterns have changed since 1954, when the first agricultural census was done, land is still largely concentrated in the hands of a few, while the majority of farming families either own very small parcels or are actually landless. In 1954, only 2.1 percent of all farms were larger than 100 hectares, but they occupied 64.4 percent of the land. The owners with this monopoly of land have often been able to exploit peasant labor and carry out natural resources management

practices that have had a negative impact on land productivity (i.e., clearing forests for intensive cattle-grazing). By 1986, as a result of land reform, only 1.3 percent of farms were larger than 100 hectares and occupied 35.2 percent of the land under agriculture (Chiriboga, 1986).

Land reform and colonization policies have reduced the importance of the latifundio or large estate. However, there is still great inequality concerning land distribution in Ecuador. The Gini coefficient, a measure of inequality in resource distribution, dropped from 0.86 in 1954 to 0.83 in 1974 (Barsky, 1984, p. 42). Data at the provincial level for 1974 indicate that in Manabi, farm units of less than 10 hectares comprised 67 percent of the total number, but occupied less than 10 percent of the land area (Uquillas et al., 1986, p. 17). In Chimborazo, they represented 90 percent of all farms, but constituted only 20 percent of the total area (Galloway, 1986, p. 6). In areas that have been recently opened for colonization in the coastal and Amazonian lowlands, land distribution is somehow more equitable, with an average of 30 hectares per family, but even there, the phenomenon of land concentration has begun.

It is important to note an apparently contradictory situation that is not unique to Ecuador, but does place the government in a difficult political position. Though many large landholders have cleared most of their land for grazing, the existence of latifundia or very large holdings sometimes permits the maintenance or reestablishment of large forested areas. Large landowners can also benefit from the government's reforestation policies, particularly those that emphasize block plantations. However, the more numerous "minifundia" or smallholdings are usually associated with deforestation practices and can be detrimental to reforestation efforts, especially ones which utilize traditional approaches, such as the creation of block plantations. Where land is scarce, people view the forest as a competitor for basic resources, such as light, water and nutrients--hence, they wish to remove it. Furthermore, scarcity of land is usually associated with poverty and the use of forest products for fuel.

In situations where minifundia predominate and soils have often deteriorated, agroforestry schemes make good sense. In such schemes, the trees are only a small component of the farming system and contribute either directly to farm income by producing fruit or wood, or indirectly to better farm management as windbreaks, terrace supports and live fences.

2. Land Tenure

People's attitudes toward the land they hold, and consequently, such resources as soil and vegetation cover,

including forests, is determined to a large extent by land tenure--that is, by whether they are legal proprietors, have only possession rights, rent or are just sharecroppers. A farmer's short- or long-term perspective and the use of land resources varies with the form of land tenure. In the Ecuadoran Amazon, where close to 50 percent of both native and colonist farmers do not yet have title to their land, there is a tendency to clear the forests for pasture and different types of crops. This is often a direct consequence of state policies that favor granting titles and credit to those who use the land productively, which usually means production for market, not just subsistence. Concerns about land tenure and fears of land expropriation by DINAF have led some people in the Amazon region, especially native farmers, to oppose participation in the agroforestry subproject, as previously stated.

In contrast, FSDP agroforestry subprojects have good prospects for working with communes, through EMDEFOR in the central highlands, MFM in Santa Elena and perhaps MAG/INIAP in the Coca area. Again, land-tenure considerations are important because in these cases, title to the land is held globally by the organizations and any collaboration involving communal land would have to be agreed on by the communes' elected leaders. Reforestation efforts in the Sierra can also be helped by the fact that an increasing number of landowners, who have legal title, but fear expropriation by IERAC in application of the Agrarian Reform Law, are turning unused and marginal land into forests as a way of protecting their holdings (see Macdonald, 1983, pp. 18-20).

Finally, temporary or precarious tenure arrangements, such as renting and sharecropping, are usually related to intensive land-use patterns that are generally detrimental to the protection of existing forests or reforestation efforts. In some Ecuadoran Sierra areas, such as Pimampiro and Imbabura, about 25 percent of the arable land is either rented or sharecropped (Uquillas et al., 1985, p. 17). In 1974 in the province of Carchi, 24.1 percent of the land fell into these two tenure categories, and in Chimborazo, peasants who migrate for seasonal employment in coastal areas often leave their holdings with sharecroppers (Barsky, 1984, p. 81).

3. Land Use

The most significant processes in Ecuador relating to land use are:

- o the expansion of agricultural frontiers;
- o the conversion of forest and agricultural lands to pastures; and

- the use of different farming technologies, i.e., agricultural inputs, such as biocides and mechanized equipment.

All of these processes are deeply related to the nation's social and economic structures and particular development policies. Population growth, modernization and inequality in the distribution of resources, particularly land, have led the state to adopt policies of colonization in areas previously occupied only by native ethnic groups, such as the Amazonian and northwestern coastal lowlands. In turn, people have either become colonists or used nearby areas to expand their crops and pastures. The utilization of technology, such as chain saws and skidders, has permitted more rapid exploitation of the forest in the humid lowlands.

One factor which needs to be considered by FSDP is that in the Sierra, inequality in the distribution of resources has created a situation where large holdings have control of the best land in the lower, relatively flat intermountain valleys. These are dedicated to pastures for dairy cattle, while an infinity of small parcels are located on steep slopes, ". . . marginal lands with thin, poor soils that would be better left in forest than cleared for crops and fuelwood" (Nations, October 1985, p. 5). Those small farms with poor soils are where the land is used most intensively. Thus, the 1954 and 1974 agricultural censuses revealed that farm size is inversely related to cultivation intensity. In 1974, on farms of five hectares or less, 35.2 percent of the land was worked, compared to 10.7 percent under cultivation on farms of over 500 hectares (Seligson, 1984, p. 7).

The survival strategies of small farmers, peasants and Indians in the Ecuadoran Sierra have led them to own small parcels in multiple ecological zones and adopt practices such as long fallows and the utilization of wide varieties of crops for specific microenvironments (Nations, October 1985, p. 8). Nevertheless, they have not always opted for the best management practices. Illustrations of this include the existence of vertical rows, burning of "pajonales" (grassy fields) and improper irrigation practices that accelerate erosion.

On the other hand, in Ecuador's Amazon region, traditional shifting cultivation, characterized by itinerant horticultural practices, hunting, fishing and gathering, has been considered ecologically sound. For centuries, shifting cultivation has permitted a harmonious relationship between people and the Amazonian forest. However, this relationship was facilitated by a low population density, dispersed settlements, seminomadism and the predominance of subsistence over felt needs. These conditions are changing, and although there are still ethnic groups that live off the forest, other native people and colonists are clearing forestland for pasture as well as

subsistence and commercial crops. A serious problem in Ecuador's Amazon region which limits the possibilities of agricultural production is that according to soil studies, only about 10 percent of the land is relatively appropriate for agricultural uses. It is recommended that the other 90 percent be left as forest or subjected to very careful management practices so as not to destroy the environment.

Finally, in Ecuador's western lowlands, or Costa region, the desert is apparently expanding due to a combination of human actions and climatic fluctuations. The deforestation process in the Costa is very advanced. For many years, people have been clearing the forest for agricultural uses and to exploit trees for fuelwood, construction and even forage (e.g., cutting ceibo trees to feed animals in very dry times). Moreover, the logging industry in the humid forests is depleting the forest resource without reforestation. This exploitation of timber is usually done through third parties, apparently to avoid legal and social obligations. In any case, these human predatory practices are continuously reducing forest cover in the Costa.

The drier areas of the southeast (the Santa Elena peninsula and parts of Manabi Province) are characterized by very small parcels of land or minifundia and intensive cultivation patterns, especially during the rainy season and in areas where irrigation water is available. The common practice of burning vegetation before planting a new crop is contributing to erosion and a loss of soil fertility because lands are often exposed to solar radiation.

In conclusion, Ecuador's land (and forest) are at the losing end of a relationship with its people because of the latter's occasionally inappropriate use of natural resources and increasing occupation of space previously reserved for forests. The reforestation/agroforestry efforts of the Ecuadoran government, through DINAFA, AID and other collaborating institutions, have not given enough consideration to the patterns of human-land relationships in each region which shape development policies and promote improvement in any of the different components of the agrarian structure, particularly more appropriate use of the land resource.

B. Potential Effects of FSDP on the Indigenous Populations of Chimborazo and Napo

The sociocultural feasibility and soundness assessment (Annex V of the forestry project) attempted to summarize the types of benefits that could be derived from the development of Ecuador's forest resources as well as ways to motivate peasants and Indians. In addition, it dealt with the possible negative results of forestation policies and steps that should be taken to

prevent or minimize such effects. Although the assessment was not specific enough in relation to the potential positive or negative effects of the forestry project in the Amazon region, its coverage of ethnographic characteristics was generally adequate for the assigned task. This subsection provides a brief discussion of the document and an evaluation of whether or not the EMDEFOR subproject in Chimborazo and agroforestry subproject in Napo have followed its initial recommendations.

According to the project document, indigenous people in the Sierra could benefit from the development of forest resources in four basic ways. The first long-term benefit was to be the availability of wood for construction and fuel in 10 to 15 years. Second was to be soil conservation and erosion control, provided that tree-planting was done in conjunction with soil conservation measures and/or agroforestry practices. The third benefit was indirect and intended to be realized in the short term--the project was supposed to help peasants obtain legal title to their land. Finally, a fourth immediate benefit was to be payment for planting trees, a contribution to familial income for work done close to home. To promote the project in areas of the Sierra such as Chimborazo, the document suggested community-level promotional activities, the use of audiovisual and radio programs, and collaboration with grass-roots organizations.

While the long-term benefits cannot be evaluated at this time, there is evidence that some peasants in the central provinces of Chimborazo, Bolivar and Tungurahua are taking advantage of short-term benefits offered by EMDEFOR through the FSDP-sponsored subproject, such as help in obtaining legal documents concerning their organizations and land as well as payment for planting trees. However, it should be realized that work with indigenous communities in the Sierra has just begun, and thus far, there has not been any reforestation in any of the seven communities which have agreed to participate in the subproject. EMDEFOR has carried out some of the suggested promotional activities, but has been slow to start reforestation work on Indian communal lands. The possibility of negative consequences from the development of forest resources still exists, but the rather limited actions carried out in the central Sierra up to the time of this evaluation did not make such effects obvious. Reforestation has been done on individual properties and lands that are apparently unfit for other activities.

According to the sociocultural feasibility and soundness assessment, the main benefit that the project could offer the indigenous people of the Amazon region is a forestry alternative to cattle. Because of particular sociological and anthropological characteristics of large Indian societies, it was suggested that there should be close collaboration with their

local and regional organizations, and joint projects should be carefully negotiated. As Annex V of the PP states:

Any organization or program which attempts to force itself on these groups might be rejected simply because it fails to respect them. By contrast, a program which incorporates them as equals, listens to them and responds to local requests can be extremely successful. (p. 13)

Regarding small ethnic groups, the project document indicates that short-term benefits or incentives could include providing land titling and demarcation assistance as well as immediate cash income through selective deforestation of lands under their control. The long-term benefits included the development of enriched natural forests, and management (and use) of wild flora and fauna. Unfortunately, the potential positive effects of the DINAF/AID project have not been realized yet because the project has been unable to collaborate with the Indians.

C. Finding and Recommendation

Finding: FSDP has successfully initiated work with some small landowners, particularly in the Napo and, to a limited extent, Sierra regions. The Napo agroforestry subproject has established a method for working with local agencies and farmers that could be valuable for other regions. However, FSDP has not been very successful in its efforts to work with indigenous people in eastern Ecuador because many DINAF activities are perceived as a threat.

Recommendation: To fully achieve the subprojects' technical objectives, particularly for tree-planting in the highlands and agroforestry in Napo, more progress must be made in interesting communities, indigenous people and their organizations, and smaller landholders. This must be done by improving communications, mutual respect and understanding, and developing technical packages and options that suit their needs. The evaluation team recommends that FSDP pay more attention to these requirements, and that a rural sociologist or anthropologist be contracted to assist with these efforts.

IX. FUTURE PLANNING AND DECISION-MAKING

Evaluations often result in many detailed technical recommendations, but contribute little at the policy and strategy levels. This section presents material for planning the future of the FSDP from general project strategy and project management viewpoints.

A. Uncertainties Facing the Project

Mid-course planning for the FSDP must be carried out in the face of enormous uncertainty, and the uncertainty must be taken into account in all future plans. The following questions are presently without answers. While progress has recently been made on the first two, any future plans must consider these issues:

- Will DINAF become a semiautonomous institute with all the accompanying advantages and recurrent costs?
- Will Plan Bosque, the national reforestation program, pick up momentum?
- Will the acting director of DINAF, who is paid with AID money, receive an official appointment as director?
- Will the Minister of Agriculture's resignation, which has been submitted to the president of Ecuador, be accepted? (This eventuality looks improbable as of this writing.)
- Will a project coordinator and a training coordinator be appointed? (The former has been promised by DINAF.)
- Will the contractual problems of the agronomists and foresters hired for the Napo agroforestry subproject be resolved before that effort falls apart?

B. Alternative Courses of Action

The evaluation team believes that FSDP's problems cannot be solved by fine-tuning. Strategic decisions must be made if FSDP is to succeed, either at strengthening Ecuador's forestry institutions, or at initiating a broader range of effective forestry activities in the field. Currently, DINAF has administrative responsibility for generating and managing forestry activities carried out by other organizations, but does not have the capacity (or desire) to carry out that

responsibility. In general, FSDP must develop DINAF's capacity in this area (as stipulated in the PP and Loan Agreement), find another mechanism for generating and managing forestry projects, or stop undertaking subprojects.

During its final week in Ecuador, the evaluation team discussed with DINAF and AID the major alternative courses of action open to the project. The alternatives and viewpoints below represent the beginning of discussions and negotiations which must be carried out among DINAF, MAG, USAID/Ecuador and technical assistance staff. It should be noted that the alternatives are not necessarily mutually exclusive, and might be combined in a number of imaginative ways. Also, the list of alternatives does not exhaust all possibilities. The evaluation team believes that a full commitment to any of the alternatives outlined below is more important than which specific alternative is chosen.

Alternative 1

- o Create a DINAF system for generating and managing forestry subprojects carried out by DINAF and other organizations. The Ecuadoran consulting firm being contracted by DINAF for management assistance may be able to create and install the system.

This alternative must be undertaken only if both the Ministry of Agriculture and Livestock (MAG) and DINAF express a clear desire to the shift in DINAF's focus (spelled out in the PP) from direct implementation of forestry activities to a mix of direct implementation and coordination of subprojects carried out by other organizations. Agreement within DINAF must include the operational as well as top administrative levels. DINAF is already contracting an Ecuadoran consulting firm to improve management and accounting systems in general. However, the contract does not focus specifically on the generation and coordination of forestry activities carried out by other organizations. The evaluation team believes that the central focus of FSDP should have been to create a system for generating and managing subprojects. For the time being, emphasis must be on managing current subprojects, not generating new ones. Sources of new subprojects are the 31 proposals submitted to FSDP in 1984, expansion of the agroforestry activities taking place in the Napo Province, Plan Bosque and Patrimonio Forestal (see Alternative 2). The concept of subprojects could be expanded to include those generated and implemented by DINAF's own large extension structure (see Alternative 3).

Alternative 2 (variant of Alternative 1)

- o Use the financial and technical resources of the AID project to assure the success of Plan Bosque and/or Patrimonio Forestal.

Plan Bosque and Patrimonio Forestal present FSDP with the opportunity to contribute to the success of major forestry efforts already initiated by the Ecuadoran government. Plan Bosque's reforestation program and Patrimonio Forestal's forest conservation and management program will be the largest forestry activities ever undertaken in Ecuador if they proceed as planned. Technical assistance in species diversification has already been planned for Plan Bosque. In addition, Plan Bosque may face central management problems similar to those of the AID project, but on a much larger scale. If Patrimonio Forestal is to progress from a mapping exercise to a forest management program, assistance will be required in mapping, demarcation, management and establishment of forest protection systems, including extension, promotion and making agreements with communities.

Alternative 3

- o Focus technical assistance on the traditional forestry extension system within DINAF.

This alternative would require assessment of the district forest officers' training and equipment needs, and redesign of the technical assistance, training and budget in light of those needs. On the one hand, choice of this alternative may be combined with the subproject generation model spelled out for DINAF in the PP. For example, if a percentage of FSDP were reserved for DINAF extension system subprojects, the subprojects generated by DINAF extension offices could strengthen both the subproject process and the extension system. On the other hand, AID and DINAF may wish to abandon the subproject generation system and DINAF's coordination role in favor of traditional, direct implementation approaches. The traditional extension model's weaknesses are at least as grave as those of the subproject generation model. In general, the validity of models is probably less important than a belief in models, and the willingness to make investments and undertake the effort necessary to make them work. Objective assessment of past experience with the subproject generation model in other projects should be carried out. Did other projects that used the model fail because of the model, or because the model wasn't tried? For these reasons and for the sake of FSDP and other future programs in Ecuador and elsewhere, the evaluation team suggests that USAID/Ecuador conduct a more detailed analysis of its experience with the "subproject generation" model for project

implementation. This would clarify the strengths, weaknesses and appropriations of the model for FSDP and other projects.

Alternative 4

- Finance the establishment of a semiautonomous forestry institute, including vehicles, furniture and computers; develop the design and plan for the institute, and calculate the costs of operation.

FSDP has played an important role in moving DINAF toward autonomy. Thus, the project also has responsibility for helping DINAF carry it out. This alternative can be combined with any of the above alternatives. Obviously, this alternative can only be undertaken if DINAF acquires the role of semiautonomous institute, a decision that was pending at the time of the evaluation. DINAF's top management has expressed high interest in this alternative. Efforts by FSDP to support such an initiative should not come at the expense of other positive, ongoing project activities such as the Napo agroforestry subproject.

Alternative 5

- Extend the PACD beyond March 1988 without increasing project funding.

The evaluation team believes that this alternative should be pursued only if, in a year's time:

--DINAF has provided a satisfactory project coordinator for a definite, prolonged period of time;

--FSDP has made satisfactory progress in creating a system for managing current forestry subprojects; and

--DINAF and FSDP have generated several new forestry subprojects.

C. Assessment of November 1985 Technical Assistance Plan

The evaluation team was asked to analyze the revised project plan prepared in November 1985 by AID and technical assistance staff. The revised plan is a list of past and proposed expenditures on administrative personnel, technical assistance, studies, training and equipment. In ARD's view, the areas that need improvement are those which apply to administrative

personnel, technical assistance and studies, where most of the ineffective expenditures have been made.

The evaluation team suggests that decisions regarding technical assistance be made according to the following rule. If the technical assistance contributes to an existing or probable forestry subproject, or to development of a system for generating subprojects, then it is a good investment. If not, then it is probably not a good investment.

Administrative Technical Assistance

The plan proposed US\$390,000 for the principal advisor. This investment is paid for project administration--often simple, but time-consuming administrative details. The talents of the current advisor, a qualified senior forester, are, to a large extent, being wasted. Of the US\$390,000, US\$170,000 comes from loan funds. The evaluation team and DINAF's top management are concerned that this use of money loaned by the United States to the GOE conflicts with the latter's attempts at austerity in public-sector spending.

Project-Specific Technical Assistance

Below, the evaluation team presents a review of the proposed technical assistance in three categories:

- o proposed assistance which the team believes to be appropriate and a good investment;
- c proposed assistance which is of questionable or marginal value; and
- c proposed assistance which the team believes should not go forward.

Valuable Assistance

While the team concurs with the wisdom of investing technical assistance resources in the following areas, it cannot vouch for the soundness of the budgets, or for the distribution between loan and grant money. No audit has been conducted.

- c Agroforestry, US\$490,000 (\$200,000 loan, \$290,000 grant): This has been increased from eight months to 36 months. The evaluation team concludes that this technical assistance must continue because agroforestry is the area that has received the best response within the project.

- Nurseries specialist, US\$310,000 (\$210,000 loan, \$100,000 grant): DINAF is having nursery trouble of various kinds. Due to confusion about the demand for seedlings represented by Plan Bosque, nurseries have been left with millions of overgrown seedlings. Attempts to use modern machinery and bare-root techniques incur high risks. Any contribution FSDP can make to solving these problems is worthwhile. Approximately seven months of the above budget has been spent. The DINAF director has requested two more years of assistance.
- Highland reforestation specialist, US\$150,000 (\$100,000 loan, \$50,000 grant): This technical assistance has been successful and is connected to the EMDEFOR reforestation subproject rather than DINAF. The assistance includes advice, research and training. The effort will move toward agroforestry under the new EMDEFOR program.
- Site/species or forest physiologist, US\$60,000: The AID project, DINAF and Plan Bosque have concentrated primarily on Pinus radiata. This is unwise because of disease problems and the questionable ability of the Ecuadorian market to support an Ecuadorian pulp industry. Species trials are a necessary step toward diversification.
- Arid zone specialist, US\$60,000 (loan): This assistance has increased from an original four to 10 months. If the Santa Elena MFM reforestation/agroforestry subproject is approved, then this technical assistance investment makes sense. Specifications must be carefully defined. Four months of assistance have been used and six months remain.
- Nursery and plantation inventories (US\$20,000): These two studies are important to the planning and management of Plan Bosque. US\$500 has been spent on the nursery inventory, but nothing on the plantation inventory. DINAF's idea has been to carry out these studies with no project technical assistance. The studies could be combined with an evaluation of species trials and plantation growth rates (see "site/species or forest physiologist," above).
- Land use planner, US\$15,000 (loan): This assistance was not included in the PP and has already been spent. It produced Plan Pichincha, which is now underway; therefore, it was a productive investment. Land use planning will be a vital part of Patrimonio

Forestal, Bosques Protectores and INECEL watershed management, so additional assistance here could be effective.

- c. Anthropology, US\$10,000 (loan): The Napo agroforestry project used an anthropologist during the planning stages (US\$6,000 worth) to study relations between the project and Indian groups. According to the Indians, his advice was not followed sufficiently, and he is no longer involved with the project. The assistance of a rural sociologist or anthropologist is still needed.

Potentially Valuable Assistance

- c. Forest protection plan, US\$360,000 (\$210,000 loan, \$150,000 grant): This element has been increased from US\$160,000. Approximately US\$140,000 has been spent so far, with unclear permanent results. Several questions remain: What are the objectives of the remaining US\$200,000 of technical assistance? Which institutions and individuals in Ecuador have taken responsibility for implementation of this idea? Who will invest the contemplated US\$259,797 for the diagnostic centers necessary for the success of this effort? What is the University of Washington's role in this subproject?
- c. Administrative specialist, US\$132,000 (grant): US\$90,000 has been spent with uncertain results. The objectives for use of the remaining US\$42,000 are unclear. If the administrative specialist returns, he must help calculate a budget for the autonomization of DINAF that he has helped promulgate. The study must include capital start-up costs, operating costs and the extent to which national park and forestry revenues cover them.
- c. Flora del Ecuador study, US\$330,000 (\$135,000 loan, \$195,000, grant). Basic botanical information of long-term value is being collected under this component. However, there is little involvement of Ecuadoran institutions. Ecuadoran individuals are being trained, but they are not permanent DINAF employees. This subproject suffers from DINAF's inability to fund counterparts. Also, there is little apparent relation to other subprojects. Perhaps the research could be connected to the agroforestry work with INIAP in Napo, or to Fundacion Natura's idea of an Amazonian research

station. Fundacion Natura seemed to have received no information on the Flora del Ecuador effort.

- o Fundacion Natura/AIMA forestry promotion and education (uncertain budget): Communication, education and extension activities directed at FSDP's problems and clientele are sorely needed. FSDP's problems in this area are the generation of forestry subprojects and spreading of forestry practices that have proved successful in subprojects. FSDP's clients are primarily farmers and groups of farmers in Ecuador's rural areas. Fundacion Natura has submitted proposals focusing on urban audiences, mass media and formal education. Since the proposals had little relation to FSDP's specific objectives, reception has not been enthusiastic. Gonzalo Oviedo at Fundacion Natura is mentioned as someone who could direct communication and education activities toward AID project objectives and audiences.

Unproductive Assistance

- o Tropical forest management, US\$210,000 (loan): This money should not be spent unless connected to a concrete forestry subproject. The current logic is to work with colonists and indigenous people. However, the evaluation team sees no evidence of receptivity to this topic.
- o Logging expert, US\$60,000 (\$40,000 loan, \$40,000 grant): Half of this assistance has been used, with little or no benefit. There is no apparent reason for continuing it.
- o Feasibility for a research station in Napo, US\$30,000 (grant): The objectives of this work are not clear. It is unclear who will pick up the recurrent costs of maintaining a research station. The politics and logistics of the Limoncocha location are difficult compared to the INIAP location in Coca.

D. Summary of Findings and Recommendations

1. Project Management

Finding: Poor overall project management, by AID, the technical assistance team and DINAF has been a principal limiting

factor in FSDP's success. The principal problems and/or causes have been:

- o a fragmented project design and technical assistance effort because of an unclear definition of institution-building, a PP that suggests a wide range of forestry activities across the broad protection/production continuum, and loose PASA contracts with USFS and FSP/OICD;
- o a misplaced higher priority placed on technical rather than management expertise, because management systems development expertise was not specified by the PP and, consequently, no one was hired with the background, interest and mandate to develop, install and train DINAF to use a system for generating, approving, funding and monitoring forestry subprojects; and
- o many instances of poor or nonexistent working relationships among Ecuadoran institutions, AID and members of the technical assistance team.

Recommendation: Project redesign must be accompanied by a thorough management review. FSDP must place the highest priority on providing project management resources and skills. Alternative sources of management expertise include AID personnel with design and management experience, expatriate consultants and Ecuadoran consulting firms. By project management, the team means all the skills and techniques involved in converting ideas and resources into plans, budgets, action and results. Technical assistance personnel must be able to not only perform these tasks, but also teach them in seminars and by example. Project management includes strategic planning of the best ways to reach project objectives as well as scheduling and budgeting.

2. Institutional Strengthening

Generation and Selection of Subprojects

Finding: The subproject proposal process was poorly designed. Some subproject applicants submitted full proposals in areas that were ineligible for funding under the project. The instructions to applicants were so vague that there was no uniformity and, hence, comparability among the submissions. There were no formal selection criteria.

Recommendation: If DINAF and USAID/Ecuador decide that a subproject generation model is worth continuing, then:

- o identification and selection procedures must be part of a clearly articulated, step-by-step process-- there should be a preliminary query stage to establish that there is sufficient commonality of objectives to warrant further work;
- c the system must include instructions to applicants, criteria for subproject identification and selection, mechanisms for project approval and disbursing funds, monitoring and evaluation systems, and training in the use of these systems; and
- o potential selection criteria mentioned by the principal advisor include social benefits (number of beneficiaries and "rich-poor" equity criteria), total cost, requirements for DINAF staff time and fit with objectives put forth in the PP--the team would add to this list the ability of the applicant or forestry activity to sustain itself both financially and managerially after the life of the subproject.

Training Course in Project Design

Finding: The one attempt made to train DINAF and other organizations in subproject design was criticized as being too complex and academic, and did not lead to any subprojects. However, the evaluation team believes that these problems were minor compared to the fact that no follow-up training was conducted to take advantage of lessons learned during the first seminar.

Recommendation: In future, FSDP should:

- c include project design seminars and workshops for staff from DINAF and other institutions that address the philosophy and value of moving from implementation to coordination, as well as the mechanics of subproject generation and management;
- c employ a teaching system at all seminars and workshops that is not as complex and academic as the one used at the January 1984 seminar; and
- o assure that seminars and workshops include follow-up tutoring or, possibly, on-site work while participants work on individual project plans.

Subproject Decision-Making

Finding: The project's coordination of forestry activities is stalled due to the lack of a long-term, working system for generating and managing subprojects. This is because there is a lack of belief and training in such a system among AID, DINAF and the technical assistance team.

Recommendation: If DINAF and USAID/Ecuador agree that a coordinating role for DINAF is desirable, then DINAF and the project must devote resources to the development of a subproject generation and management system as well as training in that system. For the time being, emphasis must be placed on DINAF's management of current projects generated by FSDP.

Finding: Of the more than 30 subproject proposals submitted to DINAF, only five have been approved. Some of the unapproved applications may represent major opportunities for FSDP.

Recommendation: If DINAF and USAID/Ecuador decide to continue with the subproject generation model, an attempt should be made to respond to selected subproject applications that have been submitted to FSDP but not approved. Potentially viable subprojects should be considered for funding, and those which are not should be formally disapproved.

Validity of the Subproject Generation Model

Finding: On the one hand, the subproject generation model for institution-building and leveraging scarce resources has weaknesses. On the other, the problems of a traditional extension system are at least as serious. The evaluation team believes that the subproject generation model has not been given a chance because the technical assistance for the project has not focused on it. The team also believes that acceptance of the subproject generation model depends as much on DINAF's and GOE's belief in or support of the model as its validity.

Recommendation: AID and DINAF need to decide immediately whether to start applying the subproject generation and management model seriously, or give up on it. Such a decision should be preceded by a careful analysis of experiences with the model (i.e., FSDP and other USAID/Ecuador projects) as well as an analysis of the alternatives. If a decision is made to continue using the model, then imaginative ways to motivate DINAF staff to assume subproject activities must be found. These must not be limited to monetary incentives and may include access to vehicles for fieldwork or training activities.

Training

Finding: Many FSDP courses have responded to the technical needs of different forestry-sector organizations in Ecuador. However, training has not been directed at DINAF management weaknesses that are currently limiting the success of both DINAF and FSDP.

Recommendation: Training emphasis must be placed on developing DINAF's management skills, particularly in the areas of accounting and the generation and management of forestry subprojects. Continued training is warranted in the areas of forest protection and nursery management.

Planning of General Programs and Approaches

Finding: The FSDP administrative specialist provided valuable assistance in streamlining and saving DINAF. He also assisted DINAF in its efforts to acquire a degree of autonomy from MAG. However, the autonomy sought by DINAF will likely be a mixed blessing--the slightly improved ability to pay staff and potential improvement in administrative flexibility may be offset by added costs, such as the capital investment required to set up elsewhere and recurring costs of separate administration and logistics. At this time, no one knows what these costs will be.

Recommendations: First, since the project played a role in moving DINAF toward autonomy, it must also help DINAF determine the costs involved. Hence, the next job of organizational technical assistance must be to work with DINAF to determine the capital investment required to set up an institute as well as the recurrent costs DINAF must pay if it becomes an institute. Second, FSDP should consider using portions of the remaining project funds to capitalize the forestry institute. The current DINAF director suggests that paying to set up the institute would be a much better use of AID money than the present use. Setting up the institute would be an accomplishment that AID and taxpayers could be proud of, the project is having difficulty spending funds, and DINAF can cover the institute's operating costs out of national park and forestry revenues. The evaluation team suggests this option for serious consideration, but any action taken should not be at the expense of subprojects that are having positive effects.

Finding: Overall, investment in the planning of general strategies and approaches has produced little institutional strengthening and has been a poor investment. Unless it is carefully planned with the active involvement of agency counterparts and a detailed analysis of short- and long-term financial costs, the planning activity is a waste of FSDP resources.

Recommendation: FSDP should invest in more planning of general strategies and approaches only if a clear need exists, and counterpart support and financial resources are available to implement them. Current efforts should concentrate on making investment in past planning efforts (e.g., the national forest protection plan) pay off.

Bottom-Up Institutional Strengthening

Finding: The Napo agroforestry subproject has demonstrated that collaboration at the local level between FSDP and other organizations is often much easier than at the central level. Other institutional-strengthening elements of the agroforestry subproject (e.g., strong local involvement and interesting scheduling of technical assistance) establish valuable precedents for FSDP.

Recommendation: The project should consider adopting an institutional development strategy that simultaneously strengthens the central capacity to approve and fund subprojects, and outreach capabilities to generate and supervise them. The evaluation team does not believe that either a top-down or bottom-up approach alone is sufficient. Also, FSDP project staff should analyze for themselves why the Napo agroforestry subproject has been successful to date and apply the lessons learned to other subprojects.

3. Productive Forestry

Reforestation Subprojects

EMDEFOR

Finding: FSDP financial and technical support have made an important contribution to the capabilities and practical experience of EMDEFOR, while at the same time, fulfilling the FSDP objective of establishing two-thirds of the area stipulated in the PP for productive forest demonstration plantations as well as utilizing applied research methods. However, misunderstandings and a sense of competition have prevented DINAF from benefiting greatly from this experience. The potential for continuing with EMDEFOR is limited by uncertainties about funding, the impact of Plan Bosque, and future markets for the products of pine and eucalyptus plantations.

Recommendation: Technical collaboration between DINAF, AID and EMDEFOR should be maintained, and they should work toward resolving uncertainties about management and markets. EMDEFOR

should be supported in the proposed changes to agroforestry activities that would have a positive impact on a greater number of people in the Sierra. Species trials would greatly assist in this work and should be expanded. Permanent plots should be considered for more definitive research on different species and planting methods.

Portoviejo

Finding: The Portoviejo plantation is fulfilling its soil-conservation objectives, but does not yet serve as a model that can be recommended for other areas because the city of Portoviejo has not yet agreed to protect and manage it over the long term. However, it has set a valuable precedent for FSDP by demonstrating a rapid response to local needs.

Recommendation: The experiences of this subproject should be analyzed to learn lessons in the areas of collaboration and publicity for use in protective forests and other productive, protective and city-greenbelt plantation projects. In addition, a determined effort should be made to reach an agreement with the municipality of Portoviejo that satisfies their political and social requirements, and when such an agreement is reached, the plantation should be extended. To permit the Portoviejo plantations to maintain their integrity and prevent invasion by settlers and fuelwood cutters, the mayor should be convinced to have the hills surrounding the town declared a civic heritage area. When this is done, DINAF should designate the area a protective forest, and assist in planting the remaining 100 hectares and perhaps more.

Plan Bosque

Finding: Plan Bosque has the potential to be an extremely important program for wood production. However, it is encountering severe administrative and technical uncertainties, including problems with species selection and marketing.

Recommendation: FSDP should make a major attempt to assist in resolving Plan Bosque's administrative problems, and also focus on developing new species and marketing outlets. Plan Bosque will require streamlining of its administrative procedures if it is to accommodate the greatly increased planting rate being contemplated. Coordination of land approval, nursery production and planting seasons will have to be closely synchronized. Pines should be planted on selected production and industrial plantations, and a greater variety of species at protective and agroforestry sites. Production of bare-rooted seedlings in mechanized nurseries should be limited to situations where adequate care during transportation and planting can be assured.

Alder

Finding: The promotion of alder is a successful and valuable contribution to farm improvement. However, it is only a small portion of the component outlined in the PP and funded in the loan agreement.

Recommendation: The project should continue to support the propagation and distribution of alder and other useful species to farms and communities, and DINAF's collaboration in these activities should be encouraged. Expansion of the alder program should be encouraged to increase the number of useful species planted in the Sierra from the two that now predominate, eucalyptus and Pinus radiata.

Other Reforestation Activities

Finding: The mechanized nurseries consultant provided valuable assistance in setting up the nursery equipment purchased by FSDP. However, the emphasis on sophisticated nursery technology is inappropriate as it is not likely to be replicated elsewhere in Ecuador.

Recommendation: The team does not believe FSDP should place great emphasis on disseminating such technology at this time. Future nursery-related consultancies should focus on better overall quality control and more efficient utilization of the equipment now in place at the mechanized nurseries.

Finding: The native plant nursery at Conocoto is an important subproject for FSDP in that it is examining the value of existing trees in Ecuador for wider propagation.

Recommendation: The production of native plants at Conocoto and elsewhere should be continued, and the diversity of species being tested should be increased.

Finding: The two reforestation manuals produced by the project are well-written, high-quality documents that deserve wide circulation in Ecuador.

Recommendation: These manuals should be widely distributed to universities, agricultural schools and other organizations involved in tree planting.

Finding: In spite of being DINAF's largest (and most visible) plantation, the Cotopaxi forest has not received assistance through FSDP.

Recommendation: FSDP should seek ways to contribute to management and research in Cotopaxi, including pine silviculture, disease control, and collection and analysis of growth data. More specifically, the evaluation team suggests that a series of light improvement cuttings, as already prescribed in the management plan, should be done to improve the appearance and growth condition of the stands.

Rain-Forest Silviculture and Enrichment

Finding: The absence of tried and proven technical rain-forest management systems, secure land tenure and a clear indication that plantations would be financially successful have been deterrents to FSDP in its attempts at rain-forest management, particularly in terms of plantations. FSDP staff were probably correct in deciding not to concentrate on this component, given the prevailing circumstances.

Recommendation: The evaluation team believes that much more effort is justified, at both the experimental and demonstration levels, to develop systems for rain-forest silviculture, which will be needed as soon as extensive management becomes feasible. However, at this time, FSDP is not the appropriate agency for such work. The team recommends that FSDP apply some of its resources in Napo to do quantitative studies of existing plantations and demonstration enrichment-planting trials, preferably in collaboration with ENDESA and the DINAF/GTZ project.

Agroforestry

Agroforestry Subproject in the Humid Tropics of the Northwest and Northeast

Finding: The Napo agroforestry subproject has progressed very well with its extension system and demonstration trials on over 100 colonists' farms. Its main technical systems for timber trees, grass fodder and leguminous ground cover are working well. Its collaboration with INIAP and MAG provincial staff are commendable. However, the forest management components of the original general plan have not been implemented, so the total area of intervention falls far short of the area that was planned and budgeted.

Recommendation: Administrative problems must be resolved immediately to establish a durable extension system that will continue after the end of FSDP. The existing system, in collaboration with INIAP staff, should extend the range of techniques and species it offers, especially with regard to fruit

trees, to correspond more closely to farmers' wishes and attract more of them to participate. A new, more sensitive approach should be made to organizations of indigenous people in order to understand and allay their suspicions and find ways of attracting their interest and contributing to their needs.

Finding: According to the PP, ". . . the sociocultural feasibility of the project rests not on whether it will benefit the recipients, but whether the intended beneficiaries can be sufficiently motivated to participate in the project" (p. 48). Nevertheless, the subproject has done little to motivate organizations of indigenous people to participate. For instance, CONFENIAE indicated to the evaluation team that they felt the agroforestry subproject does not respond to the basic needs of Amazon Indians, and they were asked to cooperate in a scheme where they did not have any input and thus, suspected it as "an imposition."

Recommendations: To reduce the mistrust existing among Indian organizations of the Amazon region and eventually get their collaboration, FSDP needs to work at the levels of both CONFENIAE and organizations such as FECUNAE. CONFENIAE needs to be convinced that the project does not intend to negate or in any way reduce their legitimate rights, rather it could be beneficial to Ecuador's indigenous people. At the same time, some assistance could be given to CONFENIAE in such areas as land titling and demarcation for native communities (through collaboration with IERAC) and establishing objectives and planning for agricultural development. Organizations, such as FECUNAE, could be approached to find areas of mutual interest, where both the organization and DINAF (plus a third party, such as INIAP) could collaborate.

Santa Elena Meals for Millions

Finding: Because of its established presence in Santa Elena, past and present field-demonstration experience, and interest in agroforestry, MFM seems to be an ideal extension agency in Santa Elena.

Recommendation: For this potential agroforestry subproject to be successful and contribute to the objective of strengthening the forestry sector in Ecuador, the evaluation team suggests that MFM develop more lines of coordination and cooperation with MAG dependencies, both in the region (including DINAF/Guayaquil and INIAP in Boliche and Portoviejo) and at the central offices in Quito. The Santa Elena MFM agroforestry subproject appears to have every chance of success and should be supported with technical assistance, vehicles and funds.

EMDEFOR's Shift in Focus Toward Agroforestry

Finding: The agroforestry project would be critically important to EMDEFOR in keeping their personnel occupied and aiding cash flow. This subproject would also meet FSDP's basic objectives of soil improvement and increased production for a higher standard of living.

Recommendation: The evaluation team supports the proposed EMDEFOR subproject. However, the present EMDEFOR project document does not include baseline studies, which could be used for future comparisons, and should do so if its success or failure is going to be measured. EMDEFOR's involvement in agroforestry should be supported in terms of both strengthening the organization and the need to provide material benefits to a large segment of the agricultural population in the Sierra.

Other Productive Forestry Activities

Central Maderera Palmira

Finding: The Palmira sawmill fulfills the project's purposes and goal by providing an operating example of a small sawmill that can serve as a demonstration to other plantation owners of the kinds of equipment that can be obtained locally and types of products which can be made using them.

Recommendation: Cooperative members should continue to receive technical assistance from FSDP on both sawmill operation and marketing their wood products.

Technical Assistance on Logging Practices

Finding: Due to a lack of receptivity in Ecuador's forestry sector, the logging practices consultancy was of little value. The consultant's report is valuable as documentation of poor logging practices, but nothing was done to address the problems noted.

Recommendation: No further FSDP inputs are recommended in terms of logging practices until there is more assurance of achieving useful results.

National Forest Protection Plan

Finding: Though good progress has been made in terms of developing and beginning to implement a national forest

protection plan, basic resources are still needed to translate the plan into action. Still lacking is a clearly defined mechanism for putting the resources of trained students and new laboratories to work. The establishment of laboratory facilities and continued undergraduate training at the Loja and Catholic universities will be a direct contribution to institutional strengthening only if a mechanism is set up for coordination and implementation of the forest protection plan.

Recommendation: FSDP must find ways of turning the plan and diagnostic laboratories now being established into a functional system for the control of diseases, pests and fire. This will require a coordinator, control center, communications network and field system, all of which should receive immediate attention.

Flora del Ecuador

Finding: The Flora del Ecuador subproject is still collecting basic information and is producing a book that will be of great long-term value for forest management, botanical science and economic production.

Recommendation: This subproject should be extended until the project completion date, under the condition that provisions be made for publishing a substantial part of the ethnobotanical data and integrating the agroforestry extension staff into the information collection system. The Flora del Ecuador study will be most useful if this work is more closely integrated with the agroforestry subproject, taking advantage of the agronomists' close relations with farmers and any improved contacts with indigenous communities. The ethnobotanical results must be published if they are to be useful. With these stipulations, it is recommended that this subproject be extended for at least one year.

4. Protective Forestry

Plan Pichincha

Finding: The evaluation team was very favorably impressed by the philosophy behind Plan Pichincha, as well as the success, energy and enthusiasm with which it has been implemented. Continued support for improving management will not only help DINAF achieve its local objectives, but will also develop the practical capabilities of the staff involved and improve the prospects for sound management in the many other protective forest areas that are now being delimited. A failure to solve the administrative problems and/or to deal with the outstanding land-use issues in this conspicuous project will discourage the

staff and reduce the capability of DINAF to implement protective forestry activities elsewhere. This makes it crucial to ensure its continuing success.

Recommendation: Given the success of Plan Pichincha management to date, the probability of failure if designated funds are not made available, and benefits to the people of Quito should sound management continue, it is recommended that AID funding continue to support this DINAF project. It is recommended that funding be continued to support management activities, increased official support be given for negotiations with owners of crucial properties which are most vulnerable to damage or most valuable for conservation purposes, and FSDP provide further funds to improve access (e.g., vehicles, tracks), publicity materials and visitor facilities.

Patrimonio Forestal

Finding: Patrimonio Forestal has made substantial progress in the demarcation of forest boundaries in two provinces, but has a long way to go to achieve its objectives. It is severely restricted by a lack of vehicles, staff and practical management experience as well as a functional mechanism for resolving sociologically based and land-tenure disputes. The evaluation team considers this program to be of critical importance for assuring the future sound management of forests that are not yet assigned to private or communal ownership.

Recommendation: Noting the potential value and problems of the Patrimonio Forestal program, closer FSDP collaboration is recommended, leading to funding and technical assistance for the work done by DINAF-Manejo, especially the preparation of management plans. This program should place special emphasis on resolving the contradiction caused by including oil-palm objectives and occupied communal land in Patrimonio Forestal, and make use of the experiences of the Plan Pichincha and Portoviejo subprojects. Equipment, vehicles and specialized support (particularly management planning) should be provided to ensure successful identification, demarcation, protection and management of Patrimonio Forestal. An arbitration mechanism (including sociologists and IERAC) should be established to settle disputes and clearly determine the limits of communal and indigenous rights.

INECEL--Watershed Management

Finding: INECEL is engaged in practical soil-conservation and land-reclamation work on a small scale with promising results. DINAF staff are collaborating locally with INECEL on the protection of forests. The evaluation team perceives these

activities as an extremely important start toward resource conservation and watershed management, corresponding closely to FSDP objectives.

Recommendation: Since the MAG-INECEL agreement is imminent, FSDP should be ready to seek ways to support forest delimitation and field demonstration programs in the Paute watershed. One option would be to have DINAF take the initiative in protecting existing forests, and promoting tree- and shrub-planting in critical parts of the Paute watershed, in order to develop practical techniques, experience and management plans in preparation for the subsequent BID-financed project. FSDP could finance the fieldwork, vehicles, nurseries and equipment. Technical assistance, if required, must concentrate on close and practical collaboration in field activities.

Mangroves

Finding: Mangrove protection is included in the PP and is also an area in which DINAF has shown substantial interest because of the great environmental and economic importance of these forests.

Recommendation: The evaluation team recommends that FSDP contribute to developing a system for mangrove protection, delimitation and management which has been proposed by INERHI and DINAF. Particular needs include vehicles, surveys and management planning.

Galapagos Fire

Finding: FSDP's role in fighting the Galapagos fire was very appropriate and overall, a highly beneficial activity. FSDP's ability to act quickly in such a situation set a valuable precedent for future work.

Recommendation: FSDP should maintain the flexibility needed to respond rapidly to pressing forestry needs in Ecuador (i.e., fires or natural catastrophes). Such flexibility can be positive in terms of both long-term contributions as well as its short-term public relations value for FSDP.

5. Sociological Implications

Finding: FSDP has successfully initiated work with some small landowners, particularly in the Napo and, to a limited extent, Sierra regions. The Napo agroforestry subproject has established a method for working with local agencies and farmers that could be valuable for other regions. However, FSDP has not

been very successful in its efforts to work with indigenous people in eastern Ecuador because many DINAF activities are perceived as a threat.

Recommendation: To fully achieve the subprojects' technical objectives, particularly for tree-planting in the highlands and agroforestry in Napo, more progress must be made in interesting communities, indigenous people and their organizations, and smaller landholders. This must be done by improving communications, mutual respect and understanding, and developing technical packages and options that suit their needs. The evaluation team recommends that FSDP pay more attention to these requirements, and that a rural sociologist or anthropologist be contracted to assist with these efforts.

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the Project can reasonably be expected to attain its objectives and, if so, whether that would require a major redesign or relatively minor implementation adjustments.

2. A recommendation regarding the proper and feasible role for DINAF. If the originally planned role is retained, specific recommendation should be given for overcoming DINAF's difficulties in working out legal agreements with other entities, allowing DINAF to utilize Project Loan funds more rapidly and effectively, and making DINAF a more responsive, flexible institution with greater ties to other national forestry entities, and the private sector.
3. A recommendation as to whether the PACD should be extended and, if so, when and for how long.
4. A recommendation as to how to better structure the implementation organization for the Project, both within DINAF and USAID.
5. Recommendations for changes in the mix of inputs, the provision of additional inputs, (such as technical advisors, equipment and materials, or training), or the elimination of existing or planned inputs.
6. Recommendations for how the Project can better interact with other USAID or other donor institution projects.
7. Recommendations for making the Project contribute more strongly to the overall Mission strategy.

INDIVIDUAL SCOPES OF WORK FOR TEAM MEMBERS

Team Leader

I. Scope of Work

General. The Team Leader will be responsible for the supervision of the other members of the evaluation team. He will make sure that the team works together and interchanges observations and ideas. He will make a particular effort to tie together the various components of the Project and analyze the effect of components on each other.

The Team Leader will review, analyze, evaluate, and formulate recommendations for aspects of the Project that deal with institutional development and the establishment of closer links between DINAF and other forestry entities, particularly on the private sector.

Specific. The Team Leader will:

1. Write the final evaluation report, based upon the separate reports of team members.
2. Review, analyze, and evaluate the progress of Component A, Institutional Development.
3. Analyze the reasons for implementation difficulties, such as design deficiencies, legal obstacles, administrative weaknesses, or changes in circumstances or assumptions, and formulate recommendations for overcoming such problems.
4. Describe and analyze DINAF's relationships with the private forestry sector. Recommend ways in which the two sectors can better work together and steps the Project can take to encourage such improved cooperation.
5. Evaluate the activities the Project has already, or intends to undertake, with the private forestry sector, with regard to their technical feasibility, relevance to Project objectives, overall importance and relevance to the development of the sector, and coherence as a set of activities.

II. Qualifications

The Team Leader will have at least 15 years of experience in international forestry with a professional emphasis on institutional development, training, and private sector forestry development projects. Previous experience with AID forestry projects will be desirable. The Team Leader will have the character to be able to coordinate and review the work of other consultants. He will be an excellent writer. He will speak, write, and read Spanish at the FSI-3 level.

Watershed Management and Protection

I. Scope of Work

General. The team member in Watershed Management and Protection will review, analyze, evaluate, and formulate recommendations for all aspects of the Project which deal with watershed management and protection. He will work

closely with the Team Leader to define the contributions the watershed management and protection activities have made to the overall goal of the development of the forestry sector, in general, and to the institutional development of DINAF, in particular.

Specific. The team member will:

1. Describe Project activities in the Paute Watershed and compare them with what was planned for in the Project Paper. Discuss reasons for discrepancies. Analyze the possibilities for continuing activities in the Paute and make appropriate recommendations.
2. Describe Project activities on the Pichincha volcano. Evaluate their effectiveness for promoting better use of the volcanos slopes, especially on the eastern side. Formulate recommendations for this Project activity.
3. Describe the work that has been done on the delimitation of protective forests, including the number of hectares delimited, and the methods of delimitation. Evaluate the delimitation work for its effectiveness in preventing the cutting of protective forests. Formulate recommendations for this Project activity.
4. Describe the Patrimonio Foresal study. Analyze the technical quality of the study. Describe and analyze the problems which the study has or may cause in relationship to the indigenous people of Napo and Esmeraldas Provinces. Describe and analyze the role of IERAC in the study.
5. Describe and analyze the technical assistance that has been provided to INECEL's Watershed Management Unit. Evaluate the effectiveness of this technical assistance. Formulate recommendations for this part of the Project.
6. Consider the appropriateness of the newly formulated DINAF policy of concentrating on the protection of watersheds which still retain forest cover, to the exclusion of activities in already deforested and degraded watersheds, and the implications of that policy for the DINAF and for watershed management in Ecuador in general.

7. Describe and analyze the training in watershed management and protection which has been thus far given under the Project and evaluate its effectiveness. Make recommendations as to whether additional training should be provided and, if so, of what types.

II. Qualifications

The team member will have at least 10 years of experience in international forestry, with a professional emphasis in watershed management and protection, preferably in Latin America. He will have previous experience in development projects that involve watershed management and protection. He will speak Spanish at the FSI-3 level.

Nurseries and Reforestation

I. Scope of Work

General. The Team Member in Nurseries and Reforestation will review, analyze, evaluate, and formulate recommendations for the nursery improvement and field demonstration components of the Project. He will work closely with the Team Leader to analyze and evaluate the effect the implementation of the field demonstration activities has had on the overall development of the forestry sector, in general, and the institutional development of the national government forestry service, in particular. He will formulate recommendations for improving the implementation of field demonstration activities. He will consider the three geographical areas in which the Project has financed demonstration activities: the humid lowlands; the highlands; and the arid coast. In addition to evaluating individual activities, as described below, the team member will evaluate the overall coherence and consistency of the set of activities planned or undertaken in each area and recommend changes in activity mix emphasis to increase the relevance and feasibility of the demonstration component.

- a. Humid Lowlands. The team member will analyze and evaluate the humid lowland field demonstrations of the Project. He will focus on the agroforestry subproject being implemented in Napo Province, but will also

describe, analyze, and evaluate other potential field demonstration activities in the humid lowlands that were included in the Project Paper or that could be considered. He will make recommendations regarding the implementation of all aspects of the humid lowland field demonstrations.

For the agroforestry subproject the Team Member will describe, analyze, and evaluate:

1. The technical merit of the subproject from the point of view of species selection, planting and thinning techniques, and nursery management.
2. The economic justification for the subproject, including the social and ecological benefits to be expected if the techniques being developed in the subproject are replicated over a large area.
3. The ecological benefits the subproject may bring, especially if its practices are adopted on a large scale in the Ecuadorean Amazon.
4. The social ramifications of the subproject, especially with regard to the indigenous populations of the Napo.
5. The administrative support for the subproject that has been provided by MAG, DINAFA, and USAID. Judge its effectiveness.

b. Highlands. The Team Member will describe, analyze, and evaluate the highland nursery improvement and field demonstration aspects of the Project, including:

1. The nursery improvement work that has been done, including training, equipment, and research.
2. The EMDEFOR Subproject. For the EMDEFOR subproject the Consultant will describe, analyze, and evaluate:
 - a. Site selection, species selection, quality of planting stock, planting techniques, site preparation, and maintenance.
 - b. The method of operation of EMDEFOR and its interaction with campesinos, landowners, and the government.

- c. The new subproject which EMDEFOR has proposed informally for funding under the Project and describe how such a subproject would fit into the overall goals of the Project.
 - d. The financial status of the subproject. Describe and analyze financial difficulties the subproject has had. Make a judgement as to whether the amount earmarked for the subproject will be fully utilized or not.
3. Other possibilities for the Project to become involved in Highland Reforestation, such as the initiation of a highland agroforestry subproject..
 4. The highland research in nurseries, reforestation techniques, species selection that the Project has promoted.
 5. The training in nursery management, reforestation, and extension which has been provided under the Project.
 6. The technical assistance that has been given to EMDEFOR.
 7. Other highland demonstration activities described in the Project Paper but not yet undertaken, and their technical feasibility and continued relevance.
- c. Arid Coast. The Team Member will describe, analyze, and evaluate the field demonstration activities of the Project on the arid coast, including:
 1. The Portoviejo Greenbelt Project. He will describe the extent of this project, its administration, its technical, economic, ecological, and social merits. He will describe its present status and likely future.
 2. The relationship between the Central Offices of DINAF in Quito and the coastal district chiefs, giving some attention to the role of the Subsecretary of Agriculture for the coast and the coastal forestry advisor.
 3. The role of private voluntary organizations such as Meals for Millions who are or could be engaged in forestry activities on the arid coast.
 4. The proposed DINAF-Meals for Millions subproject from technical, economic, social, and ecological viewpoints. Describe and analyze the delays encountered in getting DINAF to write and approve an agreement with MFM to carry out this subproject.

- De Bonis, J. 1985. Evaluation of Tropical Forest Harvest Practices in Ecuador (in draft).
- De Bonis, J. 1985. Final Report.
- De Bonis, J. April 1986. "Harvesting tropical forest in Ecuador." Journal of Forestry, pp. 43-46.
- Deely, D., and Guess, G. 1982. A Public/Mixed Enterprise Approach to Forestry and Natural Resource Management for Integrated Rural Development in Ecuador.
- DINAF. August 1985. Informe de la Delimitacion Provisional del Patrimonio Forestal del Estado. Napo-Esmeraldas.
- DINAF and AID. Forestry Sector Development Project Paper.
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- DINAF and AID. January 1986. Subproyecto: Agroforesteria en el Nor-Oriente - Plan de Trabajo. Phase 2, 1986-87.
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- Gara, R. I. August 1985. Final Report. (Also numerous memoranda, trip reports and quarterly reports.)
- Gara, R. I.; Arnold, P.; Peters, J.; and Montesdeoca, J. 1986. The Isabela Fire: Galapagos Islands.
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- Gara, R. I., and Littke, W. I. August 1983. Condiciones para Enfermedades Forestales y Recomendaciones Administrativas para la Sierra Ecuatoriana.
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- Kline, K. L. February 1984. Estufas Lorena y Mejorada para el Ecuador Rural. (Informe final. Datos y analisis de estufas.)
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- Macdonald, Theodore. 1984. De Agricultores a Ganaderos. Quito, Ecuador: Ediciones Abya-Yala.
- MAG. February 1983. Plan Emergente de Caracter Forestal para la Provincia de Manabi.
- MAG. May 1985. Convenio de Cooperacion Interinstitucional entre el Ministerio de Agricultura y Ganaderia y el INIAP para la Ejecucion del Subproyecto Agrisilvopastorial en el Nororiente del Ecuador.
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- Moore, A.; Quesada, R.; and Corbut, M. April 1984. Informe Final del Asesor para el Plan de Manejo Bosque Protector de Pichincha.
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5. The training courses which have been given in nursery management and reforestation on the arid coast. The consultant will make recommendations for all aspects of the agroforestry subproject.
 6. The technical assistance that has been provided to DINAF in arid zone forestry.
 7. Other arid coast demonstration activities described in the Project Paper but not yet undertaken, and their technical feasibility and continued relevance.
- d. Fondo Nacional Forestal. The Team Member will analyze the effect of the Fondo Nacional Forestal (FONAFOR) on the Project, focusing on how FONAFOR may reinforce or overlap with certain Project activities and how the Project can contribute to FONAFOR's success. He will identify the ways in which the Project can support FONAFOR with equipment and materials, technical advice, and research. He will evaluate the possibility and justification for considering at least part of the FONAFOR funds to be national counterpart to the Project.

II. Qualifications

The Nurseries and Reforestation team member will have at least 10 years of experience in international forestry with a professional emphasis on nurseries, reforestation, and agroforestry. Former working experience in the Andean countries and with USAID Forestry projects will be desirable. The team member will speak Spanish at the FSI-3 level.

Research, Protection, and Extension

I. Scope of Work

The Team Member in Research, Protection, and Extension will review, analyze, evaluate, and formulate recommendations for the various components of the Project that deal with these areas. Research, protection, and extension are closely related with each other and with the institutional development, watershed management, and field demonstration components of the Project. This Team Member will, therefore, have to work closely with the other experts.

a. Research

The Team Member will focus on the efforts of the Project to promote a system of forestry research. He will describe, analyze, and evaluate:

1. The technical assistance in research that has been provided including the work of the various long and short-term advisors.

- Nations, J. D. October 1985. Socio-Cultural Factors in Watershed Management in Ecuador.
- Neil, D., and Baker, M. February 1986. Plant Resources of Amazonian Ecuador. First annual report, Flora del Ecuador project.
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- Seligson, Mitchell. 1984. Land Tenure Security, Minifundization and Agrarian Development in Ecuador: A Preliminary Assessment. Quito, Ecuador: USAID.
- Sevilla, P., and Sevilla, R. February 1986. Proyecto: Establecimiento del Centro Ecuatoriano para la Conservacion de Recursos Bioticos. Fundacion Natura.
- Southgate, D. October 1985. Analisis Economico del Manejo de Cuencas Hidrograficas en el Ecuador. AID/INECEL Proyecto de Manejo de Cuencas.

2. The contribution to research which the provision of seed and other equipment and materials has made.
3. The research components of the Forest Protection Plan, the EMDEFOR, Meals for Millions and Agroforestry Subprojects, and the nursery improvement work.
4. The "Flora del Ecuador" botany subproject and its contribution to the development of forestry research.
5. The demonstrated or expected utility of the research undertaken or planned, and recommend changes in research priorities, as appropriate.

b. Protection

The Team Member will review, analyze and evaluate the forest protection components of the Project, including:

1. The inputs of technical assistance, training, equipment and materials that have contributed to forest protection.
2. The Forest Protection Plan.

c. Extension

The Team Member will examine the effort which the Project has made to improve forestry extension. He will describe, and analyze:

1. The lessons of the Agroforestry Subproject which could be extended to extension efforts in the rest of the country.
2. The proposed subproject with ALMA and Fundacion Natura, considering the content of the subproject, its relationship to the overall goals of the Project, and the problems of implementation it has faced.
3. The training courses in extension provided under the Project, and evaluate the need for additional training courses in extension.

II. Qualifications

The Team Member will have at least 10 years of experience in the areas of research, protection, and extension, with a somewhat even mixture of all three. He will preferably have working experience in Latin America and have been involved previously in AID forestry projects. He will speak Spanish at the FSI-3 level.

- Stewart, M. 1981. Asesoramiento para la Identificación de Oportunidades de Inversión en el Sector Forestal. Quito, Ecuador: USAID.
- Tolisano, J. 1985. Final Report on Reforestation and Watershed Management Activities in the Dry Coastal and Sierra Zones of Ecuador.
- Tolisano, J. 1985. Informe Final Sobre las Actividades de Reforestación y Manejo de Cuencas Hidrográficas en las Zonas Secas de la Costa y Sierra del Ecuador - Actividades, Observaciones y Recomendaciones. (Also in English.)
- Tolisano, J. 1985. Proyecto de Reforestación para la Península de Santa Elena.
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- Venator, C. April 1984. "Comparison of growth of Pinus radiata seedlings in small-volume nursery containers filled with various rice-hull and turba formulations" (study plan).
- Venator, C. April 1984. The effectiveness of various herbicides for the control of nursery weeds in high-elevation forest tree nurseries of Ecuador (study plan).

Plan of Work

The Team Leader will have the final responsibility for setting up a Plan of Work for the Evaluation Team, but the following is a suggested Plan of Work.

1. Week One

The Team Leader arrives alone to make preparations for the evaluation. He:

1. Interviews the Project Manager, the Principal Advisor, the USAID staff, the National Forestry Director, and his assigned counterparts.
2. Collects background reports.
3. Arranges for office space, secretaries, and translators.
4. Puts his Work Plan in final form and obtains the approval of USAID and DINAF.

2. Week Two

The other team members arrive. They:

1. Are briefed on their expected duties and roles.
2. Prepare draft Plans of Work which the Team Leader coordinates and approves.
3. Collect and read background reports which correspond to their Scopes of Work.
4. Settle administrative and logistical matters (ID cards; money; visas, etc.).
5. Interview the Project Manager, Principal Advisor, other advisors, and DINAF staff and are introduced to PRONAF counterparts for the evaluation.
6. Visit DINAF offices in Quito, MAG, and Conocoto to interview DINAF staff and see Project provided equipment and materials.

- Venator, C. April 1984. "Selection of a fertilizer formulation for optimum growth of Pinus radiata seedlings grown in containers filled with rice-hull potting mixture" (study plan).
- Venator, C. February 1986. Summary of Activities and Progress in Nursery Production. (Also in Spanish.)
- Venator, C., and Liegel, L. H. May 1985. Manual de Viveros Mecanizados para Plantas a Raiz Desnuda y Sistema Semimecanizado con Recipientes de Volúmenes Menores a 130 cc. Quito, Ecuador: MAG-PRONAF-AID.
- Vizcarra, T. J. January 1985. Proyecto de Rehabilitación del Cinturón Verde. Portoviejo.
- Weaver, P. L., and Salinas Torres, J. Tasas de Incremento y Sugerencias para las Investigaciones Forestales y Manejo Forestal en Sabalo y Cole.
- Weaver, P. L., and Salinas Torres, J. March 1985. Programa para el Manejo Forestal en la Región de Sabalo y Cole.
- Weaver, P. L., and Salinas Torres, J. June 1985. Bases para una Política de Desarrollo Forestal del Sector Comprendido entre los Ríos Guavllabamba y Canande.
- Weaver, P. L., and Salinas Torres, J. June 1985. Plan Nacional de Investigaciones Forestales en Ecuador, 1985-1989.
- Wetterburg, G. B. February 1982. Elemento de Tierras Silvestres y Vida Silvestre. Proyecto Forestal, Ecuador.

3. Week Three

Team members make field trips to the Oriente, Chimborazo, Portoviejo, Conocoto, Loja as they deem appropriate. The Team Leader will accompany members on some or all of the trips.

4. Week Four

Team members write their individual reports, under the supervision of the Team Leader. Additional interviews can be arranged with USAID, DINAF, and other forestry entity personnel as necessary. At the end of this week all members except the Team Leader depart.

5. Week Five

The Team Leader works on the preparation of a draft report. It is translated and presented for USAID and DINAF review.

6. Week Six

The Team Leader discusses the report with USAID and DINAF personnel. Revisions are made as necessary. A final version of the report is prepared and discussed with USAID and MAG staff, including the Mission Director and the Minister of Agriculture. The Team Leader departs.

ARTICLE IV. REPORTS

Reports will be submitted according to the following schedule:

	End of Week
Team Leader Draft	5
Watershed Management & Protection Draft	1
Nurseries & Reforestation Draft	4
Research, Protection & Extension Draft	4

The final report will be submitted by the Contractor to USAID/Ecuador within four weeks after the departure of the Team

APPENDIX A

Scope of Work

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Leader from Ecuador. The report will be submitted with 10 copies both in English and Spanish. The Project Manager, USAID, will be responsible for review and approval of the final report.

ARTICLE V--RELATIONSHIPS AND RESPONSIBILITIES

All work under the contract will be coordinated and directed by the Team Leader. The Team Leader will consult with the Project Manager, USAID, the Principal Forestry Advisor to the Forestry Project and the Counterpart of the Ministry of Agriculture.

Article VI. TERM OF PERFORMANCE

The effective date of this work order is April 21, 1986 and the estimated completion date is July 18, 1986.

Subject to the written approval of the Project Manager (see block 5 of the Cover Page), the estimated completion date of this work order may be extended provided that such extension does not cause the elapsed time for completion of the work, including furnishing of all deliverables, to extend beyond 30 calendar days from the original estimated completion date. The contractor shall attach a copy of the Project Manager's approval for any extension of the term of this order to the final voucher submitted for payment.

It is the contractor's responsibility to ensure that Project Manager approved adjustments to the original estimated completion date do not result in costs to the Government which exceed the total amount obligated for the performance of the work. Under no circumstances shall such adjustments authorize the contractor to be paid any sum in excess of the total amount obligated to this order for the performance of the work.

Adjustments which will cause the elapsed time for completion of the work to exceed the original estimated completion date by more than 30 days must be approved in advance by the Contracting Officer.

BACKGROUND:

A mid-term process evaluation of the Forestry Sector Development Project is required. It will be undertaken with the collaboration of the cooperating agency of the Project, The National Forestry Directorate. The mid-term evaluation will allow USAID/Ecuador and the GOE to assess the progress of the Project thus far, and plan its further implementation.

ARTICLE I. TITLE

Mid-Term Evaluation of the Forestry Sector Development Project (Ecuador) - Project No. 518-0023.

ARTICLE II--Objective

The overall objective of the Evaluation will be to (a) assess progress toward achieving Project outputs and purpose; (b) assess the continued relevance of the various objectives and of the strategy for achieving them, and (c) formulate practical recommendations for USAID and DINAF that will make the Project function more smoothly and allow it to reach its objectives, and/or for modifying objectives. The team members will do this review, analysis, and evaluate the Project for each of their areas of expertise. They will not, however, work separately, but rather will cooperate fully with each other in the sharing of information, observations, ideas, and recommendations.

Many of the activities thus far undertaken by the Project cannot be neatly categorized as belonging to only one component of the Project or as fully under only one of the specialities for which the Contractor is being requested. The Team members will have to work closely with each other, and with the Team Leader, to analyze and evaluate the contribution the Project has made to the overall goal of developing the forestry sector in general and the institutional capacity of the DINAF, in particular. The same collaborative approach will be necessary for the Evaluation Team to properly evaluate the contributions the Project has made to developing forestry research and towards creating closer links between the government forestry service and private sector forestry entities.

The Team Leader will play a particularly vital role in this evaluation. He will have to distill the observations and recommendations of his team members to come up with an overall assessment of the progress of the Project and practical recommendations for its future course. He will have to be sure that each team member is contributing towards the final evaluation report and recommendations and, therefore, prevent any team member from working in isolation without regard for the work of the rest of the team.

APPENDIX B

List of Individuals Interviewed

Ing. Carlos Aguirre C., president, Planisoc. Cia.
Ing. Jose Ramon Almeida M., acting chief, EMDEFOR, Riobamba
Sr. Lautaro Andrade, representative, Meals for Millions
Mr. Peter Arnold, principal forestry advisor, DINAF-AID
Dr. Mark Baker, DINAF-AID Flora del Ecuador subproject
Ing. Jorge Barba, executive director, AIMA
Ing. Leonardo Benavides A., district chief, DINAF-MAG, Loja
Ing. Luis Benitez, Unidad Industrial, DINAF
Dr. John Bishop, agroforestry subproject, DINAF-AID, Coca
Ing. Mario Cabrera, office chief, MAG, Coca
Lic. Marcia de Casco, EMDEFOR, Riobamba
Ing. Leonel Cedenos Rosado, mayor, Portoviejo
Ing. Victor Hugo Chala, director, INIAP, Coca
Dr. Carlos Donoso Echanique, administrative subsecretary, MAG
Ing. Siegfried Dudek, German Forestry Mission, DINAF
Ing. Hugo Eguez Vera, provincial director for agriculture and livestock, MAG, Manabi
Fernando Escobar, technical director, DINAF
Ing. Eduardo Figueroa, general director for protection of the environment, Ministry of Energy and Mines
Mr. Glen Galloway, Sierra reforestation, DINAF-AID
Agr. Javier Guerrero, INIAP, Coca
Ing. Jorge Guzman, Production Department, DINAF
Sr. Frank Huthnance, executive president, Artepractico, Cuenca
Manuel Kakabadse, national director, DINAF
Yolanda Kakabadse, executive director, Fundacion Natura
Mr. Bruce Kernan, DINAF-AID project manager
Lic. Helena Landazuri, technical director, Fundacion Natura
Prof. Mel Larsen, University of Ohio
Ing. Enrique Laso, consultant to INECEL, DINAF
Ing. Napoleon Lopez, pathologist, Loja University
Ing. Fausto Maldonado, AID
Ms. Cindy Minor, U.S. Peace Corps volunteer
Ing. Vicente Molinos, director, INFORDE
Ing. Fernando Montenegro, executive director, Corporacion Forestal Juan Manuel Durini
Ing. Jorge Montesdioca C., chief for administration and finance, DINAF
Dr. David Neil, DINAF-AID Flora del Ecuador subproject
Mr. John O'Donnell, AID Agriculture and Rural Development Office
Ing. Patricio Oliva, chief, Watershed Management Unit, INECEL
Dr. Giovanni Onore, Catholic University
Dr. Robert Peck, agroforestry subproject, DINAF-AID, Coca
Mr. Joseph Peters, U.S. Peace Corps volunteer, Loja University
Ing. Marcelina Pita, EMDEFOR, Riobamba
Ing. Arturo Ponce, chief, Departamento de Areas Naturales y Vida Silvestre, DINAF

ARTICLE III--STATEMENT OF WORK

The Contractor's Evaluation Team shall produce the following:

I. Background

1. A written review of the activities of the Project thus far, with as many of the inputs put in quantitative terms as possible; for example, number of people trained, number of months of technical assistance provided in various fields; amounts of kinds of equipment and material provided; local currency disbursements.
2. A written comparison of the Project accomplishments thus far with those planned for in the Project Paper and Logical Framework.
3. An assessment of progress made toward achieving the End-of-Project Status (EOPS), as stated in the Logical Framework, particularly with regard to the institutional development of DINAF.
4. A written analysis of why Project accomplishments (outputs, progress toward EOPS) are behind or ahead of those planned in the Project Paper, including a discussion of all factors such as legal obstacles, administrative weaknesses, project design or others affecting Project implementation.
5. A written description of how the Project has been modified and an analysis of how and why these modifications were made.
6. A written evaluation of the effectiveness of the various inputs which the project has received. This evaluation will be of the technical assistance, training, equipment and materials, and use of loan funds for the support of field demonstrations.

II. Analysis

The Evaluation Team will use the Background Information to write an analysis of the progress of the Project, thus far. The analysis will discuss:

A. Implementation Problems

1. The effect of the Project Design on the implementation of the Project.
2. The effect of implementation arrangements both in DINAF and in USAID on project implementation.

Inga. Ruth Quesada, Pichincha Forest Protection Unit, DINAF
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Dr. Larry Szott, soil scientist, North Carolina State University,
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3. The effect that implementation delays, such as those involved in hiring technical advisors or in procuring equipment and materials, have had on project implementation.
4. The effect of the legal framework within which DINAF operates on project implementation.
5. The effect of the administrative framework within which DINAF operates on project implementation.

B. Project Accomplishments

1. The links which the Project has helped to establish within the forestry sector.
2. Progress of DINAF in adopting the role contemplated for it in the Project Paper, including its effectiveness as a planning and coordination unit for the sector, usefulness of technical information dissemination and technical assistance services, and effectiveness of relationships with other sector institutions.
3. Physical accomplishments such as areas reforested or better managed.
4. Initiation of forestry research and its relevance with regard to eventual likely contributions to better executed forestry activities, such as healthier plantations or better managed forests.
5. The prospects of the Project achieving its objectives (outputs, EOPS) within the planned time frame, assuming no changes in the Project design or strategy.

III. Recommendations

The Evaluation Team will formulate practical recommendations regarding the continued implementation of the Project. The recommendations made should arise logically from the analysis of the background information. However, some areas in which it is expected the team will make some recommendations are as follows:

1. Basic design of the Project, including the feasibility of the institutional strategy and the relevance of the planned and actual field demonstration and research activities. A judgement should be made as to whether