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FORESTRY SECTOR DEVELOPMENT
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FORESTRY SECTOR DEVELOPMENT
PROJECT 518-0023
PROJECT PAPER SUPPLEMENT

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I. SUMMARY AND RECOMMENDATION

A. Recommendation

It is recommended that the Director of the A.I.D. Mission to Ecuador approve this Project Paper Supplement for the Forestry Sector Development Project (518-0023). This amendment to the project will revise the project description for the remaining two and one-half years of the project. No increase in the authorized life-of-project funding level is requested.

B. Project Summary

The Forestry Sector Development Project was authorized on July 12, 1982 and signed on September 30, 1982. This five and one-half year, \$8,100,000 (\$6,500,000 loan and \$1,600,000 grant) project represented the first major intervention in the Mission's strategy to support the development and protection of Ecuador's forest and other natural resources. The purpose of the Project is to strengthen Ecuadorian public and private sector institutional capacity to rationally develop and utilize Ecuador's forest resources. The Project seeks to enhance the GOE's capacity to support private and public sector initiatives in the development and management of productive forests and on-farm forestry (agroforestry) and to manage protective forests effectively. The Project's three interrelated components, as set forth in the original Project Paper, are:

1. Institutional Development of the National Forestry Program and Other Forestry Institutions
2. Productive Forestry Research and Field Demonstrations
3. Protective Forest and Watershed Management

The Project's implementing agency is the National Forestry Directorate (DINAF) - formerly the National Forestry Program (PRONAF) - in the Ministry of Agriculture (MAG). The original PACD was recently extended two years from March 31, 1988 to March 31, 1990.

Several factors, including perhaps an overly ambitious design, have lessened the Project's impact on strengthening DINAF. Among these have been a lack of counterpart personnel, administrative constraints, lack of long term management assistance, and a reluctance on the part of DINAF to accept the original Project model.

However, the Project has made progress in a number of important areas and, in spite of some shortcomings, the Project remains an excellent vehicle for improving the productive use of forest resources and protecting the forest, soil, and water resources which are essential to agricultural production in Ecuador. The Project is also a useful intervention for strengthening DINAF to play a more focussed but critical role in the development of the sector. Thus A.I.D. and DINAF have agreed to revise the project design.

While the project purpose will remain the same, this purpose will be achieved through a more focussed strategy that emphasizes: (1) a more modest, realistic role for DINAF and assistance to strengthen DINAF's internal capacity in critical areas; (2) implementing productive forestry demonstrations in agroforestry only in three regions of the country; and (3) delimiting and managing natural areas. The Project strategy is summarized below for each of the three revised components.

1. Institutional Strengthening. The Project has attempted to reorient and develop DINAF's role as a coordinating and support institution that could act as a catalyst for other institutions to implement forestry projects. DINAF has had difficulties carrying out its new role. The revised Project recognizes that DINAF has to overcome a number of internal constraints and be a more successful and respected institution before it can fully share its forestry sector responsibilities with other institutions. Therefore, the revised strategy for this component focusses on assisting DINAF to assign the key personnel needed to achieve the institutional strengthening and technology transfer objectives of the Project and improve its core administrative and financial management systems so it can more effectively manage its programs. Also, the direct management burden on DINAF is reduced by delegating certain ongoing responsibilities to other organizations. Project resources will assist DINAF to develop a plan to protect forest resources from fires, insects, and disease and to implement this plan in times of emergency with Civil Defense counterparts, the armed forces, and forestry schools. Project funds will also be used to assist DINAF to support forestry research programs carried out by other Ecuadorean institutions.

2. Agroforestry Demonstrations. The revised strategy for this component is to concentrate on agroforestry subprojects that will demonstrate tangible benefits to farmers in the form of erosion control, improved soil fertility, forage, etc. These subprojects will be carried out in the three main ecological regions of Ecuador.

3. Delimitation and Management of Natural Areas. The revised Project strategy for this component is to support the delimitation and management of natural forest areas. This component will therefore continue to assist the GOE to delimitation of the Patrimonio Forestal. This work has already been carried out in Esmeraldas and Napo provinces and will be phased over the rest of the life of the Project to the other regions of Ecuador. This component will also assist DINAF in the delimitation and protection of national parks and natural reserves and provide funds for the completion of a coastal mangrove inventory.

C. Specific Changes in the Forestry Sector Development Project

The changes in Project activities are summarized in the following table:

<u>Original Project</u>	<u>Revised Project</u>
A. Institutional Strengthening	
o Management Assistance	o DINAF Management and Administrative Improvement (new)
o Planning and Programming	

- o Research Coordination
- o Information Dissemination
- o Outreach Support
- o Forest Protection System (ongoing and new)
- o Forestry Research (ongoing and new)

B. Productive Forestry/Agroforestry Demonstrations

- o Forestry Plantations
- o On-farm (agro) forestry
- o Natural Regeneration
- o Agroforestry/Demonstrations (ongoing and new)

C. Protective Forestry/Delimitation and Management of Natural Areas

- o Paute Watershed Planning
- o Other Watersheds and Critical Areas
- o Revegetation and Natural Regeneration
- o Demonstrations in the Paute Watershed
- o INECEL Watershed Management Unit
- o INECEL Watershed Management Unit (completed)
- o Portoviejo Protective Greenbelt (completed)
- o Plan Pichincha (on-going)
- o Patrimonio Forestal (on-going and new)
- o Natural Areas Management (new)
- o Coastal Mangrove Inventory (new)

D. Summary Financial Plan

The total estimated Project cost is \$11,387,401 of which A.I.D. is providing \$1,487,401 grant* and \$6,500,000 loan. The counterpart contribution consists of the equivalent of \$ 3,400,000. The summary financial plan by project component is as follows:

* \$112,399 was de-obligated in 1985.

SUMMARY FINANCIAL PLAN
(\$ 000)

COMPONENT/ACTIVITY/INPUT	GRANT	LOAN	COUNTERP.	TOTAL
A. INSTITUTIONAL STRENGTHENING	889	2,324	900	4,113
B. AGROFORESTRY DEMONSTRATIONS	346	3,286	1,898	5,530
C. DELIMITATION AND MGMT. OF NATURAL AREAS	188	785	546	1,519
D. EVALUATION/AUDIT	50	83	6	131
E. CONTINGENCY	14	22	50	86
TOTAL	1,487	6,500	3,400	11,387

II. RELATIONSHIP TO MISSION STRATEGY AND OBJECTIVES

Since the time of the original authorization of the Project, the Mission's overall program and agricultural sector strategies have been updated. It is therefore useful to review the relationship of the redesigned Project to the current strategy, as outlined in the Mission's approved CDSS and Action Plan.

The Mission's approved strategy for Ecuador has three major goals: (1) economic stabilization, (2) achievement of basic structural reforms leading to rapid and sustained economic growth, and (3) a wider sharing of the benefits of growth. In support of this overall strategy, the Mission's Agricultural Sector strategy is designed with the objectives of: (1) increasing agricultural output to supply the Nation's food and fiber needs at reasonable prices; (2) increasing producer incomes and the country's foreign exchange earnings; and (3) managing the natural resource base to assure the long-run productive capacity of the sector (Annex 2, FY 88/89 Action Plan).

This revised Project will directly support two of the three above stated objectives of the Mission's agricultural strategy: increased production and productivity (agricultural output); and improved natural resource management. The Project contributes to increased agricultural production and productivity by establishing forests, woodlands, and plantings which provide a wide range of commercial products, employment opportunities, and environmental benefits. For example, the Project's highland agroforestry activities will use fast growing species and species such as Alder which have nitrogen-fixing qualities which improve soil fertility and reduce the need for expensive chemical fertilizers. Wind breaks will minimize soil moisture loss. These agroforestry techniques complement food crops and raise agricultural production. In the lowlands, Leucaena, another fast growing species, can be a food supplement for livestock and used for firewood.

One of the clearest ways to improve the management of Ecuadorean natural resources is to promote the rational use of its forests. As identified in the original Project Paper most economic activity related to forestry in Ecuador, except for highland Eucalyptus plantations, involves the exploitation of natural forests. In addition to renewable resources directly provided by forests (food, fuel wood, construction and industrial materials), forests help to sustain and renovate soils. Forest resources, for example, often maintain soil fertility, reduce erosion, and improve agricultural microclimates. Furthermore, forest reserves are sources for valuable plant or animal genetic stock. Therefore, the revised Project will support applied research as well as the ongoing botany study. In addition, the third component of the revised Project is designed to identify and delimit forest areas which should be protected, and their use managed on a rational basis. Also, the Forest Protection System managed by DINAF under the revised Institutional Strengthening Component is designed to establish mechanisms to identify forest emergencies involving fire, disease, and insects. This will enable DINAF to work with Civil Defense and other local authorities to put out forest fires and with forestry schools to protect forest reserves from pests, thus preserving potentially productive forest resources.

Finally, the redesigned Project will place greater emphasis on strengthening DINAF's administrative, managerial, and technical capacity to implement its programs. DINAF will be able to provide critical services which benefit the public, such as forest fire suppression and management of insects and diseases which attack forests, as well as coordinate agroforestry and reforestation activities which increase agricultural production and productivity.

III. DESCRIPTION OF THE REVISED PROJECT

The purpose of the Project as stated in Section I.B. remains the same. The revised Project retains its three component structure and proposes to achieve the Project purpose through: (1) increased efforts to strengthen DINAF's internal capacity in critical areas; (2) a more focused set of field demonstrations emphasizing agroforestry and (3) delimiting and managing natural areas. Each of the Project's three components is discussed in detail below.

A. Component A: Institutional Strengthening

To date the Project has attempted to modify and strengthen DINAF's role as a coordinating and support institution that could act as the catalyst for other institutions to implement forestry projects. For various reasons, discussed in Annex IV, DINAF has not yet been able to attain this role. The revised Project will provide increased emphasis on strengthening DINAF's internal operations by:

- o Providing management assistance on a sustained basis to help DINAF overcome a number of fundamental internal administrative constraints.
- o Reducing the scope of activities under the Project, especially in the field demonstration component, thereby easing the implementation load on DINAF.
- o Ensuring that MAG itself provides a selected number of key counterpart personnel to DINAF to support implementation and institutionalization of Project activities.

This component of the revised Project will finance the management assistance to DINAF. In addition, the forest protection system activity initiated under the first phase of the project will be continued. Finally, this component will fund a number of research activities to complement the field activities of the Project. The research activities include continuation of the botanical research in the Ecuadorean Amazon with applications to agroforestry, a research grants program with Ecuadorean universities focused on agroforestry topics, and species selection which will directly support the Plan Bosque reforestation program. In keeping with the original Project concept, the forest protection and research activities will, for the most part, be implemented by public and private organizations under the coordination of DINAF. However, the number of activities involving DINAF coordination under this component have been reduced.

I. Administrative Improvement of DINAF

Background: As stated previously, the original Project tried to strengthen DINAF as a coordinating and support institution that could act as a catalyst for the efforts of private and public sector institutions which implement forestry projects. DINAF has not been able to fully carry out this role and appears to be a weaker institution than originally thought.

DINAF suffers from basic organizational and administrative constraints that impede it from implementing the most basic of its functions. First, DINAF has a small staff relative to its responsibilities. Second, DINAF lacks effective planning and budgeting systems, as evidenced by its difficulties in developing annual operating plans for the Project. Third, DINAF does not have working financial management systems to allow it to control its financial resources and account for budgeted and donor funds. Fourth, high level officials often do not have the information they need to manage resources and make decisions. Fifth, DINAF is unable to procure and import forestry equipment and commodities on a timely basis. Nor is it able to contract services and make agreements with other organizations, especially private ones, in an efficient, consistent manner.

Objective: The revised Project will place increased emphasis on improving DINAF's institutional capacity to administer its programs, to manage its financial, human, and physical resources, to establish and manage formal contracts and agreements with other forestry sector institutions, and to monitor, control, and supervise priority field activities. It is expected that a stronger organization will result, with enhanced capability to carry out its basic responsibilities.

Description: The principal tool for strengthening DINAF will consist of a direct contract between A.I.D. and a qualified Ecuadorean management consulting firm. The objective of the contract will be to strengthen DINAF's institutional capacity in the following areas: planning and budgeting; financial management and accounting; procurement, contracting, and agreement formulation and approval; internal communication and administration; and management information systems for the monitoring and control of field activities.

The management firm, to be competitively selected, will assess and analyze DINAF's present capacity and organization, help establish priorities, recommend specific improvements, and assist DINAF to articulate and implement systems and procedures in the above areas which meet or exceed the requirements of the GOE and international donors. The firm will pay particular attention to strengthening DINAF to successfully carry out its key responsibilities for managing the Project. The firm's main emphasis will be on training. For example, it will train DINAF staff to prepare annual operating plans and keep Project accounts. In addition it will assist DINAF to set up stronger systems to control agroforestry subproject activities and to organize and control Plan Bosque reforestation activities. The contractor will develop manuals, computer software, and other materials and provide on-the-job training to DINAF personnel in these areas to help ensure that the systems are fully integrated and utilized.

The success of this activity depends on the availability of key counterpart personnel in the various administrative areas. During the redesign, with encouragement from A.I.D., DINAF assigned a full-time accountant to the Project. This head of DINAF's Administration Department, will be the main counterpart for the contractor in the area of financial management. In addition, under this activity, A.I.D. will contract an Ecuadorean Project

Coordinator to work in DINAF. Based on a joint review of staffing conducted by A.I.D. and DINAF during the redesign, these are the minimum additional personnel required at the administrative level of the Project. During the implementation of this activity, additional counterpart needs may be identified and A.I.D. will encourage DINAF to assign these additional personnel as quickly as possible.

Under this activity, the Project has financed a number of personal computer systems. Additional systems will be needed to handle the new administrative systems developed with the assistance of the consulting firm, including systems in certain key districts which can communicate with the central DINAF offices. The Project has also financed various secretarial services. Under the redesigned Project, this category of financing will be reduced to those services which are needed specifically for DINAF's management of Project activities and which are not properly considered recurring costs. The temporary services of an accounting assistant to work with the DINAF accountant in reconciling the Project accounts are also needed.

By the PACD DINAF will have established systems for:

- Follow-up on planned actions and on issued instructions. This system should feed into the system for personnel evaluation and promotion.
- Follow-up on written and verbal communications between different parts of the organization and between DINAF and other institutions.
- Preparation of annual operating plans with quantitative targets.
- Distribution of planning information to field offices and feed back of information from the field offices.
- Evaluation of actual versus planned progress and updating of planning documents accordingly.
- Reporting of program and related financial information necessary for decision making to DINAF management.
- Financial reporting that meets both GOE and various external donor requirements including necessary manuals and design and install programs as appropriate.
- Financial planning and budgeting that are linked to: (a) the process of developing annual operating plans and long-term institutional goals; (b) requests for funding to the GOE and external donors; and (c) historical budgetary and expenditure data.
- Computer assisted control systems for contracting procedures, including contracts for procurement and interinstitutional agreements.

Appropriate DINAF staff will be trained in, and operating manuals will be prepared for, the use of the above systems.

Inputs and Costs: The total cost of this activity is estimated at \$1,255,980. To date, A.I.D. grant funds of \$359,000 have financed the first two-and-a-half years of the Principal Advisor, short term technical assistance in administration, small amounts of training and office equipment, and administrative expenses including secretarial and translations services. A.I.D. loan funds of \$285,542 have financed the balance of the Principal Advisor's services, personal computers and other office equipment, motorcycles for DINAF district staff, a small amount of in-country training, and additional secretarial services. The counterpart contribution to date is estimated at the equivalent of \$169,533.

During the remainder of the Project, A.I.D. loan funds estimated at \$326,305 will finance management assistance to DINAF (approximately 20 person-months, \$99,000), an Ecuadorean Project Coordinator (36 person-months, \$85,100), additional computer equipment and other office equipment (\$112,205), in-country training (\$10,000), and additional administrative expenses including secretarial services (\$20,000). Further DINAF in-kind counterpart in the form of services, office space, and equipment is estimated at \$115,600.

2. Forestry Research System

Background: The original Project included a program of research activities which would be coordinated by DINAF and incorporated into the productive forest field demonstrations. The field demonstrations thus far undertaken have included applied research components, such as the planting of new species and a study of alternate planting methods. Also, forest pathology and entomological research is being organized and funded as part of the Forest Protection System in collaboration with the University of Loja and the Catholic University in Quito.

In addition, the Project has supported technical assistance to identify forest research priorities and two independent research activities, both related to the Ecuadorean Amazon which comprises some 70 percent of Ecuador's forest lands and a vast number of species. First, A.I.D. awarded a Grant to the Nature Foundation, an Ecuadorean PVO, to undertake a feasibility study for the establishment of a private Amazonian research institute to investigate and promote good management of natural resources in the Oriente including sustainable land use practices by indigenous groups and colonists.

Second, A.I.D. entered into a Grant Agreement with the New York Botanical Garden which, in conjunction with the Missouri Botanical Garden, has been working with botanists at several Ecuadorean universities to carry out research in the Ecuadorean Amazon. This research, which was partially funded by AID/W, has included identification of hundreds of tree species previously undocumented in Ecuador and investigation of the potential economic uses of trees and other plants. The results of this research will provide a data base which is essential for planning the development and management of the Amazon. The results have already had practical applications in the selection of species for use in the Napo Agroforestry Subproject. The Project has also

financed long-term training in botany research and herbarium management at New York and Missouri for two Ecuadoreans connected with the Catholic University and National Museum herbaria, plus short-term training for the field assistant to the botany project.

The experience of the Project thus far has shown the need for mechanisms to take advantage of existing organizations with research capabilities that DINAF does not have and is not able to develop because its priorities and capabilities lie in other areas. Under the revised Project, the research activities will be given greater focus to support and complement the agroforestry activities under Component B of the Project.

Objective: The Project will strengthen Ecuadorean institutional ability to do forestry research with a focus on areas of relevance to other Project activities.

Description: This objective will be achieved through the following four activities:

a. Research grants. The Project will support a research grants program to strengthen Ecuadorean university research capabilities in forestry. Although several universities have qualified faculty and some infrastructure, they generally lack funding for specific research programs, and what forestry research does take place is scattered and isolated. The grants program will provide an infusion of funding and help focus the research of the universities.

Candidates for implementing this research grants program include the Ecuadorean Agricultural Development Foundation (FUNDAGRO), the Consejo de Universidades, and Fundacion Ciencia. The implementing organization would competitively solicit and evaluate research proposals and award research grants to faculty or possibly graduate students in Ecuadorean universities. Detailed selection criteria would be specified in the agreement between DINAF and this organization. As part of the Project's effort to promote agroforestry techniques in Ecuador, most grants will provide support for research in agroforestry. Researchers will be expected to carry out their investigations in the agroforestry demonstration areas financed under this Project or other such areas. Examples of the types of research that may be carried out might include the effect of agroforestry practices on soil fertility and the contribution of tree forage to livestock yield. In this way, an interest in agroforestry will be instilled among the country's leading university faculties and a research capacity will be established that will contribute to the development of agroforestry on a continuing basis. DINAF, in consultation with the A.I.D.-financed Project advisors and A.I.D. Project Officer, will give prior approval to the research proposals.

b. Agroforestry research and evaluation. The major demonstration activities of the revised Project will involve agroforestry. Agroforestry, as a consciously applied technology, is new to Ecuador. It is therefore important that the experience of these demonstrations be carefully recorded and analyzed so that DINAF and other Ecuadorean institutions can make

informed decisions regarding the future promotion of this technology. It is important to know the technical conditions under which various agroforestry systems best function. It is also critical that the socioeconomic impacts be assessed, particularly on small holders. For this reason, the Project will finance an ongoing program to evaluate the agroforestry demonstrations, especially the Napo Agroforestry subproject.

It is proposed that the evaluation services also be obtained through FUNDAGRO. This is appropriate because, by its nature, the evaluation is largely a research activity involving a specific technology. Also, an important part of FUNDAGRO's mandate is to promote the extension of new technologies. Thus, working through FUNDAGRO will help develop a mechanism for promoting the dissemination of agroforestry over the long run. Finally, agroforestry is one of FUNDAGRO's expressed priorities for research and extension. Consistent with its mode of operation, FUNDAGRO may enter into a subagreement or subcontract with another research organization, such as an international agricultural research center, for the direct evaluation services and would supervise the work.

The evaluation will take place over the remaining life of Project and include baseline surveys, farm case studies, and follow-up surveys to measure changes. The evaluation will focus on agroforestry demonstrations in the Oriente. The evaluation will provide findings on the rate and mode of adoption of agroforestry techniques, physical impacts of the techniques in areas such as soil conservation, the financial impact at the farm level, and the overall economic feasibility of agroforestry in Ecuador. On the basis of the research results, FUNDAGRO itself would then become an active promoter of the extension of agroforestry techniques in Ecuador.

c. Plan Bosque. An objective of Plan Bosque (the GOE's reforestation plan) is to promote the diversification of species with economic and ecological value. This is of particular importance in the highlands where pine (P. patula, P. radiata) and eucalyptus (E. globulus, E. saligna) are now almost exclusively used. To date, the Project has supported this effort by financing a short term advisor in species selection. This advisor, working in collaboration with DINAF's research department, has analyzed existing plantations in the highlands to determine the adaptability of different species to particular site conditions (e.g., soil, rainfall, elevation, and aspect). In addition, the long-term highlands reforestation advisor has established a number of trials of Alnus acuminata (Spanish: Aliso). The Project has also provided short-term training in forest genetics and plantation establishment to the director of Cooperación Durini, Ecuador's only private, industry-funded forest research organization.

The revised Project will finance additional short-term assistance through an existing PASA with USDA, and the publication of the results of this research in a practical manual for use of foresters and Plan Bosque participants. The suitable site conditions and growth characteristics for an estimated 30 species will be described. Short term training, will also be provided to Ecuadorean forest researchers in botanical and silvicultural research techniques. In addition, DINAF will encourage the planting of nontraditional species in Plan Bosque plantations. As a rule of thumb, DINAF will seek to have five percent of each plantation forested with these species. Such a

program of applied research and demonstration will lead to greater species diversity in Ecuadorean plantations. The planting costs incurred by Plan Bosque participants who agree to dedicate part of their land for this purpose will be considered counterpart to the Project.

d. Botanical research. Forest management in the lowland humid tropical forest of the Amazon region in eastern Ecuador will be impossible until the enormous variety of tree species have been identified and described. The New York Botanical Garden and Missouri Botanical Garden have begun this work with great success under the Flora of Ecuador Botany Subproject. However, more remains to be done, especially in the dendrological study which is identifying species of potential use in agroforestry in that region. A dendrological guide needs to be published; more field collections need to be made; and more work is needed on the silvical characteristics of the species identified. The revised Project provides financing for continuation of this dendrological work with continuing applications to the Napo Agroforestry Subproject. All told, an estimated 1,000 species are expected to be identified.

The Acting AA/LAC, in March 1987, approved a waiver of competition to allow the Mission to enter directly into a Handbook 13 Grant Agreement with Missouri Botanical Garden, which was responsible for the dendrological research under a subagreement with the New York Botanical Garden. In addition, AID/W has offered funding from the Biological Diversity Initiative for continuation of the economic botany study. The Mission has proposed that that AID/W funding be channeled through a direct contract between AID/W and the New York Botanical Garden.

Inputs and Costs: The total cost of the research activities is estimated to be \$1,662,497. To date, Project grant funds in the amount of \$177,264 have financed the Flora of Ecuador agreement with the New York Botanical Garden, the Amazonian research feasibility study by the Nature Foundation, and technical assistance in species selection. Loan funds of \$414,266 have financed additional technical assistance, long-term U.S. training for two persons and other short-term training, field expenses, and a small amount of equipment and materials. The counterpart for these activities is estimated at \$106,367.

During the remainder of the Project, a total of \$186,000 in A.I.D. grant funds will finance the continuation of the Flora of Ecuador research under the Missouri Botanical Garden (\$106,000) and the university research grants program (\$80,000). Additional loan funds totalling \$408,000 will cover the agroforestry evaluation program including salaries of the evaluation team, equipment and materials, and field expenses, plus FUNDAGRO's administrative costs (\$380,000), research publications (\$10,000), and short term training (\$18,000). The counterpart contribution for these research activities is estimated at the equivalent of \$370,600.

3. Forest Protection System

Background: The original Project did not contemplate forest protection as a discrete activity. Instead, the Project provided for eight person-months each of a forest pathologist and a forest entomologist to set up

specialized laboratories and provide on-the-job training to DINAF' in these areas. In 1983, two advisors in these fields came to Ecuador to investigate outbreaks of a disease and a defoliating insect in the pine plantations of the highlands. At the conclusion of their three week visit, A.I.D. and DINAF' realized the need for the development of a national forest protection system involving other Ecuadorean institutions to respond to problems of fire, insect attack, and disease in Ecuador's forests. A.I.D. proceeded to contract an advisor for one year to assist DINAF' to design, approve, and initiate a forest protection system. That advisor continues to provide follow-up support on an intermittent basis to develop this system.

As part of the national system DINAF' has established diagnostic centers in the University of Loja and the Catholic University in Quito. DINAF' has also reached an agreement in principle with National Institute for Agricultural Research (INIAP), the MAG's research organization, to establish a third center in the Amazonian lowlands in conjunction with the agroforestry subproject there. Project funds have financed vehicles and specialized laboratory equipment and supplies for these units. These diagnostic centers will identify insects and diseases which DINAF' foresters have encountered and make recommendations for controlling them. They will also study the life cycles of important insects and diseases. The Project is also financing long term studies in the U.S. and Mexico in the fields of entomology, pathology, and forest protection for three professionals from the participating universities and DINAF' who will return to Ecuador to help run these laboratories and train other Ecuadoreans in these fields.

In addition, under the auspices of the Project, the University of Loja's forestry school has designed and taught a fire control course. The Project has financed a large quantity of fire fighting tools for use by DINAF', Civil Defense, and other entities (excluding the police and military). The Project assisted the GOE to suppress the 1985 Galapagos fires and, in the process, trained DINAF' and other GOE personnel in fire suppression techniques. Finally, members of DINAF' and the Quito Fire Department have attended fire control courses sponsored by the U.S. Forest Service (USFS). DINAF', with USFS assistance funded by the Project, held a three week fire course for DINAF' and other personnel involved in assessing and suppressing forest and range fires throughout the country.

There is a need to tie these various elements of the forest protection system together. In line with the original Project concept, responsibility for coordinating the system should lie with DINAF'.

Objective: The redesigned Project will support a second phase of the Forest Protection System. The focus of this second phase will be on establishing a permanent unit in DINAF' to coordinate extension, training, research and field activities undertaken by the DINAF' District Offices and other public and private entities.

Description: A Forest Protection Unit will be created at DINAF's Conocoto research station outside of Quito. The unit will be staffed by technicians who received university training during the first phase of the activity in entomology, pathology, and fire management. The unit will, through the District Offices, monitor harmful outbreaks of disease, insects,

and fires and will supervise the activities of the District Offices aimed at preventing, controlling, and suppressing these outbreaks. The District Offices will remain the front line of the system with responsibility for detecting and assessing the damages to the forest and for providing extension services to private owners of forest lands.

To support the District Offices in these tasks, the Conocoto unit will provide training to District personnel as well as other interested public and private concerns. The training will focus on techniques for detecting, assessing, and controlling pests and disease, particularly in nurseries and plantations. Training in fire detection and suppression will also be given. The training will be linked to the unit's monitoring function to ensure that the training is relevant to the specific kinds of protection problems that the field staff are facing.

The unit will also coordinate a program of forest protection research. DINAF will provide funds to universities and other qualified institutions to undertake the research. Possible topics of research include the life cycle of pathogens, the conditions associated with occurrences of plagues and diseases, and the efficacy of different control mechanisms. The Conocoto unit will review research proposals and make awards based on predetermined criteria, monitor the research, and disseminate the results. The technicians in the Conocoto unit will also perform applied research.

In the area of fire control and suppression, the unit will arrange for agreements of cooperation between DINAF and other organizations, such as fire departments, and Civil Defense. Under these agreements, the cooperating organizations will become a resource that DINAF can call upon in time of need to combat forest fires in specific locations. The unit will provide training to the fire fighting personnel and make available to them the fire fighting equipment already purchased under the Project.

At the outset of the second phase, A.I.D. will fully fund the contract personnel in the Conocoto unit. By the beginning of 1989 DINAF will be expected to have created permanent positions for these personnel and be fully responsible for their funding.

The technicians who initially make up the unit will be relatively junior with little experience in the complexities of implementing a nationwide forest protection system. Therefore, it is necessary to contract a long-term advisor (most likely expatriate) to provide technical and administrative advice and support to the unit and to the participating agencies. This advisor will assist in setting up the unit and its procedures and designing the training courses. The advisor will also assist in the design and execution of research activities as needed and will closely monitor the field activities to ensure that the prevention, detection, control, and suppression techniques are carried out in a technically adequate fashion. The Project will also provide short term specialized assistance in entomology, pathology, and fire control to support specific training and research activities.

Inputs and costs: The total cost of this activity is estimated at \$1,179,961. Thus far, A.I.D. grant funds of \$96,959 have financed a portion of the services of the expatriate forest protection advisor. A.I.D. loan funds of \$430,939 have financed additional services of the advisor and short term technical assistance, vehicles, fire fighting and lab equipment, long and short term training, and field expenses. The counterpart contribution from the GOE and universities is estimated at the equivalent of \$9,333.

Under the second phase, A.I.D. grant funds totalling \$70,000 will finance the short-term technical assistance. Loan funds totalling \$444,430 will finance a forest protection advisor (24 person-months, \$248,430), forest protection equipment and vehicles (\$68,000), forest protection training (\$8,000) and various field expenses (\$120,000). The counterpart, consisting of salaries, travel and per diem for the Conocoto Unit staff is estimated at the equivalent of \$128,300.

B. Component B: Agroforestry Demonstrations

Under the original project, agroforestry demonstrations were implemented under a broader project component entitled Productive Forestry Demonstrations which also included forest plantation and natural regeneration demonstrations.

The redesigned project will support only agroforestry demonstrations for the following reasons:

- o The Napo Agroforestry project implemented under the original project proved to be successful;
- o The numerous activities contemplated under the original project were too much for DINAF to manage. In particular, DINAF experienced serious difficulties in negotiating agreements with other implementing organizations;
- o Forest plantations in both the lowlands and highlands could not be economically justified;
- o Natural regeneration demonstrations proved impractical due to DINAF's inability to control sites and farmers' and communities' unwillingness to set aside land for long periods of time.
- o A growing recognition in Ecuador of the benefits of agroforestry techniques;
- o A recognition that agroforestry demonstrations, in relation to other demonstration activities originally contemplated, will provide the most direct benefits to the rural poor.

The redesigned project component will support agroforestry subprojects in each of the three principal geographic regions of Ecuador. The objective of these subprojects is to demonstrate how incorporating trees into the farm enterprise can complement agricultural production, provide forest products, and improve agricultural productivity.

The three subprojects identified at this time are:

- o Agroforestry in Napo Province
- o Highland Agroforestry
- o Arid Coastal Agroforestry

To assist in the implementation of this component, A.I.D. will finance, and enter into a contract with, one long-term expatriate forestry advisor. The advisor will be a generalist with experience in agroforestry. The advisor will provide technical support for the implementation of the subprojects and other activities in this component and provide on-the-job training to DINAF and other personnel to help institutionalize knowledge and expertise in agroforestry techniques.

As one means of institutionalizing within DINAF the capacity to promote agroforestry, DINAF will designate coordinators to work with the forestry advisor and the agroforestry subproject implementing institutions.

1. Agroforestry in Napo Province

Background: In the past decade, the lowlands of Napo Province in the northeast quadrant of Ecuador have experienced a boom in colonization due to road building for oil exploration and extraction. This is also a region where indigenous peoples claim substantial areas of forest land for their own reserves. They do little land clearing and almost no extraction of logs or lumber, thus foregoing a potential source of income. Colonists, on the other hand, clear land for agriculture and sell timber to logging contractors. Agroforestry practices would help reduce the adverse environmental impacts of colonization.

The Napo Agroforestry Subproject, begun in late 1984 by DINAF and INIAP, has enlisted the participation of over 180 farmers, as well as cooperatives and indigenous communities to demonstrate and test easily replicable and cost-effective means to integrate trees into farming systems. Because this region has only recently been opened up by exploration, infrastructure similar to that existing in the highlands or the coast is lacking. Therefore, the subproject has established two nurseries, supplied both tree and pasture stock to participants, and started a tropical hair sheep breeding activity. The trees contribute to improving soil and nutrient conditions and provide a source of future income when ready for harvest. The Flora of Ecuador botanical research, described previously, has been carried out in the same region and there are opportunities for applying the results of this work, particularly the dendrological research, to the selection and management of species for the Napo Agroforestry Subproject. This subproject provides an excellent example of how productive, low cost, and easily transferable forestry practices, can respond to the needs of the rural poor.

Objective: The objective of this subproject is to help farmers make more productive use of their lands through improving their existing systems of combining trees and other perennials with their traditional crops, livestock, and pastures.

Description: This subproject is a five year endeavor of which two and a half remain. DINAP district offices and INIAP are providing technical assistance, planting stock of tree species, and pasture plants such as nitrogen fixing tropical clovers and improved varieties of food producing plants including bananas, plantains, yuca, and taro. The tropical hair sheep breeding program has over 100 head and will soon begin supplying farmers with their own breeding stock. The subproject is also beginning a program to help indigenous groups use trees to delineate their reserves to discourage invasion by colonists.

It is intended that the subproject will directly address the agroforestry needs of 25 communities or cooperatives of colonists and result in an estimated 3,750 hectares in mixed use with agriculture, marketable timber for forest products industry, improvement of soils, and 5,000 hectares of mixed forest and pasture lands supporting increases in meat production. As these simple and effective agroforestry practices become more widely known other neighboring farmers outside of the 25 communities will be able to acquire the same inexpensive technology. Therefore, it is expected that the subproject will benefit at least 1,000 families in the Napo region on 17,500 hectares of land.

Inputs and costs: The total estimated cost of this subproject is \$2,796,480. To date, A.I.D. grant funds of \$180,681 have financed technical assistance. A.I.D. loan funds of \$333,499 have financed additional technical assistance, seeds, vehicles, and other equipment, and short term training abroad. Also, \$1,000,000 of loan funds have been earmarked for local field expenses during the life of the subproject.

An additional \$171,500 of A.I.D. loan funds are budgeted to finance technical assistance for the remainder of the subproject (\$157,500) and additional vehicles (\$14,000).

The GOE, through DINAP and INIAP, is providing land, vehicles, equipment, and counterpart personnel for the subproject estimated at the equivalent of \$1,110,800.

2. Highland Agroforestry

Background: Forestry in the Andean region of Ecuador has traditionally focused on the establishment of pure stands of a few species to produce wood for commercial purposes, rather than on-farm applications. However, population pressures in the highlands on land and forest resources are intense and growing with more and more people subsisting on small plots of land which are often on steep slopes, resulting in soil erosion which decreases agricultural productivity each year. Trees, as discussed in the Technical Analysis, can contribute to maintaining soil fertility and minimizing soil moisture loss and erosion on this type of land.

The Project proposes to finance an agroforestry subproject in the highlands of Chimborazo Province. The Project financed a prior forestry plantation activity with EMDEFOR, a mixed (public-private) enterprise in the same region. The Project's highland reforestation advisor has worked with EMDEFOR

to lay the conceptual base for this new activity and design a subproject which is now in the process of approval. EMDEFOR has demonstrated its ability to work with rural communities in the Chimborazo province. In addition, EMDEFOR's staff is enthusiastic about implementing this agroforestry subproject.

Objective: The objective of this subproject is to demonstrate how incorporating trees into the rural landscape can complement and improve agricultural production while providing the small landholder with products such as fruit, honey, forage, mushrooms, etc., and sufficient wood to meet needs for fuel and other uses. In addition, the subproject will apply systems to help stem topsoil erosion, reduce the loss of soil moisture, and shelter crops from the wind.

Description: EMDEFOR will enter into an agreement with DINAF to carry out agroforestry activities which will provide the forestry sector with information about the application and management of agroforestry systems in the highlands. DINAF's Department of Forestry Management and District Offices have participated in the development of the subproject and, through an agroforestry coordinator, will monitor subproject progress, provide technical support, and maintain a repository of technical data and records which can be used to evaluate subproject success and as a basis for expanding and replicating agroforestry technologies in other highland areas. The following agroforestry systems will be implemented on an estimated 1,700 hectares in Chimborazo Province:

- Establishment of small, multiple use, on-farm and community sites to provide firewood, posts, wood for construction, and in some cases cash from wood product sales;
- Establishment of windbreaks to protect soil and crops;
- Establishment of agroforestry systems which reduce erosion by regulating the flow of surface water; and
- Application of agroforestry systems which improve the microclimates within the tracts on which they are applied to favor agricultural and livestock production.

The Highland Agroforestry Subproject will work with small landholders with plots of 1-20 hectares. It is expected that at least 225 farm families will benefit from this subproject.

Inputs and costs: The total estimated cost of this new subproject is \$757,300. To date, A.I.D. loan funds of \$3,610 have financed local legal assistance to DINAF in preparation of the interinstitutional agreement with EMDEFOR.

For further implementation of the subproject, A.I.D. loan funds totalling \$605,950 for the part-time technical assistance of the long-term expatriate forestry advisor (\$249,950), equipment (\$76,000), and field expenses related to the establishment of agroforestry demonstrations (\$280,000). The

counterpart contribution will consist of EMDEFOR's in-kind participation valued at \$119,240. This includes extension and technical assistance as well as implementation support and tree seedlings. A DINAF contribution of \$28,500 is estimated which consists of technical support and monitoring by the DINAF coordinator and other staff.

3. Coastal Agroforestry

Background: The coastal region of Ecuador includes a variety of environments and agricultural systems, such as coffee, cacao, and cattle raising, whose productivity could be raised by the use of agroforestry practices. DINAF is interested in developing agroforestry demonstrations on the coast to show how large volumes of high-quality timber can be grown in conjunction with agriculture and livestock systems.

Objective: The objective of this subproject is to demonstrate agroforestry techniques which will complement agriculture production and provide needed wood products, forage, and food supplies, and to encourage soil and water conservation by participating communities in the Ecuadorean coastal region.

Description: The coastal agroforestry demonstration will work through the existing DINAF organization in conjunction with local farmers and organizations the provinces of Guayas, El Oro, Los Rios and Manabi. District foresters will be provided with the financial resources that will enable them to establish approximately 40 demonstrations in each province distributed between the principal agricultural and livestock systems. The district foresters will establish the demonstrations on operating farms. The possibility exists that they will be able to cooperate with private forest industry to establish the demonstrations.

Inputs and costs: A total subproject cost of \$810,400 is estimated. A.I.D. loan funds will finance extension workers, nursery equipment, vehicles, materials, transportation and field work for the subproject (budgeted at \$190,000 based on the costs of the other agroforestry demonstrations) The present agroforestry advisors for the Napo Subproject will work approximately half their time (\$160,000) on this subproject beginning in late 1987. A counterpart contribution, estimated at the equivalent of \$460,400, is projected for salaries, materials, and labor. The farmers will supply all necessary labor. DINAF, through its forestry coordinator for the coast will provide subproject supervision. The subsecretariat for the coast of MAG will support the project with its accounting office.

C. Component C: Delimitation and Management of Natural Areas

This component consists of two completed activities (INECEL watershed management unit, Portoviejo Protective Greenbelt) two on-going activities (Plan Pichincha and Patrimonio Forestal) and two new activities (Natural Areas Management and Coastal Mangrove Inventory).

The objective of the original project component (entitled Protective Forest and Watershed Management) was to strengthen DINAF's capacity to delimit and manage economically important watersheds. DINAF and A.I.D. have now agree that, for the remainder of the Project, funds will be best used to protect and manage existing forests and natural areas rather than to rehabilitate degraded watersheds.

1. Ongoing Activities

a. Plan Pichincha. The Plan Pichincha activity includes both delimitation of protective forests and their management as a watershed above the city of Quito. The activity began with a study carried out under the Project. The objective of the study was to develop a management plan for the slopes of Pichincha volcano above Quito in order to limit urban spread, control the destruction of vegetation, limit the effects of erosion, and impede the clearing of those slopes. The study was completed and the management plan presented in early 1985. At that time DINAF proposed that additional loan funds be used to carry out the management plan. These funds were to be used to delimit the boundaries of the protective forest reserve, pay forest guards and supply them with transportation, and purchase various supplies and equipment. These funds were approved by A.I.D. in June 1985.

The implementation of Plan Pichincha has proceeded well. Boundary markers have been set, encroachment of new settlers into sensitive areas has been controlled, and initial steps toward fire prevention and control have been taken. During the remainder of the project, counterpart funds will finance guard stations, a radio communication system, and the development of at least three hiking and nature trails. While no additional A.I.D. funding is needed for this activity, funds that are currently earmarked for this activity are being used to finance the salaries of 10 guards to patrol the area the printing of posters about the Pichincha Reserve and the production an audiovisual program for schools.

Related to this activity, A.I.D. has financed a long-term participant in the area of protective forest management at the University of Idaho. This trainee will return to Ecuador in 1987 to develop management plans for Ecuadorian parks.

Total A.I.D. input to the Project is \$105,655. A.I.D. grant funds of \$14,830 have financed an advisor to assist in the development of the Pichincha management plan. Loan funds of \$90,825 are financing implementation of the plan including the salaries of the contracted forest guards plus long-term training.

b. Patrimonio Forestal. Widespread clearing of land throughout Ecuador has resulted in the loss of large areas of forest cover. The occupancy, ownership, and utilization of land in Ecuador, especially in the moist tropical lowlands, have never been well defined. Colonists from the highlands have been taking advantage of the network of roads created by logging and oil exploration activities to move into Napo and Esmeraldas provinces. At the same time there has been a significant development of

industrial-scale African oil palm plantations on thousands of hectares of land. This has been a very large source of concern to indigenous groups in the Oriente. These factors, as well as the spread of other commercial activities, have put increased pressure on a very finite land base.

The Forest Law of 1981 and a Ministerial ruling in 1983 recognized the need to define and protect the public forest domain. In late 1983 the Minister of Agriculture named an interdisciplinary group consisting of DINAF, PRONARUG (the National Agrarian Regionalization Program), IERAC (the Ecuadorean Institute for Agrarian Reform and Colonization), and INERHI (the Ecuadorean Water Resources Institute) to map, demarcate on the ground, and provide legal and physical protection for the principal areas of intact forest remaining throughout Ecuador. The government created this program, called Patrimonio Forestal, because it considered it necessary to prevent the continued destruction of forests, conversion of forested lands to unsuitable land use systems, and subsequent damage from erosion and excessive runoff. DINAF was designated the lead organization to carry out this national program.

Early in 1984, DINAF requested Project funding for the first and most difficult phase of the Patrimonio Forestal, a survey of the heavily forested provinces of Napo and Esmeraldas. A.I.D. concurred, since this work logically fell within the Protective Forest and Watershed Management Component of the Project. At the time it appeared that the interagency working group had a well designed plan of action. No technical assistance was requested by DINAF, and A.I.D. offered none, believing that the plans as presented would be followed. The Project financed special mapping equipment and materials, local contract personnel, logistical support, field equipment, and supplies.

Provisional maps were ready in August 1985. They were inaccurate because of a lack of reliable background materials including up-to-date aerial photography and good base maps. Moreover, it subsequently became evident that the physical verification of the survey results on the ground had not been carried out conscientiously. These preliminary maps showed as Patrimonio Forestal (that is, public forest lands) many areas which were already occupied by colonists and indigenous communities.

The preliminary maps were published in May 1986 in order to solicit public comment before the final versions were prepared. Six months were allowed for comment. The public responded by complaining about the inaccuracies in the maps. Some, especially the leaders of the indigenous communities, claimed that the whole Patrimonio Forestal program was only a front for MAG schemes to promote large-scale African palm plantations. The process of revising the maps is continuing. As claims are filed the amount of land within the Patrimonio Forestal has diminished considerably from the preliminary maps. Probably this was to have been expected. For no matter how accurate (or inaccurate) the preliminary maps, their publication was sure to have generated intense interest and forced colonists and land speculators to state their claims openly. A.I.D. will continue to support this activity through the provision of funds for technical assistance and field expenses related the continuation of this mapping exercise.

The total cost of the Patrimonio Forestal subproject is estimated at \$369,645. A.I.D. loan funds of \$117,645 have financed primarily field expenses related to the delimitation work and a small amount of materials for preparing the maps. Additional loan funds will finance additional field expenses (\$150,000). The counterpart contribution is estimated at the equivalent of \$102,000 for personnel and field expenses.

2. New Projects

a. Natural Areas Management

Background: The March 1987 earthquake brought to attention the need for improved management of natural reserves and parks in the northeastern section of the country. The opening of alternative access routes through that region will inevitably give rise to a new wave of colonists which threaten the natural areas which are home to a multitude of tree and plant species. The Mission believes assistance is warranted to protect these areas, both for their intrinsic botanical value and as a means of controlling the negative environmental impacts of roads and colonization.

Objective: This subproject will achieve the delimitation, demarcation, and protection of national parks and natural reserves.

Description: The subproject activities will be carried out in four main sites: the Yasuni National Park, the Limoncocha Biological Reserve, the Cuyabeno Wildlife Reserve, and the Cayambe-Coca Ecological Reserve. The protection of these areas was mandated by a Ministerial Decree in 1979 but little has been done to date. These parks and reserves cover a large part of the area expected to be affected by the earthquake recovery activities. However, other areas may be included under the subproject if there is a need.

DINAF, with the assistance of the Agrarian Reform and Colonization Institute (IERAC), will delimit these areas and demarcate them with signs, "live fencing", and other appropriate means. A.I.D. funds will finance resources to protect the areas effectively, including vehicles and boats, communications equipment, and guard houses and refuges.

Inputs and costs: The total estimated cost of this subproject is \$514,500. A.I.D. loan funds will finance vehicles, boats and motors, radios, and spare parts (\$77,000) and field expenses including per diem and local contract labor (\$92,000). The counterpart totalling an equivalent of \$345,500 will consist of the salaries of professional and technical personnel and guards, additional per diem, field equipment, and construction of guard houses and other structures.

b. Coastal Mangrove Inventory

Background: During 1986 DINAF, in cooperation with the Ecuadorean remote sensing agency, CLIRSEN, carried out an inventory of the mangrove forest in Guayas and El Oro provinces. The inventory determined the volume, species, and location of the mangrove forest. Such information will

be useful in efforts to produce mangrove poles, make ecological studies, and prevent the further destruction of the forest. The inventory is thus an important part of efforts to manage Ecuador's coastal resources in an integrated, planned, sustainable way. DINAF, in early 1987, requested that the Project fund the continuation of the inventory. The Mission was favorably disposed to this request because of its relationship to the Coastal Resources Project funded by A.I.D./W.

Objective: This subproject will complete the inventory of Ecuador's mangrove forests.

Description: DINAF, in cooperation with CLIRSEN, will carry out an inventory of mangrove forests in the remaining coastal provinces of Manabí and Esmeraldas.

Inputs: A.I.D. loan funds totalling \$22,000 will finance the field expenses of this inventory. The counterpart contribution is estimated at \$16,750.

IV. REVISED PROJECT ANALYSES

The Project redesign team reviewed the analyses in the original Project Paper to determine to what degree they needed updating. With regard to the financial and economic analysis, the PP provided estimates of the feasibility (benefit/cost ratio and internal rate of return) of several of the originally proposed demonstration activities. The Mission considers that this analysis satisfactorily covers the narrowed range of activities under the redesigned Project so that a new set of analyses is not required. Similarly, the revised Project does not raise new social or environmental issues.

Other analyses will require modification. Given the changes in the set of field activities, a revised Technical Analysis is warranted. Also, the Institutional Analysis requires updating to reflect the experience with DINAF to date and to justify the proposed approach to strengthening that institution.

A. Technical Analysis

This technical analysis will address two issues related to the change in Project emphasis. The first concerns the rationale for focusing on agroforestry within the former Productive Forestry component of the Project. The technical merits of specific subprojects within this component will be analyzed at the time detailed proposals are presented. The second issue is the technical justification for deleting activities that were included in the original design.

1. Agroforestry. Agroforestry refers to the use of trees to enhance a total farm system devoted primarily to crops or livestock and secondarily to producing wood. While forests have an undisputed and vital role in sustaining the environment, trees also play a critical role outside forests. Trees around houses, along field boundaries and roadsides, and in communal grazing areas are seldom recorded in the statistics of forested lands. For the majority of the rural population, however, these trees in their own backyards, on small holdings, and on communally held lands have an even more significant role than the forests themselves.

By far the greatest demands for wood in developing economies are for energy. However, many forestry programs which concentrate on wood as a fuel overlook the multiplicity of other high value products that trees provide. Animal fodder is perhaps one of the most important of these products. A wide range of human foods is also obtained from trees and from forested areas. Trees provide fiber for ropes, mats, snares, etc. They are an important source of many herbal remedies and traditional medicines. Tannin and dyes are extracted from trees to cure leather and to dye fabrics. Many agricultural implements are made from wood. These products as well as commercial wood products have a significant monetary value. Lastly, trees fill social functions by providing shade and a place to gather.

Agroforestry is not unknown to Ecuador. Among numerous types of agroforestry systems, the cropping of annual and perennial crops with either natural or planted trees has been the most common. In Ecuador laurel and quaba are commonly intermixed with coffee and cacao plantations to provide shade. In general, the most widespread benefit from this systematic tree-pasture-crop

combination is that it maintains or enhances soil productivity. For example, the Saraguro Indians in the southern highlands of Ecuador around Loja leave alder trees when they clear off forest for pasture, knowing empirically that the nitrogen produced in the leaves and the roots of this tree will contribute to pasture productivity. This soil enriching effect of trees provides the farmer with a clear incentive to incorporate them into production systems. An additional benefit is the protection afforded by trees from various types of erosion and soil moisture loss. The eucalyptus trees planted on the borders of pastures and fields serve as a windbreak and slow water runoff while producing a variety of wood products.

Agroforestry can also contribute to delimitation of lands. For example, in the Oriente there are possibilities for introducing certain tree species to line the boundaries of communal lands held by indigenous groups. This will help identify and protect the lands against incursions such as roads.

These are but a few examples. Given Ecuador's wide range of ecological zones and mix of social and economic systems, no single agroforestry system is applicable to the whole country or to any one region. The value of trees as an integral part of farm systems needs to be systematically researched and promoted in specific areas.

Since Ecuadorean foresters traditionally have considered trees to be something separate from agriculture, the standard forestry education has not included agroforestry. Probably the only practical way to educate Ecuadorean foresters and farmers of the value of agroforestry practices is through field demonstrations. The agroforestry subproject in Napo Province, for example, is of value as much for the visual proof it offers for the potential of agroforestry systems as for the actual increases of productivity it is bringing about on the demonstration farms. It is not possible to replicate humid lowland agroforestry systems for farmers in the highlands or the arid coast. Therefore, the Project will support demonstrations in the three major regions of Ecuador, and each demonstration subproject will include a variety of agroforestry systems (e.g., crops with trees, pasture with trees, "live" fencing).

The intended beneficiaries of the agroforestry subprojects will be farmers in A.I.D.'s target group. Agroforestry systems are, unlike plantations, generally as applicable to small farms as large ones. The definition of small farm varies by region. In the highlands, where land pressure is the greatest and historical land tenure patterns persist to some degree, agroforestry activities will be directed at farms under 20 hectares in size. In the Oriente, where land is more abundant but infrastructure is lacking, larger units are consistent with A.I.D.'s target group. The Napo Subproject is working with farms whose average size is 50 hectares. The coastal region presents a more complex situation. There tends to be greater land availability than in the highlands, but income depends on the mix of cash and subsistence crops. Thus, DINA and A.I.D. will have to conduct a careful analysis of local production, income, and land distribution prior to selecting a site for the coastal agroforestry demonstration.

The Project Paper identified land title as a key factor affecting the participation of A.I.D.'s target group in the demonstration activities. The increased Project emphasis on agroforestry, directed at small units, highlights this issue. The National Forestry Law prohibits DINAF from implementing reforestation activities on untitled land, regardless of the source of financing. The original Project design therefore called on DINAF to work with the Agrarian Reform and Colonization Institute (IERAC) to assist farmers to obtain title as an incentive to use this land for field demonstrations. DINAF personnel did not have legal expertise to represent the farmers in the titling process. They, in fact, saw this task as outside the scope of the forest service.

In fact, the lack of title has not been a constraint so far. In the Napo region, DINAF's legal staff determined that agroforestry is a demonstration activity, not reforestation, and thus no title is required. DINAF has also agreed that, for its purposes, a certificate of possession is as valid as a title. The former documents are more commonly held. The Mission's analysis of the proposed area of the highland agroforestry subproject concluded that sufficient farmers in the target group had at least certificates of possession to make the demonstration feasible from a social standpoint. Of course, changes in legal interpretation are always possible. In the meantime, A.I.D. is supporting a major land titling effort through Project No. 518-0059 which will provide a definitive long-term solution to this problem.

In summary, agroforestry offers clear benefits to A.I.D.'s target group in terms of the value of the tree products and the positive effects on agricultural production. The revised Project also includes an agroforestry evaluation program under its research activities that will identify and measure the specific benefits of different agroforestry systems in different regions of the country.

2. Justification for Deleting Activities. Experience since the Project's inception shows that certain activities have proven unfeasible, undesirable, impractical, or even impossible to carry out. Within Component A, the activity to enhance DINAF's planning and programming capacity has not been implemented because of MAG imposed restrictions on overseas training for its employees, which was considered vital to developing this capacity. Nor has information dissemination by DINAF succeeded, in large part because of an unwillingness among other forestry sector institutions to share information. In the interest of recasting a more realistic and manageable role for DINAF, the Mission and DINAF have agreed to delete these two activities - which are relatively intensive in their use of DINAF's resources - and focus on (a) strengthening DINAF's core administrative functions which are seriously deficient, and (b) certain activities which, for the most part, other sector institutions can carry out under DINAF's coordination - forestry research and forest protection.

Within Component B, the Project has supported plantation demonstration activities with limited success. The planned enrichment plantations in the Oriente did not proceed primarily because DINAF did not have access to the large areas of land required and because a private company had already begun

this work, but at great cost. Plantation demonstrations in the coast proved uneconomic due to the high cost of controlling weeds. Natural regeneration demonstrations in all three regions were found unfeasible because farmers and communities were unwilling to set aside land for long periods. Furthermore, it was not possible to protect these types of demonstrations against fires and incursion. Lastly, DINAF had inadequate personnel to record and study the data from the natural regeneration experiments. Because of the very limited success the reforestation and natural regeneration activities under the project, a decision was made to concentrate on agroforestry demonstrations in three different regions of the country. Limited support to the GOE's Plan Bosque reforestation effort will be provided through the research subproject in Component A of the Project.

Within Component C, the delimitation and management of economically important watersheds was initially supported by the Project. INECEL, the national electric company, established its own watershed management unit which the Project trained. Since then INECEL, with the proposed assistance of the IDB, has begun to protect areas in the Paute Watershed, site of a major hydroelectric project. The degradation of watersheds is primarily a problem of poor agricultural practices leading to soil erosion on steep slopes. Trees are only one part of the solution. The leadership of DINAF decided and A.I.D. concurred that the best use of DINAF's small staff and budget was to concentrate on protecting and managing existing forests rather than taking a lead role in the rehabilitation of degraded watersheds.

B. Institutional Analysis

A revised institutional analysis of DINAF appears in Annex III. This section summarizes that analysis.

DINAF is organized at the subsecretariat level in the MAG. It is headed by the National Forestry Director who reports directly to the Minister. Below the Director, the central office of DINAF consists of four staff departments (Legal, Administration and Finance, Programming and Evaluation, International Agreements) plus four technical departments which report to the DINAF Technical Director (Research and Training, Forest Management, Forest Production, Natural Areas and Wildlife). The authorized staffing level of the central office is 94 including administrative and secretarial personnel. The majority of DINAF employees are deployed among the 20 DINAF District Offices, one in each province.

DINAF has wide responsibilities. These include promoting, developing, studying, administering, conserving, and investigating forests, natural and forested areas, national parks, and reserves. DINAF is also supposed to propose legal and technical norms, formulate policies, provide technical services and training, classify forests and delimit the Patrimonio Forestal, coordinate with water basin authorities, and educate the public about conservation.

The redesigned Project continues to promote the institutional strategy of the original Project. This strategy seeks to strengthen DINAF's role as a coordinating and support institution that can catalyze efforts by private and public institutions in the forestry sector. However, it is now realized that the original scope of activities involving coordination with numerous entities

in a variety of areas was more than DINAF could reasonably absorb, given its traditional role of direct implementation (mainly reforestation) and its various weaknesses, discussed below. Thus, the redesigned Project will reduce the number and scope of interinstitutional activities, without abandoning the strategy. For instance, DINAF will still be required to enter into agreements for the highland and coastal agroforestry subprojects and for forestry research activities.

However, experience under the Project has shown that, even with a more manageable workload, DINAF's performance would continue to be impeded by a number of internal and external constraints, including the lack of personnel, the relatively low commitment that MAG has historically assigned to forestry programs, inadequate systems and skills, and lack of autonomy. The remainder of this section briefly discusses these constraints and indicates how they are being dealt with in order to increase the effectiveness of DINAF.

Counterpart personnel. DINAF's overall staffing levels are substantial and, for the most part, adequate to carry out DINAF's programs under this Project. However, there are certain gaps in areas of special relevance to the Project. The original Project design identified a need for 15 additional management and technical personnel to serve as counterparts to the Project. Up to the time of the redesign, none had been added. A number of factors account for this inaction, including fiscal austerity imposed by the GOE and bureaucratic obstacles in the MAG.

Given these difficulties and the reduced scope of the Project, A.I.D. and DINAF decided to concentrate on achieving a more modest number of staffing increases. These needs were identified in the early stages of the redesign, and the MAG responded quickly by transferring to DINAF an accountant to manage the Project books. This should help overcome accounting and reporting problems that have held up A.I.D. disbursements for extended periods. In the course of negotiating the redesign A.I.D., with DINAF backing, has also requested that the Minister assign, from other sections of the MAG, a forest protection coordinator and one or more coordinators for each of the agroforestry subprojects, which form the core of the revised field activities. It is critical that permanent, career people occupy these positions during the balance of the Project to help ensure that DINAF institutionalizes a capability to support agroforestry and other activities in the future. Therefore, A.I.D. has formally made the assignment of personnel to these positions a precondition for signing the Project Agreement Amendment to implement the redesigned Project.

In addition, the quality of DINAF's staff suffers from inadequate skills and incentives. These are discussed below.

Commitment. It is A.I.D.'s perception that some of the delays in Project implementation have resulted from bureaucratic inertia or resistance that could have been overcome by strong directives from the highest levels of the Ministry. The lack of counterpart personnel and difficulties in getting interinstitutional agreements processed through DINAF's Legal Department are two cases in point. In negotiating the redesign, A.I.D. expressed to the Minister its deep concern about the apparent low priority assigned by the

Ministry to the Project and to DINAF in general. The Minister reassured the A.I.D. of the importance of DINAF. As a sign of his commitment, the Minister agreed to a deadline of August 1, 1987 for A.I.D. approval of all new subprojects involving interinstitutional agreements to be implemented under the Project. (Note: Due to delays in project approval, A.I.D. has extended this date in the Project Agreement to December 31, 1987). The A.I.D. funding budgeted for the subprojects not approved by this date will be subject to deobligation. This will require DINAF to develop a series of agreements and process them through the MAG and other GOE entities. The greatest delays in Project implementation have occurred in this process, and the Minister's personal attention will almost certainly be required to meet the deadline. This strategy does not guarantee the Ministry's increased commitment to DINAF. However, given the Minister's expressed desire to go forward with the Project and the fact that all A.I.D. funds have been obligated, A.I.D. believes that it is the best possible way of maintaining pressure on the Ministry while leaving A.I.D. flexibility to scale back the Project if that commitment does not materialize.

Management systems and skills. The coordination and support role envisioned for DINAF requires considerably more administrative and management skills than if DINAF were only concerned with direct implementation. The original Project design recognized this fact and provided for a long-term advisor to DINAF in administration. However, one long-term expatriate advisor did not prove sufficient to improve DINAF's administration. Furthermore, DINAF appears to be an even weaker organization, in administrative terms, than was realized five years ago. DINAF has been unable to perform effectively in the areas of financial management, planning and budgeting, procurement, or execution of agreements. To a large extent, these deficiencies reflect a lack of basic administrative systems and the skills to operate them.

The redesigned Project seeks to remedy this situation by placing greater emphasis on strengthening DINAF's administrative and management systems. As described earlier, the Project will finance one or more contracts with qualified local management firms. This firm will assist DINAF to design workable systems in the areas listed above. The firm will also provide DINAF personnel with on-the-job training in the operation of these systems. It is expected that these systems will, to a large extent, be automated and make use of the microcomputer facilities that have been procured for DINAF under the Project.

Autonomy. DINAF's dependence on the MAG administrative structure has proven to be a liability in several areas. DINAF's initial attempts at procurement, particularly on the international level, resulted in unacceptably long delays. Therefore, at DINAF's request, A.I.D. took responsibility for all offshore and most in-country procurement under the Project. DINAF's efforts to process interinstitutional agreements through the MAG bureaucracy have been only slightly less difficult and time consuming.

DINAF is also dependent on MAG personnel policies. Like all Ministry units, DINAF is tied into the GOE salary scale. This scale is far out of line with the private sector, especially at the higher management levels. For example, GOE salaries for government officials at the subsecretariat level, such as the DINAF Director, are approximately US\$300 per month compared to \$2,000 per

month for a vicepresident of a private bank in Ecuador. Competent, dynamic individuals find no incentive to stay in public service under these conditions. Not surprisingly, there has been a high rate of turnover among DINAF's management.

There is little that A.I.D. can do, within the scope of this Project, to alter this situation. However, the GOE is taking steps which could lead to a long term solution. The GOE administration recently proposed to convert DINAF into a decentralized institute. This proposal, which is now before the Congress in the form of a draft law, would extract the forest program from the MAG bureaucracy and confer upon the institute considerable administrative autonomy. (Fiscal autonomy is also part of the package. The institute would have to fund its programs entirely from its own income rather than from a line item of the MAG budget.) In the event that the institute were approved, A.I.D. could provide support within the bounds of the Project to get it up and running. For example, the emphases of the management assistance services described above could be adjusted to address particular needs of the institute (e.g., development of an autonomous procurement system).

V. REVISED IMPLEMENTATION ARRANGEMENTS

A. Revised Project Schedule

A two year extension of the Project, to March 31, 1990, has been approved and allows for the approval and implementation of new and ongoing field activities which require a minimum of three planting seasons to be able to demonstrate results. Agroforestry sites, unlike wheat or corn, for example, require follow-up in the two succeeding years to replace those trees which may have died and to thin, prune, and protect the remaining trees. This means that in an agroforestry subproject, such as the one proposed for the highlands, sites established during the first season (December 1987-March 1988) will need follow-up care during the two succeeding seasons (beginning December 1988 and December 1989) if this demonstration is going to provide tangible benefits prior to the end of Project.

The two-year Project extension will also maintain Project activities during the first year and a half of the GOE administration which will come to power in August 1988. During this period the new administration will need to define its priorities and programs vis-a-vis the forestry sector. The presence of this Project in a late stage of implementation will provide A.I.D. and the GOE with a mechanism for continuing dialogue on the sector and an experiential base upon which to discuss possible future activities. In the event that the new administration wishes to undertake a major follow-on effort in the sector, design could take place during the final year of the Project and implementation could begin within the second year of that administration.

The schedule of key events for the remainder of the Project is as follows:

Project Paper Supplement approved	September 1987
Project Agreement Amendment signed	September 1987
Contract awarded to an Ecuadorean management consulting firm	October 1987
Project Coordinator contracted	October 1987
All new subprojects approved by A.I.D.	December 1987
All long-term technical assistance advisors on the job	January 1988
DINAF annual operating plan for 1988 submitted and approved	October - November 1987
DINAF annual operating plan for 1989 submitted and approved	October - November 1988
Final evaluation completed	February 1990
PACD	March 31, 1990

For the technical reasons stated above, it is essential that DINAF enter into subagreements to carry out the highland and coastal agroforestry subprojects and the research activities with FEDIA no later than October 1987. If DINAF does not meet this target, the A.I.D. funds budgeted for those subprojects not approved will be subject to deobligation.

B. Administrative Responsibilities

A.I.D. and the GOE will sign a Project Agreement Amendment which will add and modify Conditions Precedents and Covenants and substantially revise the Project Description in accordance with the revised design described herein.

DINAF is the lead Project implementing agency. DINAF will be responsible for the overall management of the Project. A.I.D., with DINAF concurrence, will contract a Project Coordinator to assist DINAF in those administrative tasks directly related to the A.I.D. Project, including liaison with A.I.D. on routine implementation matters. DINAF will be responsible for developing the new subprojects and activities and developing the corresponding agreements. DINAF will monitor and support those subprojects being implemented by other sector institutions and directly implement the Patrimonio Forestal and Plan Pichincha activities. Plans for each new subproject will be reviewed and approved by A.I.D. prior to disbursement of funds for the subproject.

DINAF will prepare an annual operating plan for each calendar year of the Project. This plan will include a detailed budget based on time phased procurement, technical assistance, training, and field activity plans. Annual operating plans for the succeeding year should be submitted to A.I.D. by October 1 of the preceding year so that they may be reviewed and approved by November 30. An existing Covenant in the Project Agreement will be revised to cut off disbursements as of the first day of a given calendar year if A.I.D. has not yet reviewed and approved the operating plan for that year. (The 1987 operating plan was postponed pending the redesign and was submitted to A.I.D. in early February 1987.) DINAF will also prepare and present to A.I.D. quarterly progress reports describing physical and financial progress against the operating plans.

This Project will be managed by A.I.D.'s Rural Development Office. The Project Officer will plan and coordinate all Project activities, manage the management consulting contract, monitor subproject progress, and act as the principal contact between A.I.D. and DINAF. As part of the Mission's overall portfolio management process, this Project will be subject to a full review by the Mission Director and other key staff every six months plus mid-semester reviews with the Deputy Director to follow-up on actions and outstanding issues identified at the semiannual reviews.

A.I.D. has performed virtually all procurement under the Project so far. The Mission considers it important that DINAF develop its own procurement capacity and to this end will finance assistance to strengthen DINAF's own procurement systems. Under the revised Project, A.I.D. will directly contract the Project Coordinator and the management assistance firm. All other in-country procurement financed by A.I.D. funds will be done by DINAF and other Ecuadorean implementing institutions. Many of the commodities required for

the Project are indigenous or can be obtained off the shelf in Ecuador, rather than being imported specifically for the Project. DINAF will, therefore, to the extent possible, procure these goods using local cost financing procedures as outlined in Handbook 1B, Chapter 18. At this time, the following commodity categories have been identified for local cost financing:

<u>Component</u>	<u>Description</u>	<u>Estimated Cost</u>
A.1.	Office equipment	\$10,000
B.1.	Motorcycles	8,000
C.	Motorcycles	10,000
C.	Boats and motors	12,000
C.	Spare parts for vehicles and boats and other miscellaneous equipment.	18,000

DINAF will also be expected to begin procuring its own seeds from offshore sources using counterpart funds, following completion of the last A.I.D.-financed and procured shipments in early 1988.

In addition to procuring goods and services, DINAF will enter into interinstitutional agreements for certain subprojects. As these are agreements rather than contracts, A.I.D. host country contracting rules do not apply. It is expected that the participating institutions will be nonprofit in nature and will be selected by DINAF on the basis of their experience and qualifications to carry out the corresponding subproject. EMBEFOR, the mixed (public-private) forestry institution expected to carry out the highland agroforestry subproject, was specifically identified in the original Project Paper (p. 30) as an implementing institution and, on this basis, was previously selected by DINAF to execute the highland reforestation subproject. FUNDAGRO has been identified as an appropriate institution for the agroforestry evaluation activities. In accordance with a new Condition Precedent, A.I.D. will retain the right of prior approval of all interinstitutional agreements, including the basis for selection of the implementing institution and the costs and the procedures by which the implementing institution will procure any goods and services financed with A.I.D. funds. These procedures should be consistent with the general competitive and reasonable price principles stated in A.I.D. handbooks.

The major A.I.D. procurement actions identified at this time are as follows:

- o One or more contracts with a management consulting firm(s) to provide services to strengthen DINAF's core administrative, financial, and management systems. The estimated cost of each contract is under \$100,000. Therefore, informal competition may be followed. Given that there are several qualified management firms in Ecuador (many of them associated with U.S. firms), competition will be limited to Ecuador.

- o Contract for the Project Coordinator. The cost of this personal services contract is also expected to be under \$100,000. This position requires knowledge of the Ecuadorean public sector and other skills that are readily available in Ecuador. Therefore, competition will again be limited to Ecuador.
- o Contract(s) for the two long-term advisors in forestry and forest protection plus various short term advisors. The Mission has examined three options for obtaining these technical services. The first option is to contract with a single firm, through full and open competition, to provide the services as a package. A second option was to obtain the services through the A.I.D. PASA with the USAID/OICD. The Mission has used the PASA successfully under the Project. This action would be carried out by AID/W. Finally, the Mission could execute Personal Services Contracts for the individual advisors. In this case, the Mission would probably engage in informal competition on an international level for these positions. The Mission has determined that Personal Services Contracts for these positions would be the least costly and most expeditious alternative. Both long-term positions have already been advertised.
- o A Handbook B grant agreement for continuation of the Flora of Ecuador botanical research. As explained above, this research will represent a continuation of the work carried out principally by the Missouri Botanical Garden under the Mission's previous agreement with the New York Botanical Garden. The Mission proposes to award a grant directly to Missouri for the additional work. The AA/LAC has already approved the noncompetitive award of this grant.
- o Contract for the end of Project evaluation. These services are expected to cost less than \$100,000 and will probably be procured by the Mission through informal competition on an international level or through an IXC.

C. Evaluation Plan

A final evaluation will be carried out during the final months of the Project. This evaluation will assess what the Project has accomplished and the sustainability of its activities. This evaluation will examine the following:

- o The extent to which DINAF's core administrative, financial, and management systems have been strengthened and DINAF has institutionalized the role set out for it in this Project.
- o The utility and impact of the forestry research and protection systems implemented under the Project and the probability that they will be sustained.
- o The impact of the Project on the effectiveness of Plan Bosque.
- o DINAF's success in carrying out the Patrimonio Forestal and Plan Pichincha subprojects and the potential of these activities for generating effective forest management on a wide scale in Ecuador.

This evaluation will not examine in any depth the agroforestry activities, which will be the subject of the separate evaluation and research program financed under Component A. The evaluation will provide specific lessons learned and recommendations which could be used to identify and justify future investments in forestry in Ecuador.

The estimated A.I.D. funding for this evaluation is \$ 50,000.

D. Audit

Approximately \$15,000 has been budgeted from Project funds to finance the cost of annual financial/compliance audits which will be carried out through a contract with a local independent consulting firm.

In addition the GOE will include DINAF in their regular government audit schedule and the Contraloría General will perform at least one financial audit prior to the PACD.

E. Conditions and Covenants

A Condition Precedent to Disbursement of Funds for Subprojects after August 31, 1987 will be added to Section 5 of the Project Agreement. This new CP will require prior A.I.D. approval of all new subprojects, currently identified as highland and coastal agroforestry, the forestry research grants and agroforestry evaluation program through FEDIA, natural areas management, Patrimonio Forestal-Phase II the forest protection system-Phase II and the mangrove inventory. The terminal date for meeting this CP will be December 31, 1987.

The new Section 5.2.a will read as follows:

"Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement subsequent to the signing of Amendment No. 4 thereto, to finance any individual subproject, the Borrower shall, except as the Parties may otherwise agree in writing, furnish, in form and substance satisfactory to A.I.D., a plan which details how the subproject activity will be implemented and, if appropriate, the corresponding agreements between the National Forestry Directorate and the implementing institution."

Article 6: Special Covenants, Section 6.2. regarding submission of Annual Operating Plans will be revised as follows:

"The Borrower covenants, unless the Parties otherwise agree in writing, to cause the National Forestry Directorate to provide to A.I.D., prior to January 1 of any given calendar year of the Project, an Annual Operating Plan for that year which describes the programmed activities and objectives, the estimated budget for A.I.D. and counterpart funds, and the source and use of financing for all Project activities."

Lastly, in Article 6: Special Covenants, Section 6.3. Additional Personnel shall be modified as follows:

"The Borrower covenants that, except as the Parties may otherwise agree in writing, it shall cause the National Forestry Directorate to assign permanent employees to the positions of project accountant, forest protection coordinator, three forest protection specialists for the Conocoto Forest Protection Unit, and co-ordinators for agroforestry projects in the Oriente, Sierra and Costa, and to maintain these positions throughout the remaining life of the Project."

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Annex I
LOGICAL FRAMEWORK
(Revision No. 1)

Project Title & Number: Forestry Sector Development, 518-0023

Life of Project:
From FY 1982 to FY 1990
Total US Funding: US\$8,100,000
Date Prepared: 8/31/87

NARRATIVE	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><u>Goal:</u> to productively manage and protect Ecuador's forest resources.</p>	<p>10,000 additional has. of land placed under productive management (reforestation, agroforestry, etc.) or protection each year, by 1989.</p>	<p>Annual DINAF progress reports.</p>	<ul style="list-style-type: none"> - Ecuador's economic and fiscal situation allows GOE and private sector to provide resources needed to sustain forest management and protection activities. - A socially and environmentally conscious private sector which collaborates positively in management of Ecuador's forest resources. - Political stability.

NARRATIVE	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><u>Purpose:</u> To strengthen the capacity of Ecuadorean forest sector institutions to undertake afforestation/reforestation activities and to manage productive and protective forests.</p>	<ol style="list-style-type: none"> 1. Functioning systems in place for DINAF's contracting and agreement formulation and approval, procurement, accounting, planning and budgeting, and the monitoring and control of district/field activities. 2. A functioning interagency/national forest protection system to protect forest resources from fires, insects, and disease in times of emergency. 3. An increased DINAF capability to provide technical services and other support through its district offices and nurseries. 4. Interinstitutional cooperative agreements completed or in operation: agroforestry (3), national forest protection system (4), research (1). 5. Research results related to agroforestry, reforestation, and botany published and being used by DINAF and other Ecuadorean organizations and individuals. 6. <u>Patrimonio Forestal</u> and other forests and natural areas being delimited and managed. 	<ol style="list-style-type: none"> 1. Final evaluation will assess: <ol style="list-style-type: none"> a. Annual Plans b. Inter-institutional agreement documents c. Computer capability of DINAF staff 2. A.I.D. and DINAF Project reports. Reports from University of Loja and Catholic University of Quito. 3. A.I.D. and DINAF Project reports. DINAF District Office records. 4. A.I.D. and DINAF Project reports and copies of agreements. 5. Final evaluation. 6. Final evaluation. 	<ol style="list-style-type: none"> 1.a) DINAF personnel able to absorb and effectively utilize training in new systems. Reasonable staff stability so that acquired skills not lost. <ol style="list-style-type: none"> b) DINAF leadership continues to support these improvements and promote use of systems. 2. DINAF incorporates the proposed system and modifies the functions of its HQ and district offices accordingly. 3. <u>Plan Bosque</u> program continued by GOE and adequately funded. 4. DINAF and MAG committed to developing and approving agreements. 6. GOE provides adequate budgetary funding for recurrent costs of programs.

NARRATIVE	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<u>Outputs:</u>			
A. <u>Institutional Strengthening</u>			
1. <u>Management and Administrative Improvement of DINAF</u>	- 4 systems in place	- DINAF records.	- Technical assistance effectively provided.
a. <u>Internal administration and communication system.</u>	- Personnel trained in operation of systems.	- Management consulting firm reports.	
b. <u>Financial management and accounting system.</u>	- Manuals produced for each system.	- Final evaluation.	
c. <u>Procurement, contracting, and agreement formulation and approval system.</u>		- Reports by the Project Coordinator.	
d. <u>System for monitoring and control of district/field activities.</u>			
2. <u>National Forest Protection System</u>			
a. <u>Diagnostic centers established and staffed.</u>	3 diagnostic centers	- DINAF reports	- Continuing cooperation of public and private institutions involved in system.
b. <u>Persons trained in identification of pathogenic diseases and insects.</u>	20 persons trained	- Final evaluation	
c. <u>Fire suppression units created and functioning.</u>	4 units	- Reports of diagnostic centers	
d. <u>DINAF, civil defense, Fire Dept., and other Ecuadorean officials trained in fire suppression techniques.</u>	20 officials trained	- Records of courses	
		- Reports by the long-term expatriate advisor	
3. <u>Forestry Research</u>			
a. <u>University research projects financed by grants.</u>	5 Grants	- DINAF reports	- Universities can design viable research projects.
b. <u>Tree species collected and identified.</u>	7,000 species	- Grantee reports	
c. <u>Area set aside for testing of species other than <u>P. patula</u>, <u>P. radiata</u>, <u>E. globulus</u>, and <u>E. saligna</u>.</u>	5% of <u>Plan Bosque</u> plantings		

NARRATIVE	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
i. Persons trained in bacterial research.	2 long-term, U.S.		
<u>Agroforestry Demonstrations</u>			
Agroforestry subprojects implemented in each of the three principal regions of Ecuador which demonstrate how incorporating trees into the farm enterprise can complement agricultural production, provide forestry products, and improve agricultural productivity.	Highlands - 1,700 has. Oriente - 17,500 has. Coast - 150 has. (Given the demonstration nature of these activities, it will not be possible to set targets <u>a priori</u> for improved productivity and other benefits. These will, however, be measured by the agroforestry evaluation.)	- Agroforestry evaluation. - Reports by the long-term expatriate advisor.	- A casual relationship exists between the agroforestry techniques to be demonstrated and improvements to agricultural productivity and production - Farmers can be motivated to adopt agroforestry techniques.
<u>Delimitation and Management of Natural Areas</u>			
1. Paute Watershed. Protective forest established.	7,000 has.	- DINAF records and reports. - INECEL records.	- Opposition to delimitation by claimants to land is minimal or controllable.
2. INECEL Watershed. Management Unit established and trained.	1 Unit	- IERAC records. - CLIRSEN records.	
3. Patrimonio Forestal delimited.	Nation-wide delimitation of national forests.		
4. Plan Picnucha model management plan	10,000 has. delimited and management plan implemented.		
5. Portoviejo greenbelt	400 has. planted		
5. Natural Areas Management	delimitation of critical areas in 7 parks		
7. Coastal Mangrove Inventory	54,000 ha. surveyed		

NARRATIVE	OBJECTIVE VERIFIABLE INDICATORS			MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	Grant	- A.I.D. - Loan	Counterpart		
<u>Inputs</u> (\$000):				- USAID Controller Office records. - Implementing agency records.	
1. Technical Assistance	1,314*	2,198	676		
2. Equipment/Materials	0	980	872		
3. Training	0	444	123		
4. Field Activities	100	2,759	1,729		
5. Evaluation	50	83	0		
6. Contingencies	14	36	0		
<u>OTPA</u>	<u>1,478*</u>	<u>6,500</u>	<u>3,400</u>		

*\$112,399 for TA was de-obligated in 1985.

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ANNEX II

METHODS OF IMPLEMENTATION AND FINANCING

(a) Summary Chart

<u>Project Component and Method of Implementation</u>	<u>Method of Financing</u>	<u>Approximate Amount (U.S. \$000)</u>
A. <u>Component A-Administrative Improvement</u>		
1. <u>Institutional Strengthening</u>		
- Management Assistance Contract	Direct Pay	99
- Ecuadorean Project Coordinator	Direct Pay	85
- Administrative expenses	HC Reimb.	20
- Computer and Office Equipment	Direct Pay/GSA contract for U.S. procurement. HC Reimb for local procurement.	112.2
- Short-term Training	HC Reimb for local training. Direct Pay for overseas training.	10
2. <u>Forestry Research System</u>		
- Co-op Agreement with Missouri Botanical Garden	Direct Pay	106
- Research Grants Program	HC Reimb	80
- Agroforestry Eval. Prog./FEDLA	HC Reimb	380
- Research Publications	HC Reimb	10

<u>Project Component and Method of Implementation</u>	<u>Method of Financing</u>	<u>Approximate Amount (U.S. \$000)</u>
- Short-Term Training	Direct Pay for overseas training HC Reimb. for local training.	18
<u>3. Forest Protection System</u>		
- Forest Protection Advisor (PSC)	Direct Pay	248.4
- Short -Term TA	Direct Pay (PASA with USIA)	70
- Forest Protection Equipment	Direct Pay	32
- Vehicles	Direct Pay	36
- Training	HC Reimb. for local training Direct Pay for overseas training	8
- Field Expenses	HC Reimb	120
<u>Component B-Agroforestry Demonstrations</u>		
<u>1. Napo Province</u>		
- TA - Agroforestry Advisors (PSC)	Direct Pay	157.5
- Vehicles	Direct Pay	14
<u>2. Highland Agroforestry</u>		
- TA-Forestry Advisor (PSC)	Direct Pay	250
- Field Expenses	HC Reimb	280

<u>Project Component and Method of Implementation</u>	<u>Method of Financing</u>	<u>Approximate Amount (U.S. \$000)</u>
- Equipment and Vehicles	HC Reimb, for local purchases. Direct Pay for U.S. purchases.	76
3. <u>Coastal Agroforestry</u>		
- Field expenses	HC Reimb	190
- TA- Agroforestry Advisors (PSC's)	Direct Pay	160
C. <u>Component C-Delimitation and Natural Areas Management</u>		
1. <u>Patrimonio Forestal</u>		
- Field Expenses	HC Reimb	150
2. <u>Natural Areas Management</u>		
- Vehicles/Equipment/Spare parts	Direct Pay for U.S. purchases. HC Reimb. for local purchases.	77
- Field Expenses	HC Reimb	92
3. <u>Coastal Mangrove Inventory</u>		
- Field Expenses	HC Reimb	22

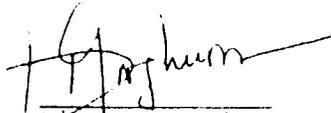
(b) Justification for Departure from Preferred Financing Methods

None of the proposed methods of financing departs from the preferred methods of financing listed in Section 1.A.3. of the Payment Verification Policy Implementation Guidance, dated December 30, 1983.

(c) Assessment of Host Country Capabilities

The host country implementing agency is the National Forestry Directorate (DINAF) within the Ministry of Agriculture. During the first 5 years of this project DINAF's procedures for payment verification have been satisfactory. DINAF has displayed

weakness in their contracting and commodity procurement procedures, as discussed in Annex IV. For this reason, the revised project has decreased the number of contracting actions to be undertaken by DINAF. DINAF will still be responsible for all in-country procurement; however, such procurements are minimal for the remainder of the project. In recognition of the above weaknesses the revised Institutional Strengthening Component of the project will provide technical assistance to strengthen DINAF's internal capacity in financial management, accounting, procurement, contracting, and agreement formulation and approval. With this added technical assistance and DINAF's recent assignment of a full-time accountant to the project, A.I.D. believes that DINAF's financial procedures are adequate.



Richard Goughnour
Acting Controller
USAID/Ecuador

(0355M)



DINAF INSTITUTIONAL ANALYSIS

1. Organization and Staffing of National Forestry Directorate (DINAF)

A major revision of the law governing the forestry sector was accomplished with the enactment of the "Forestry and Conservation of Natural Areas and Wildlife Law" (Ley Forestal y de Conservación de Areas Naturales y Vida Silvestre) on August 14, 1981. The law contains chapters on such matters as: the National Forest Patrimony; Protective Forests and Vegetation; Private Forest Lands and Forests; Forest Plantations; Forest Production and Utilization; Control and Transport of Forest Products; Training and Forestry Research; Incentives (for private sector); Forest Protection; Forest Industries; Administration of the Patrimony of Natural Areas; Conservation of the Wild Flora and Fauna; Financing; and Infractions of the Law and their Judgement. It sets broad policies, authorities, and responsibilities for the administration of programs in the subject matter areas.

In anticipation of this new, comprehensive law, the National Forestry Program (PNF) was established within the Ministry of Agriculture (MAG) through the issuance of its Functional Organizational Regulation on March 31, 1981. Previously, the GOE's forestry concerns were managed by a division level unit within MAG. In 1984 DNF was in danger of being dismantled by the new administration of the Ministry. Instead, based on recommendations of the Project's advisor in administration, the National Forestry Program was upgraded to the level of a Directorate (DINAF) which has been de facto a fifth subsecretariat, with the National Director of DINAF reporting directly to the Minister. The National Director has an advisory committee composed of:

- a representative of MAG
- a representative from the Ministry of Industry, Commerce, and Fisheries
- a representative of the Ecuadorean Institute of Water Resources (INERHI)
- a representative of the Ecuadorean Agrarian Reform and Colonization Institute (IERAC)
- the general manager of the National Development Bank (BNF)
- the president of the Wood Industrialists Association
- the president of the Wood Artisans Association, and
- the president of the Nature Foundation, a local PVO concerned with the promotion of conservation.

Since it represents a broad spectrum of concerned parties of the forestry sector, the advisory committee can serve a useful communication and coordinating function. However, this committee has not met during the life of this Project. DINAF has lacked the capacity to develop the agendas and to carry out appropriate staff work necessary to make effective use of the committee.

Below the National Director, DINAF is now organized into four staff departments and a Technical Directorate which supervises four operating departments and 20 District Offices (one in each province). The chart below shows the overall organization and the staffing levels of the central office. Details on the staffing distribution are also shown below. The headquarters staffing level is 94, including administrative/secretarial personnel. However, at any given time a few of the positions are vacant.

The Legal Department and the Administration and Finance Department provide the National Director and other DINAF staff with services regarding personnel, procurement, general services, disbursing, accounting, and records. They have a total of 23 staff members. Matters such as personnel appointments and procurement actions must be carried out in accordance with prescribed GOE norms and procedures. DINAF's Administration and Finance Department was unable to handle the Project accounts, in the beginning because of the uncooperative attitude of the chief of finance, and later because of lack of capability of an accountant contracted by DINAF for this purpose. A shift in department chief and a new accountant are expected to result in improved services. This Department handles in-country procurement of goods and services, but is unequipped to handle procurement through imports. The Legal Department provides guidance to the various departments as may be required. It reviews any legally binding document, e.g., interinstitutional agreements. The Legal Department has impeded development of Project activities partly because of the workload imposed upon it and partly due to a lack of cooperation with the Project, especially in regard to preparation and review of interinstitutional agreements. Another lawyer has been added to the office recently which will help with the workload.

The Programming and Evaluation Department should be a key staff unit to serve as the coordinating point for program development and financing and for evaluation of program implementation. It has responsibility also for the preparation of statistical data to serve as a basis for program planning, implementation, and evaluation purposes. It was eliminated in 1985 and reinstated in 1986. At the moment only one person is permanently assigned to this department, and it serves a limited function.

The last staff department is International Agreements. The DINAF Director recently created this department and intends to add to its current staffing level of two. The department - irrespective of its title - is responsible for coordinating the development and execution of all agreements entered into by DINAF. At the moment, there are four bilateral agreements, with A.I.D., Germany, Belgium, and Japan. The A.I.D. Forestry Project is by far the largest and most time-consuming for the department chief. Domestically, the department has initiated a number of interinstitutional agreements including those with EMDEFOR (highland reforestation), the University of Loja and Catholic University (forest protection system), and INIAP (Napo Agroforestry Subproject).

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DINAF's technical operations are grouped under a Technical Directorate staffed with one professional (the Technical Director) and one administrative assistant. The Technical Directorate is responsible for assuring that DINAF programs are implemented. The former position is currently filled by an acting Technical Director whose normal position is Chief of Program and Evaluation. Four technical departments based in Quito and 20 District Offices report to the Technical Directorate. The four technical departments and their functions are described below:

The Research and Training Department undertakes forestry research, trains technical level forestry personnel, and is responsible for establishing a seed bank. FAO has provided assistance in the past to this Department in the development of its training program. Its dual role of research and training will facilitate the dissemination of research results to DINAF's foresters and others. It has as yet no full time training director as required by the original Agreement. Courses have been presented with Project financing but with little coordination. The chief of this Department took over recently and quite probably will make it function more efficiently than it has. To the extent practicable, the training will draw in other DINAF professional staff for instructors. This Department is also responsible for implementing DINAF's research program. This research program currently consists of about 40 ongoing species elimination and provenance trials administered by DINAF. At this time there is no effective service for the publication and dissemination of research results.

The Research and Training Department is the largest within the Technical Directorate with a staff total of 23. In addition, 12 contract workers work preparing training materials, in the room and board services, machinery maintenance and nurseries. The research and training facilities are located in Conocoto, a 30-minute drive from DINAF's Quito headquarters. There are training facilities to accommodate 20 students.

The Forest Management Department is responsible for the utilization of the productive forests. It prepares the national forest inventory, supervises the control of movement of forest products, and recommends policies on the use of natural forests. The various field demonstration activities, including agroforestry, will be developed jointly with the personnel of this Department. Its headquarters staff totals 15.

The Forest Production Department develops the policies, programs, projects, and technical standards for reforestation and oversees its execution at the field level including the operation of tree nurseries. It participates in the establishment of the production goals for each of the provinces. The Project is working with this Department to improve the management and operation of DINAF's tree nurseries. This Department is also in charge of an ambitious incentive program for private reforestation known as Plan Bosque. The Department has a staff of 12.

The Natural Areas and Wildlife Department administers the national parks and natural areas, makes studies to identify and delimit protective forest areas, and is concerned with all aspects concerning the flora and fauna. Among the parks under its jurisdiction are those of the Galápagos Islands, Machalilla, and Cotopaxi. It has 11 staff members.

There are 20 District Offices, one in each of Ecuador's provinces. They report directly to the DINAF Technical Director in Quito. However, they continue to depend on MAG's Zonal Offices for administrative or financial management services, with support from DINAF/Quito. The major activity under the District Offices is the implementation of reforestation projects, sixteen District Offices operate nurseries for the production of seedlings. The actual planting activities are carried out in cooperation with community organizations, students, private owners, and military conscripts of the Ministry of Defense. Other activities covered by the District Offices include the administration of parks or protected forest activities in their area, matters related to flora and fauna, and the control of forestry production and its commercial movement. Also, two of the District Offices (Pichincha and Esmeraldas) have small research operations for species testing and development. The total staffing of the district offices is 719, of which 566 are non-career day wage workers engaged in field nursery activities.

2. Computer Facilities

The Forestry Project has supported the establishment of DINAF's central office computer capacity. Much of this equipment is recently installed but it has been rapidly utilized. It provides the infrastructure to support the implementation of automated systems that will improve DINAF's basic administrative and management capacities.

The installed systems are as follows, by organizational unit:

DINAF Computer Center:

IBM AT, color monitor, Comrex Comwriter.

Administration and Finance Department:

IBM XT, monochrome monitor, one-diskette system, Epson LQ1000 dot matrix printer.

Natural Areas and Wildlife Department:

IBM XT, monochrome monitor, NEC 3550 printer.

Forest Management Department:

IBM XT, monochrome monitor, no printer but hooked to computer center's printer, as are the rest.

A.I.D. also financed a Hewlett Packard system for mapping, including an HP7475 plotter, HP monitor, and ancillary equipment to an HP system provided by the German Mission. This was the first computer to go into DINAF, and it was immediately put to use in developing an automated payroll system.

The DINAF/AID project office has two IBM XT's, with monochrome monitors, one Epson dot-matrix, and one NEC 3550 printer.

A third IBM XT system will be installed in the National Director's office in the near future, and an identical system will go into the district office of Guayas to see how effectively it can be used at the district level.

Software includes Multimate, dBase, Wordstar, Lotus 1-2-3, and Symphony.

Some initial training in use of the systems has been provided, mainly to administrative/secretarial level staff. Several professionals have shown interest in applying the systems to their work, but still lack the skills to use them effectively.

3. Administrative Efficiency and Autonomy

This section briefly analyzes the efficiency and autonomy of DINAF in core administrative areas: finance; procurement; interinstitutional agreements; planning and budgeting; and personnel. This analysis refers to DINAF as currently structured. The GOE administration has proposed that DINAF be converted into a semi-autonomous institute. A law to create this institute is now before the Congress and appears to have a good chance of being approved. The following discussion therefore includes remarks on the likely impact of creation of the institute on the administration of the forestry program.

Finance. DINAF has a good level of autonomy in handling its financial administration. Through its Administration and Finance Department it handles its own funds without having to clear with other entities within MAG. For example, DINAF presents its yearly budget directly to the Ministry of Finance without having to go through any other office in the Ministry. Until recently, however, DINAF's financial accounting and reporting for the A.I.D. Forestry Project has been unsatisfactory, due mainly to the poor qualifications of the accountant previously assigned to the Project.

Procurement. Procurement of items costing up to S/. 1.3 million (about US\$9,000) can be done directly by DINAF through informal competitive procedures. Above this amount, DINAF must work through the MAG's Acquisitions Committee, with sealed bids and certain rigid requirements in bid review and final selection of the successful offerer. This can take a lot of time. International procurement has posed great problems for DINAF. DINAF initially

tried acquiring forestry equipment and vehicles through host country procurement, requesting bids from U.S. suppliers. These efforts failed and DINAF requested A.I.D. to do this procurement. Even today, with A.I.D. bringing the purchase as far as customs, DINAF/MAG can spend upwards of six months getting it cleared. If DINAF becomes an institute it will not have to go through the MAG for procurement, but it will doubtless still have customs problems.

Interinstitutional agreements. DINAF must process interinstitutional agreements through the Controller General of the state and obtain the Minister's approval. The main problem, however, has been a lack of attention from DINAF's own legal department. Even so, DINAF has managed to execute a number of agreements using Project loan funds.

Planning and budgeting. DINAF's annual budgets are incorporated into the overall MAG budget, which is reviewed and approved by the Ministry of Finance and, ultimately, the Ecuadorean Congress. Within its approved budget, DINAF prepares its annual operations and financial plans, which are approved by National Forestry Director and by the MAG's National Planning Directorate, DINAF does not have adequate planning systems, as evidenced by the difficulties it has experienced in preparing acceptable plans for the A.I.D. Project in a timely manner. Furthermore, DINAF lacks systems to monitor and measure the progress of central office and fields activities against the plans, and to provide DINAF officials with the information they need to manage those activities.

Personnel. In matters of recruitment, salary levels, promotion, and discipline, DINAF is dependent on the MAG Administrative Subsecretariat. This has proven to be a serious obstacle to DINAF's efforts to meet its counterpart personnel commitments. The creation of an institute provide almost complete autonomy and would allow higher salaries to attract more qualified personnel.

4. Conclusions and Proposed Actions

DINAF's most serious weaknesses occur at the central administrative level, as opposed to the technical departments and district offices. These weaknesses, combined with the demands of the original Project design and the scant resources assigned to strengthening DINAF, virtually ensured that DINAF would have great difficulty implementing the Project.

The preceding analysis points to four key elements that are needed to improve DINAF's performance, in the Project and overall. Three of these elements are directly addressed by the redesign.

1. Counterpart personnel. The original Project Agreement called for DINAF to add 15 administrative and technical personnel. Up to the time of the redesign, none had been added. During the redesign the Mission took up the issue again, but this time with a more modest agenda. The MAG responded immediately by transferring to DINAF an accountant to manage the Project

books. During negotiations of the redesign with the Minister, A.I.D. requested the assignment of a coordinator for the forest protection system and one or more coordinators for the agroforestry subprojects which are the core of the revised field activities. DINAF has made these assignments.

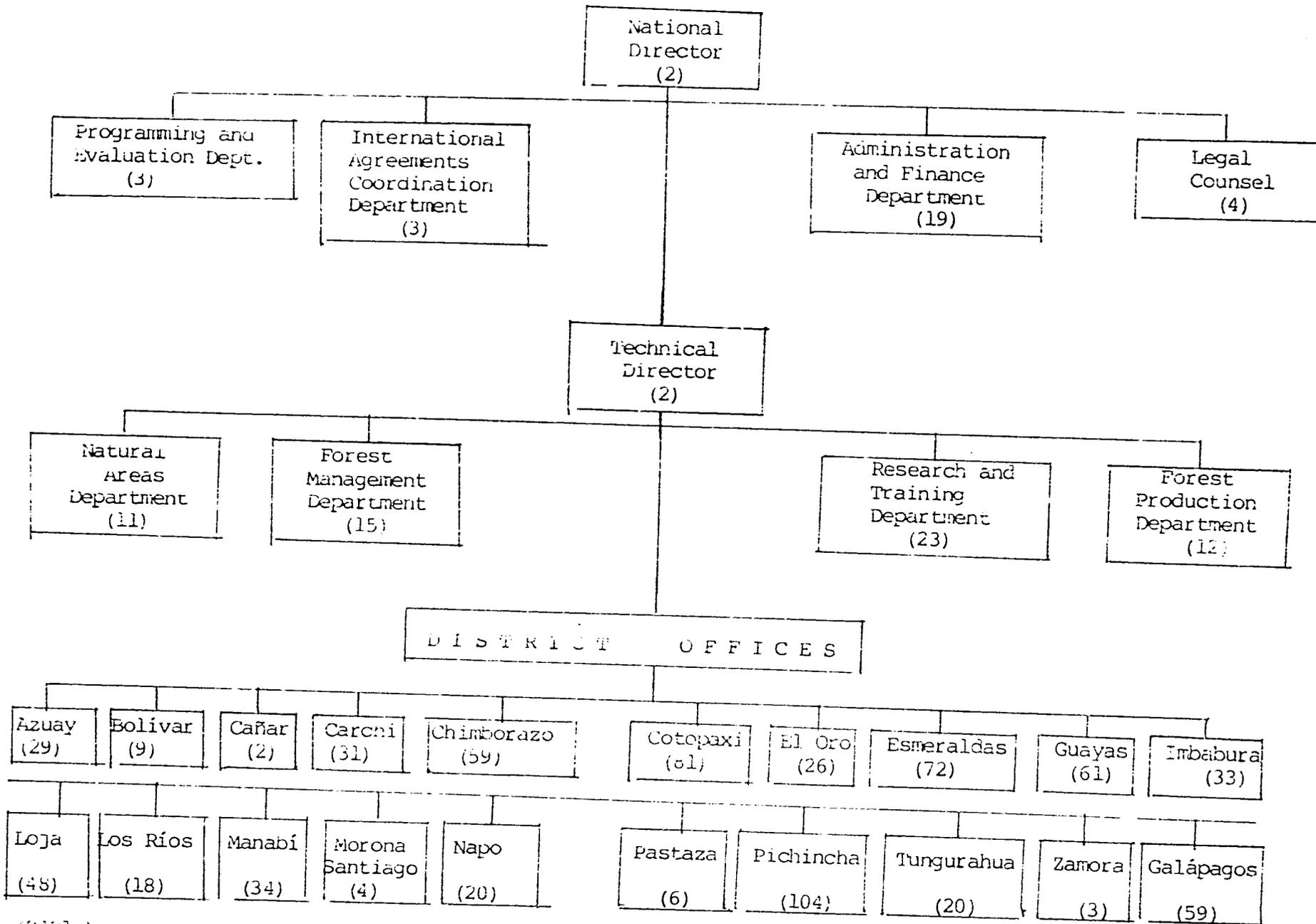
2. Commitment. It is the Mission's perception that some of the implementation delays resulted from bureaucratic inertia or resistance that could have been overcome by strong directives from the highest levels of the Ministry. However, such directives were not forthcoming. A major case in point has been the attitude of DINAF's legal department toward proposed interinstitutional agreements. In negotiating the redesign, the Mission Director expressed to the Minister A.I.D.'s concern about the apparent low priority assigned by the Ministry to the Project. The Minister has responded positively by assigning counterpart personnel and by agreeing to set a deadline for A.I.D. approval of all new subprojects, all of which entail interinstitutional agreements. In agreeing to this deadline, the Minister has signified his commitment to do what is necessary to move the Project rapidly ahead. At the same time, the deadline keeps pressure on the MAG and DINAF actually to fulfill that commitment.

3. Systems and skills. DINAF suffers from a lack of basic administrative systems and the skills to operate them. The original Project design did not provide for technical assistance to DINAF in the core administrative areas, that are its weakness and have made the implementation of not only the Project but most of DINAF's other activities difficult. The redesigned Project seeks to fill that deficit by financing a contract with a qualified local management firm. This firm will assist DINAF to design workable systems in the basic administrative areas listed above. The firm will also prepare manuals and train DINAF personnel in the operation of the systems. It is expected that these systems will, to a large extent, be automated, thus making use of DINAF's existing computer capacity.

4. Autonomy. DINAF's dependence on the MAG's overall administrative structure is a liability in several areas. Changes in these relationships are beyond the scope of this Project. However, it should be noted that, the proposal for a decentralized institute reflects some of the ideas advanced by the A.I.D. financed administration advisor to DINAF. Creation of the institute would resolve many of the difficulties described above. At this point, however, the law to create the institute is before the Congress and there is little that A.I.D. can directly do to influence the legislative outcome. In the event that the institute were approved, A.I.D. could provide support to get it up and running. For example, the emphases of the management assistance services could be shifted to address particular needs of the institute (e.g., development of an autonomous procurement system).

Drafted by: O/DR:Roeser:KC ((0379m) (02-10-87)

ORGANIZATION DIAGRAM OF THE NATIONAL FORESTRY DIRECTORATE
(as of December 1986)



(2421p)

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DISTRIBUTION OF PERSONNEL OF THE NATIONAL FORESTRY PROGRAM
DISTRICT OFFICES
(REVISED DECEMBER 1986)

DISTRICT OFFICES

Province	Sub-program	Appointment				Daily Wage		
		Prof.	Tec.	Adm.	Service	Subtotal	Subtotal	Total
Cajamarca	Forestation	1	3			4	26	30
	Operation		1			1		1
Sub-total		1	4			5	26	31
Ishabana	Forestation	1	3			4	20	24
	Operation		1			1	2	3
	Natural areas	1	1			2	4	6
Subtotal		2	5			7	26	33
Pichincha	Forestation	2	5	1		8	57	75
	Operation	1	8			9	7	16
	Natural Areas	1	2			3	9	12
	Research		1			1		1
Subtotal		4	16	1		21	83	104
Cotopaxi	Forestry	1	3			4	66	60
	Operation	1	1			2	1	3
	Natural Areas	2	2		1	5	13	18
Sub-total		4	6		1	11	70	81
Tungurahua	Forestation	1	3			4	16	20
Sub-total		1	3			4	16	20
Chiriquino	Forestation	4	5			9	33	42
	Natural Areas	2	4			6	11	17
Sub-total		6	9			15	44	59
TOTALS		18	43	1	1	63	265	328

Province	Sub-program	Appointment				Daily Wage	
		Prof.	Loc.	Adm.	Service	Subtotal	Total
Bolívar	Forestation	1				8	9
Sub-total		1				8	9
Canar	Forestation	1	1				2
Subtotal		1	1				2
Cauca	Forestation	1	3			10	14
	Natural Areas	1	2			6	9
	Operation					6	6
Subtotal		2	5			22	29
Cesar	Forestation	2	1			34	37
	Operation	2				8	10
	Natural Areas	1					1
Sub-total		5	1			42	48
Cesarvaldas	Forestation		2			12	14
	Operation	4	5	1	4	14	24
	Natural Areas	1	1		1	3	6
	Research		1			22	23
Sub-total		5	10	1	5	51	72
Manabi	Forestation	2	3			10	15
	Operation		5			6	11
	Natural Areas	1	2			5	8
Sub-total		3	10			21	34
Guayas	Forestation	2	1			37	40
	Operation		1			13	14
	Natural Areas	1	2			4	7
Sub-total		3	4			54	61
TOTALS		29	31	1	5	198	255

Province	Sub-program	Appointment				Daily Wage		
		Prof.	Tec.	Adm.	Service	Subtotal	Subtotal	Total
Los Rios	Forestation	1	1			2	13	15
	Operation	1	1			2	1	3
Sub total		2	2			4	14	18
El Oro	Forestation	1	1			2	12	14
	Operation	2	2			4	8	12
Subtotal		3	3			6	20	26
Galapagos	Natural Areas	3	4	1		8	51	59
Subtotal		3	4	1		8	51	59
Napo	Forestation						7	7
	Operation	2	2			4	2	6
	Natural Areas	1	2			3	4	7
Sub total		3	4			7	13	20
Pastaza	Operation	1	1			2	1	3
	Natural Areas		1			1	2	3
Sub total		1	2			3	3	6
Morona	Natural Areas	1	3			4		4
Sub-total		1	3			4		4
Tamora	Operation	1				1	2	3
Sub-total		1				1	2	3
TOTALS		14	18	1	0	33	103	136

District Offices

Class by Sub-program	Prof.	Tec.	Adm. Service	Subtotal	Subtotal	Total
Library	22	35	1	0	58	421
Education	14	24	1	4	48	117
Special Areas	16	26	1	2	45	157
Research	0	2	0	0	2	24
Other	52	92	3	6	153	719

ANNEX IV

ASSESSMENT OF ORIGINAL PROJECT COMPONENTS

Component A - Institutional Development. The objective of this component was to strengthen DINAF so it might more effectively support other forest sector institutions to implement forest management and reforestation activities. The component, as originally designed, included the following activities:

- 1) Provision of Management Assistance to strengthen DINAF's general project implementation capacity. The planned inputs for this activity included a forestry administration advisor and short term specialized management assistance.
- 2) An Enhanced Planning and Programming Capability within DINAF, especially in the areas of sector planning and project design. This activity included short and long term training and various forestry sector studies, evaluations, and inventories.
- 3) An Expanded Research Coordination Capability in order for DINAF to play a catalytic role in mobilizing forestry research and disseminating results by entering into cooperative agreements with other institutions to implement forestry research. The inputs for this activity included long term training in forest pathology and entomology, short term training, laboratory equipment, a seed bank, and a short term forest pathologist and a short term entomologist.
- 4) An Expanded Information Capability within DINAF to disseminate accurate information related to planning and implementing forestry sector activities. This activity's inputs included a short term information management specialist, specialized training, and materials.
- 5) A Strengthened Technical Assistance/Outreach Capability within DINAF's district offices to support other forest sector organizations. This activity included practical field based training for DINAF's district office staff and nursery materials and equipment for DINAF's nurseries.

Several factors have lessened the Project's impact on strengthening DINAF as a management and coordinating unit. These factors include an overly ambitious project design coupled with insufficient project inputs for strengthening DINAF's management capacity, the frequent absence of support and attention from key decision makers, a lack of counterpart personnel, and administrative constraints.

The Project Paper recognized that DINAF was a weak organization. Nevertheless, the Project proposed to effect a radical change in DINAF's mode of operation and to assign to DINAF responsibility for directly implementing or coordinating a wide variety of activities involving numerous public and

private institutions. As indicated above, under this component, the Project contemplated management assistance to DINAF. However, A.I.D. was unable to provide a person with all the qualifications specified, especially those that would serve to strengthen DINAF's management. Also, the scope of work laid out for such a person covered an extremely broad spectrum beyond administration and management. It turned out that the Principal Forestry Advisor contracted for this position dedicated a large share of his time dealing with technical and implementation problems, with little opportunity to address the basic management deficiencies of DINAF.

A general concern that has affected the development of DINAF and the Project as a whole has been the apparent lack of priority attention from high level Ministry officials. This has been manifested in the failure of the Ministry to assign key counterpart personnel and other resources, the long delays in processing important Project actions through the Ministry and other GOE bureaucracies, and high turnover at the level of the DINAF National Director (eight directors and acting directors since Project start-up in 1982). During all of 1986 a strong National Director was in place and some improvements occurred. However, this person is expected to leave shortly.

DINAF's failure to provide counterpart personnel has been a particularly serious problem. The Project Agreement called for DINAF to increase its central office staff by at least six permanent professional positions and its field staff by two professional and seven technical positions. In fact, no staff increases have occurred. In lieu of these counterparts, the Project has funded the short term contracts of several professionals and technicians to support DINAF. This has served the short term need to keep the Project moving, but calls into question the long term institutionalization of DINAF's capacity to manage its activities. The Ministry has argued that the austerity program and hiring freeze which the GOE initiated shortly after the Project began has prevented it from fulfilling its staffing commitments. However, the Mission notes that, under other projects, the GOE has increased staffing levels during this period and that opportunities exist for reassignment of personnel within the MAG, thereby avoiding the need to hire new personnel.

DINAF's administrative weaknesses have been evidenced by its inability to prepare, on a timely basis, annual operating plans in which the programmed activities and objectives, the estimated budget, and the sources and uses of financing are specified. DINAF has also had difficulty preparing its quarterly reports and its liquidation of advances. All of these indicate a serious need for increased Project support to assist DINAF to improve its financial management, accounting, and information systems capabilities.

Research has taken place under the Flora of Ecuador Botany study with the New York and Missouri botanical gardens and botanists at several Ecuadorean universities, the Forest Protection System subproject with the Catholic University in Quito and the University of Loja, and a small A.I.D. grant to the Nature Foundation, an Ecuadorean PVO, to study the feasibility of a private Amazonian research institute which would focus on forestry and natural resource subjects in that region. In addition, applied research has taken

place as part of the Forestry Development Enterprise (EMDEFOR) field demonstration subproject (see below). However, for the most part, DINAF has not played the catalytic role of entering into interinstitutional agreements for this research, and monitoring and supporting its execution, as contemplated in the Project Paper.

Information dissemination activities have been spotty at best, resulting from an unwillingness on the part of sector institutions to share what they consider to be proprietary information.

Finally, DINAF's outreach capacity has been strengthened through training and the provision of 31 motorcycles to DINAF field staff and nine to Peace Corps foresters working with DINAF to provide extension services. Under the Napo Agroforestry Subproject DINAF extension workers are providing information and assistance to over 100 farmers. DINAF's subagreements with EMDEFOR, the National Agricultural Research Institute (INIAP), the Catholic University, the University of Loja, the Agrarian Reform and Colonization Institute (IERAC), and the National Regionalization Program (PRONAREG) demonstrate its ability to collaborate with other forestry sector entities to design and carry out forestry protection, agroforestry, reforestation and protective forest delimitation and mapping activities. However, execution of these subagreements has often been delayed for long periods because of inflexibility on the part of DINAF's legal staff and a lack of cooperation from MAG staff and other ministries.

A recent development which could have a significant impact on the institutional component of the Project is a proposal to convert DINAF into a semi-autonomous institute. A draft law to this effect has been submitted by the executive branch to the Ecuadorean Congress. The implications of this institute for the constraints described above are mixed. On the one hand, the institute would presumably have greater autonomy in its administrative processes and personnel policies. On the other hand, it would be cut off from the MAG budget and have to generate its own income, and assignment of personnel from other MAG sections could not take place as easily. The Mission does not anticipate the need for major redesign if the institute were created. However, some details, such as the number or type of counterpart personnel and the emphases of future management assistance financed under the Project would have to be adjusted.

Component B - Productive Research and Field Demonstrations. The objective of this component was to test a variety of reforestation approaches, institutional arrangements, and extension techniques on a scale which would clearly demonstrate commercial viability. The original design called for a series of pilot activities in three geographical regions of Ecuador, as follows:

1. Highlands

a. Plantation Demonstration Activities. Approximately 4,000 hectares were to be planted. These demonstrations were to include pine plantations, intercropping, new pine species, and eucalyptus with varied planting techniques.

b. On-Farm (Agroforestry) Demonstration Activities in which at least 75 farmers would participate in on-farm tree planting programs. These were to include windbreaks, boundaries, live fences, etc. for food, fuel, shade, fodder, and construction wood.

c. Natural Regeneration was to have been implemented on 25 sites to test the feasibility of protecting selected areas from fire and grazing.

2. Arid Coast

a. Plantation Forestry. Plantations covering 500 hectares in 20 communities were to be established to provide fuel, fodder, and fruit.

b. On-Farm (Agro)forestry was to be tested on approximately 600 hectares and to concentrate on shade trees such Leucaena and Guabo for coffee plantations.

c. Natural Regeneration demonstrations were to be studied and tested on 12 plots of 25 hectares each.

3. Humid Tropics

a. Lowland Humid Tropical Enrichment Plantations were to be implemented on four sites of 250 hectares each in remnant forests. These controlled plantations were to emphasize species characterized by high local value, rapid growth, and relative insensitivity to competition by other species.

b. Lowland Humid Agroforestry consisting of pilot projects on 600 hectares on the northwest coast and 400 hectares in the Oriente.

c. Lowland Humid Natural Forest Management plots of 400 hectares each to be established in the northwest and the Oriente.

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4. Species Trials were to be conducted in conjunction with field demonstrations. Twenty trials were to be conducted each year.

5. Other Demonstration Activities such as lowland long fiber plantations, walnut plantings, balsa and rubber plantations, and model small scale sawmills were to have been considered.

Under the original Project, DINAF was to have had responsibility for the planning, design, and coordination of productive forestry research and field demonstrations. Demonstration activities were to have been carried out in collaboration with campesino communities and groups and public and private sector institutions. As noted above, DINAF has been able to execute some important subagreements. However, this scheme proved largely unworkable because DINAF did not have the administrative or legal capability to design and administer the large number of individual subagreements with the full range of communities and other organizations which would have been involved. In addition, technical and other factors have undermined the rationale for implementing some of the demonstration activities contemplated under this component. Actual progress is summarized below:

Highlands. EMDEFOR, through its subagreement with DINAF, has planted 2,000 hectares of plantations in the central highlands. Highland agroforestry demonstrations have not yet begun. There is much of interest in agroforestry and EMDEFOR, in collaboration with the Project's highland forestry advisor, has developed a proposal for an agroforestry subproject in the Chimborazo Province. Natural regeneration activities have not gone forward as planned in the highlands, nor in the arid coast, or the Oriente. DINAF concluded and A.I.D. concurred that it was socially unacceptable to remove large plots from production to demonstrate the effects of natural regeneration. A more appropriate approach would be to study the results of natural regeneration on already protected areas such as the Esmeraldas oil facility.

Arid Coast. The Project has succeeded in establishing a 500 hectare protective plantation outside of the coastal city of Portoviejo that serves to protect the city from soil erosion and, eventually, produce viable wood products. Various institutions in the coastal region have expressed interest in agroforestry but no subproject has been approved to date.

Humid Tropics (Oriente). Activities in this region have had varied success. The original Project conceived of large scale forestry plantation demonstrations. The lowland enrichment plantations activity was never begun because a commercial entity was already doing it. Agroforestry, on the other hand, has been a success. The agroforestry subproject in Napo Province has been carrying out long term research, extending technical advice to farmers, and demonstrating how forestry can complement and enhance livestock and crop production.

Species Trials. These trials have been a successful element of each of the demonstration activities.

Other Demonstrations. One small scale sawmill has been installed to process wood from a mature pine plantation in Palmira in Chimborazo Province in the highlands. German technical assistance and financing are now making this technology available on a wide scale to communities and campesino groups which own plantations.

In sum, the agroforestry activity in the lowland tropics is a success. On the other hand, a number of other activities described in the Project Paper and discussed above have not been implemented, particularly in the area of natural regeneration. A major change in circumstances has been the initiation by the GOE of a major nationwide program of reforestation plantations called Plan Bosque. The large scale plantings planned for financing under Plan Bosque have made further Project financing for pilot plantation demonstration activities unnecessary.

Component C - Protective Forest and Watershed Management. The objective of this component was to develop DINAF's capacity to delimit protective forests in critical areas and to implement management plans for protective forests in key watersheds. The original design included three activities:

1. A Strengthened National Forestry Program Capacity to Delimit, Classify, and Develop Forest Management Plans for Economically Important Natural Areas, including 60,000 hectares within the Paute watershed (site of a major hydroelectric project) and 500,000 hectares of other economically important areas. The inputs for this activity included training in protective forest management, contracting for specialized work, and photo-interpretation and mapping equipment.
2. Watershed Management Field Demonstrations in reforestation, revegetation, and natural regenerations in the Paute watershed. This activity's inputs included land management planning and geomorphology assistance and local costs of materials.
3. Technical Support to the Ecuadorean Electrification Institute (INECEL) Watershed Management Unit to help it to coordinate watershed management efforts where INECEL is implementing hydroelectric projects.

The Project has, through an activity called Patrimonio Forestal, been successful in delimiting protective forests in the provinces of Napo (in the Oriente) and Esmeraldas (on the coast). The coastal mangrove forest has also been delimited as well as the Pichincha Protective Forest overlooking Quito. The 700 hectares of natural forest in the Paute watershed have been declared a protective forest. Through a limited scope grant agreement between A.I.D. and INECEL, the Project assisted INECEL to train members of a watershed management unit which had just been established. The Project assisted this unit to develop the base for executing watershed protection activities. INECEL and MAG have since begun to protect 200,000 hectares of forest in Paute using IDB credits.

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In general, though, the rehabilitation of watersheds around major infrastructure investments in hydroelectricity, irrigation, and potable water was judged by DINAF leadership to be outside its mandate. DINAF leadership instead decided, and A.I.D. concurred, to concentrate DINAF activity on the delimitation, protection, and management of watersheds which still have a forest cover.

In summary, the Project has made progress in a number of important areas and, in spite of some shortcomings, the Project remains a vehicle for improving the productive use of forest resources and protecting the forest, soil, and water resources which are essential to agricultural production in Ecuador. The Project is also a useful intervention for strengthening DINAF to play a more focussed but critical role in the development of the sector.

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Detailed Budget and Projected Expenditures

FOREST SECTOR DEVELOPMENT PROJECT - SUMMARY

COMPONENT	GRANT	LOAN	COUNTRYPRT	TOTAL	ACTUAL EXP		UNDISE.		UNDISB.
					LOAN	GRANT	LOAN	GRANT	
A. INST. STRENGTHENING	399193.00	2323457.00	899733.00	4112683.00	426638.21	1897018.79	452127.77	437095.23	
1. Personnel	399193.00	220993.00	285133.00	1270319.00					
2. Research	763264.00	628266.00	478987.00	1870517.00					
3. Forest Protection	227736.00	675368.00	137633.00	1179737.00					
B. DEMONSTRATIONS	246156.00	3285645.00	1898907.00	5530670.00	488845.32	2797209.08	256701.99	39456.01	
1. Northeast	100681.00	1504999.00	1111500.00	2797180.00					
2. Highlands	0.00	609560.00	147740.00	757300.00					
3. Coast	0.00	350000.00	461100.00	811100.00					
4. Reforestation	145475.00	821046.00	178567.00	1165090.00					
C. NATURAL AREAS	187830.00	784362.00	545913.00	1518608.00	148575.34	636289.66	164830.47	22995.53	
1. Delimitation	0.00	267645.00	133330.00	400975.00					
2. Management	187830.00	517220.00	412583.00	1117633.00					
D. EVALUATION/AUDIT	50000.00	63409.00	5500.00	138909.00	69487.06	13921.94	0.00	50000.00	
E. CONTINGENCY	14190.00	22464.00	50000.00	86654.00	0.00	22464.00	0.00	14190.00	
TOTAL	1427401.00	4500000.00	3400032.00	11387454.00					

PROJECTED LOAN EXPENDITURES

COMPONENT	ACT. EXPEND		FY 1988	FY 1989	FY 1990
	Jun. 30.87	UNDISBURSED			
A. INST. STRENGTHEN.	426638.21	1897018.79	754807.82	754807.82	377403.76
B. DEMONSTRATIONS	488845.32	2797209.08	1118887.63	1118883.43	559441.82
C. NATURAL AREAS	488575.34	636289.66	254515.86	254515.86	127257.90
D. EVALUATION/AUDIT	69487.06	11921.94	2784.39	2784.39	8353.15
E. CONTINGENCY	0.00	22464.00	9985.60	9985.60	4492.80
TOTAL	1463946.53	5355903.47	2139977.00	2139977.00	1076945.47

PROJECTED GRANT EXPENDITURES

COMPONENT	ACT. EXPEND		FY 1988	FY 1989	FY 1990
	Jun. 30.87	UNDISBURSED			
A. INST. STRENGTHEN.	452127.77	437095.23	174838.09	174838.09	87419.05
B. DEMONSTRATIONS	256701.99	29456.01	35782.40	35782.40	17891.20
C. NATURAL AREAS	164830.47	22999.53	9199.81	9199.81	4599.91
D. EVALUATION/AUDIT	0.00	50000.00	10000.00	10000.00	30000.00
E. CONTINGENCY	0.00	14190.00	5676.00	5676.00	2838.00
TOTAL	873659.23	613740.77	235496.31	235496.31	142743.15

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