PD-AAR-058 39318

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

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

DOCUMENT CODE: 3

2. COUNTRY/ENTITY: ROCAP

3. PROJECT NUMBER: 596-0129

4. BUREAU/OFFICE: Latin America and the Caribbean — 05

5. PROJECT TITLE (maximum 40 characters): Regional Agricultural Higher Education

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 03 DD 31 YY 95

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)
A. Initial FY 84 Supp. B. Quarter ☐ C. Final FY 92

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

A. FUNDING SOURCE	FIRST FY 84 Supp. B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total						
(Grant)	(6,000)	(34,100)	(40,100)	(25,000)	(80,099)	(105,099)
(Loan)	( )	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.						
Host Country CATIE	-	403	403	-	8,653	8,653
Other Donor(s)						
TOTALS	6,000	34,503	40,503	25,000	88,752	113,752

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) ES	620	620		-		6,000	-	6,000	-
(2) EH	620	620		-		-	-	19,000	-
(3)									
(4)									
TOTALS						6,000		25,000	-

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 630 | 700 | 872

11. SECONDARY PURPOSE CODE

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	TNG	TECH
B. Amount		

13. PROJECT PURPOSE (maximum 480 characters)

To produce a professional human resource base with practical and educational experience needed to address the agricultural production problems of the Central America and Panama region.

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

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

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

17. APPROVED BY
Signature 1. [signature] 2. [signature]
Title 1. Controller 2. Acting Director
Date Signed MM 03 DD 03 YY 85

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

AID 1330-4 (8-79)

REGIONAL AGRICULTURAL HIGHER
EDUCATION
596-0129

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I. SUMMARY AND RECOMMENDATIONS

A. Recommendations

ROCAP recommends that a $25.0 million grant be authorized to implement the Regional Agricultural Higher Education Project. ROCAP and the Center for Tropical Agricultural Research and Training (CATIE), located in Turrialba, Costa Rica, will sign a grant agreement for $7.0 million to obligate funds for the CATIE graduate studies and non-degree program component of the project. USAID/CR will sign a grant agreement for $18.0 million with the Government of Costa Rica (GOCR) to obligate funds for the Inter-American Agricultural School component of the project. CATIE will implement its component over a six-year period, and the Agricultural School component will be implemented over a ten-year period.

B. Summary Description

1. Goal, Purpose and Expected Accomplishments

The goal of the project is to increase agricultural productivity in Central America and Panama, thereby enhancing rural economic growth and employment opportunities.

The purpose of the project is to produce a professional human resource base with practical and educational experience needed to address the agricultural production problems of the Central America and Panama region.

Specific achievements which will occur as a result of the project include:

- -- creation of a four-year learning-by-doing undergraduate Agricultural School;
- -- expanded and upgraded graduate studies and non-degree programs at CATIE;
- -- approximately 400 annual undergraduates in training;
- -- approximately 100 B.S. graduates per year;
- -- approximately 60 M.S. graduates completing training annually;
- -- approximately 4,000 professionals trained through short courses and specialization training; and
- -- increased institutional linkages through networking activities.

2. Background and Project Activities

Increasing the production of basic food, industrial and export crops is a principal challenge facing the nations of the Central America and Panama (CA/P) region. The agriculture sector, which has traditionally contributed the major share of GDP and directly employed over 50 percent of the region's workforce, is caught up in a veritable crisis. Despite the fact that most of the best lands are currently in production, no country in the region is self-sufficient in basic food crops and all face increasing pressures due to expanding populations (2.3% annual population growth). Income from principal export crops has been decreasing in recent years and

yields are low for a variety of reasons. These include technology generation, transfer and adaptation, market policies, and failure to establish a suitable professional human resource base to work in agriculture.

With respect to providing suitably trained professionals to work in productive agriculture, the need for strengthening national level educational and training opportunities has been recognized by the National Bipartisan Commission on Central America (NBCCA), the Report of the Presidential Mission on Agricultural Development in Central America and the Caribbean, and by numerous other studies. The NBCCA Report pinpointed the deficiencies of the region's universities, such as over-extended facilities, overemphasis on traditional fields of study at the expense of applied disciplines, and poorly trained instructors. To this list could be added the lack of a self-sustaining financial position and regular budgetary crises. No single college in the region offers a practical education in the major crops and animal and agroforestry systems that exist or are appropriate for the region tropics. One alternative has been U.S. or other foreign universities, however, the limited number of students who can afford to study abroad return with an education which, while technically sound, lacks the specialized, hands-on knowledge and experience which they require for the conditions in Central America and Panama.

The project will consist of the following two components: (1) the creation of an Inter-American Agricultural School; and (2) the strengthening and reorientation of the graduate and professional programs of the Centro Agrícola Tropical de Investigación y Enseñanza (CATIE). The project will rely on the linkages between the two regional institutions to complement, reinforce and strengthen their respective programs. These linkages include the undergraduate to graduate school progression for some students, exchange of professors, sharing of facilities, joint research activities and use of graduate students to assist with undergraduate research and teaching projects. Potential areas for linkage also exist with the Pan-American Agricultural School (EAP) in Zamorano, Honduras, which will be explored on a continuing basis to assure compatibility between programs. Other linkages that the project will seek involve foreign institutions and universities as appropriate to support project activities. For both the Agricultural School and CATIE, four activities will be undertaken. These are: (a) staff development; (b) facilities and equipment; (c) curriculum and administrative development; and (d) networking. In addition, a local currency endowment for the Agricultural School will be created and funded by the project.

The project will provide the resources needed to create a new undergraduate school and permit it to achieve financial viability. The creation of the new School with a focus on the humid tropics responds to a gap in currently available educational opportunities of growing importance to the future productive potential of the region's agriculture sector. The School will have an applied, learn-by-doing approach which, from the EAP experience, has proven to be highly effective in producing skilled technicians with the ability to work on a wide range of agricultural problems. The principal elements of this component will be the development of the professional staff (faculty and administration) required by the School and the physical creation

of a campus. Developing and installing a curriculum responsive to the needs of the lowland tropics and which follows the principles of the learning-by-doing approach is also critical to the long-term success of the School.

Over all, CATIE needs to be transformed from a post-graduate institution with a fledging training program into a fully functional quality training institution. Under the project, the scope and relevance of CATIE's training will be expanded and strengthened to meet the critical agricultural human resources needs of the region. The essential elements necessary to achieve this will be staff development and the physical expansion of CATIE to accomodate the increased student body, faculty and staff. Additions to the curriculum and institutional programs are also critical.

C. Summary Financial Plan ($000)

		FX	LC[1]	TOTAL
I.	Staff Development	13,024	—	13,024
II.	Facilities & Equipment	6,248	29,729	35,977
III.	Curriculum and Admin. Dev.	2,022	102	2,124
IV.	Networking	2,172	268	2,440
V.	Evaluation	260	—	260
VI.	Miscellaneous/Contingency	1,274	—	1,274
	SUB-TOTAL	25,000	30,099	55,099
	Agricultural College Endowment	-	50,000	50,000
	TOTAL	25,000	80,099	105,099

1/ These resources will be provided from local currency available under USAID/Costa Rica's Economic Stabilization and Recovery Program. Detailed dollar and local currency expenditures by project component are presented in Section IV - Cost Estimates and Summary Financial Plan.

D. Summary Findings

The Project Committee has reviewed all aspects of the proposed Regional Agricultural Higher Education Project and finds it is technically, institutionally, financially, socially and economically sound (see Summary Analyses and Detailed Analyses in the Annex). The Committee also finds that the project is consistent with the objectives set forth in the ROCAP CDSS, AID Policy Guidelines, and the NBCCA Report.

Based on consultations with bilateral USAID Missions, the Government of Costa Rica and CATIE, the Committee believes that all relevant issues have been addressed during the course of Project Paper development.

E. Project Participants

Agricultural College

USAID/CR

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Richard Archi, D. Director
Kevin Kelly, Chief, PDDE

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II. PROJECT BACKGROUND AND RATIONALE

A. Background

1. The challenge Facing CA/P Agriculture

a. Overview

Agriculture has historically been the backbone of the economy of Central American and Panama. In 1980, it accounted for 26 percent of the region's GDP, directly employed over 50 percent of the region's labor force, and its traditional exports generated over 60 percent of the region's export earnings. A large portion of industrial employment (e.g. in food processing and textiles) also has backward linkages to the agriculture sector. As the economies of the region recover from the crisis of the past several years and move toward a strategy of growth based on exports of non-traditional commodities to markets outside the region and population growth and increases in income expand the demand for food, the agriculture sector is expected to maintain a significant role in the economy.

An examination of recent trends, however, raises questions about the ability of the region to meet future demands for the production of basic food, industrial and export crops. For example, since 1979 total agricultural production in the region has been declining at a 1.2 percent annual rate. Some crops and enterprises have suffered more severe declines. Central America's agriculture is beset by low yields, pest and disease problems and natural resource degradation.

Basic Food Crops - Seventy five percent of the region's corn, beans and sorghum and 27 percent of the rice is grown by small producers who comprise 65 percent of the region's farmers. According to FAO, data yields are low, averaging 1.4 MT/ha in corn, 0.6 MT/ha in beans and 2.5 MT/ha in rice. These may be compared to all developing country averages in corn of 1.9 Mt/ha and in beans of 0.9 MT/ha during the same period (rice data were not available). Yields of tropical tuber crops such as cassava are also low averaging 6.0 MT/ha but with yields of less than 3.0 MT/ha reported in many humid tropical areas. While steady production gains over the past two decades have been made in corn, the region's staple food yields have stagnated in recent years. Beans and sorghum yields have also stagnated. Among the technical reasons for this situation is low quality of production technology utilized; i.e. poor varieties and inadequate cultural and crop protection practice. Food crops production has not kept up with population growth in the region. Since 1979 per capita food production has been falling at a minus 2.0 percent annual rate.

Export Crops - Traditional export commodities such as coffee, bananas, sugar and meat suffer from weak and/or stagnant demand and prices while bananas and coffee in particular are plagued by new diseases and insects which are causing major production problems. For example, coffee pests (rust and bean borer) have sharply reduced yields and raised production costs in recent years, eroding the industry's competitiveness and forcing many small farmers to abandon farming altogether. The banana industry located in

the region's humid tropical lowland areas is plagued by a retrenchment of the major transnational companies in Central America (plantations are either being taken out of production or turned over to domestic producers in Honduras and Costa Rica) and continuing problems with cost effective control of the crop's main disease, Black Sigatoka. Approximately $100 million is being spent annually in the region to combat the disease. Many smaller plantain and banana growers are being forced out of production by the disease. Expansion of cacao production, another humid lowland crop, is limited by the threat of monilia pod rot. Within one year, it reduced total Costa Rican production by one half.

The livestock sector is characterized throughout the region by low animal carrying capacity-generally less than one animal unit/ha. Since 1979, livestock production has been declining at a 0.6 percent annual rate. Meat exports are important for Honduras, Costa Rica, Guatemala and Panama. According to the Country Environmental Profiles, livestock activities, primarily beef cattle production, utilize from 15-50 percent of the agricultural land in the region with much of the current deforestation occurring as lands are converted to pasture in the humid tropical lowlands. Serious pasture, forage, nutritional and overall management problems are being encountered that limit efficient utilization of land resources for meat/dairy production destined for internal consumption and export. In addition, increased production of monogastric livestock such as swine is limited by nutritional and management problems.

Level of Crop Diversification - Data on the extent of crop diversification efforts in the region are limited. Development of new cool weather crops for export such as broccoli is occurring in the higher elevations of Guatemala and Costa Rica. Melons, cucumber and other crops suitable to lowland areas are being produced in Honduras and Costa Rica. Expansion of crops adopted to humid tropical lowland conditions such as macadamia, pejibaye, pineapple, ginger, coconut, black peper and some citrus is occurring in Costa Rica, Guatemala and Honduras. Other possible crops include: avocados, cashew, mango, soursops, carambola, cherimoya and spices such as cinnamon, monilla and cardamom.

The adaptability of many crops is known from pilot plantings throughout the region. However, very little accurate data are available about their yields, cultural methods, varietal performance and seasonality nor about plant disease constraints. Still less is known about the viability of some of these crops in the lowland humid tropics. As indicated in LAC/DR/RD's Agriculture: Central America presentation to the NBCCA, current knowledge will permit expanded production of some diversified crops, but diversification of extensive areas to these and other crops will require long-term commitments to research and development by knowledgeable agricultural professionals in order to generate and apply cost effective production technologies.

Natural Resource Base - As described in detail in the individual Country Environmental Profiles, population expansion in the region (2.3 percent annually) has put tremendous pressure on natural resources. Land mismanagement is a particularly acute natural resource problem. High

population densities in some areas of the region, combined with inequitable access to good lands, have resulted in attempts to intensively cultivate steep hillsides and other vulnerable lands, thus threatening rapid and permanent degradation of the very resource base that provides the livelihood of a large percentage of the rural population. These forces are responsible for an alarming rate of deforestation; in the last 35 years, 40 percent of the entire land base in the region has been forested. Many of these lands have been placed in annual crops, for which they are unsuited, without utilizing cultivation practices and conservation measures to avoid erosion.

This process of upland destruction threatens the lowland tropics. For example the Transversal del Norte and Peten regions in Guatemala, the most densely deforested area in that country, have begun to feel the pressure of modern exploitation. Soils in many parts of these areas are not suitable for sustained agriculture and may rapidly lose fertility unless devoted to forestry or agroforestry systems. Other areas require careful crop and livestock management and agronomic practices. Similar situations exist in the lowland tropical areas of Honduras, Costa Rica and Panama.

In summary, the salient characteristic of CA/P agriculture is an extremely low level of technology. This situation results in low land and labor productivity of both traditional and export crops. The limited amount of basic knowledge about how to most effectively and efficiently maintain the natural resource base results in continuing deterioration of land and water resources essential to a prosperous agriculture. Similarly, agricultural diversification is inhibited because little is known about the performance of new crops and enterprises in different areas of the region, and little of the existing information is being applied. Increasing the generation of relevant new technology is critical to addressing the major constraints in CA/P agriculture. And the key to increasing the output of this technology lies in making quantum improvements in the human resource base to generate/adapt, disseminate and apply this technology.

b. Principal Constraints to Agricultural Productivity

CA/P Governments, for the most part, looking for "quick fixes" have not committed themselves in the past to long term research and development efforts or necessary support activities to address the region's complex agricultural problems. The region's agricultural situation has continued to deteriorate because of:

1. The failure to focus on the generation of technology, especially for crops not covered by the International Agricultural Research Centers (IARC's).
2. The failure to adapt existing technologies from the IARC's.
3. The failure to develop an effective technology transfer mechanism.
4. The failure to adopt appropriate policies which provide positive incentives for the private sector to increase agricultural production both for the domestic and export markets.

5. The failure to establish a professional human resource base needed in the generation, adoption and application of production-oriented technology.

Structural constraints to the adoption of productivity-increasing technologies, such as limited access to land and credit resources, weak marketing mechanisms and limited investment in rural infrastructure, while important, are outside the scope of this project.

c. National and Donor Efforts to Address Constraints

In recent years CA/P countries, with AID and other donor support have been focusing on addressing the first four constraints to increased agricultural production and productivity listed above. For example, included among the technology generation adaptation and transfer efforts are the AID-financed Agricultural Research Foundation in Honduras, the Agricultural Technology Development and Transfer Project in Panama, the Small Farmer Diversification Project in Guatemala, and the IDB-financed Increased Agricultural Productivity Project in Costa Rica. CATIE's own technology generation and adaptation research activities in cacao, coffee, plantain/bananas, basic food crops, natural resources and forestry as well as tropical plant genetic resources are directly linked to these projects. Emphasis is also being placed on developing alternative (i.e. non-public sector) institutional mechanisms to carry out technology generation/adaptation and dissemination functions through private research foundations and commodity-specific producers associations.

The countries of the region are also focussing on developing policies and channeling resources which promote private sector involvement in agricultural production and marketing activities. U.S. Economic Support Fund (ESF), Development Assistance (DA) and P.L. 480 dollar and local currency resources are not only financing studies on agricultural pricing, agricultural credit and interest rates, export investment and marketing policies but providing resources for agricultural production, marketing and infrastructure investments in line with the indicated policy changes.

For example, in Costa Rica ESF local currency resources are providing credit to the agriculture sector (including agribusiness) which, through policy dialogue achievements with the government, are being offered primarily at market instead of heavily subsidized rates as was the case in the past. Also, P.L. 480 local currency resources are providing support to agriculture development projects of the government.

2. Importance and Severity of Human Resources Constraints

Skilled professionals are the basic ingredient of success in all of the activities described above. However, little effort in the region is being placed on developing a quality human resource base with both the theoretical knowledge and practical understanding of tropical agriculture. Well-trained professional manpower is needed across the board, and is particularly critical in the development, adoption and application of relevant production technology.

In general, human resources development at the undergraduate and graduate level has been minimized. As the NBCCA Report noted, "a major shortcoming of past U.S. educational assistance has been insufficient support for Central American universities and university students". In the agricultural sector the problem has been particularly acute.

a. Detailed Human Resource Constraint

The problem of quality agricultural professionals working on the region's complex agricultural problems has received considerable attention. The Report of the Presidential Mission on Agricultural Development in Central America and the Caribbean, published in August 1980, identified the "serious deficiency of trained personnel" as one of the major constraints to agricultural and agro-industrial development in the region. The 1982 U.S. Presidential Agricultural Mission to Honduras likewise viewed human resource development as one of the most critical constraints to successful agricultural development in the country. The USAID/Honduras Agricultural Research Foundation PP identified "the lack of qualified counterpart personnel to work with expatriate technicians..." as a serious constraint to effective technology generation and adoption efforts. The International Service for National Agricultural Research (ISNAR), which has carried out numerous studies on national agricultural research systems, states that the lack of trained staff is viewed by many as a more severe constraint to effective agricultural research than lack of research monies[1/]. Further, ISNAR found that in relation to population as well as in absolute terms the Central American/Caribbean region along with Africa emerged"...as the least well equipped in number of agricultural scientists". In addition, ISNAR noted that there are weaknesses in the growth of research investments and the number of scientist oriented toward the humid tropics and tropical cash crops. This is particularly serious as the multinational banana companies, which in the past carried out much of the humid lowland tropical crop research and provided in-service training to national agriculturalists, abandon research and reduce their involvement in production.

The lack of qualified agriculturalists has been most clearly identified and documented in the area of agricultural research. The demand for qualified agriculturalists in other areas of the public sector, private sector and universities, while obviously quite real, has not been as carefully analyzed or quantified. Nevertheless, examples abound of misguided public and private sector agricultural investments which failed to take into consideration basic soil and agroclimatic constraints or to keep abreast of emerging pest and disease problems. For example, the Guatemalan Country Environmental Profile mentions the serious risk of developing areas of the Peten and Transversal Norte humid lowland regions where soils cannot sustain intensive agriculture. In Costa Rica, farmers near Siquerres were urged to obtain credit to plant corn varieties that proved highly susceptible to the high aluminum toxicity in the soils.

1/P.Oram, V. Blindish, Resource Allocation to National Agricultural Research (Trends in the 1970's) ISNAR, November 1981. The importance of quality personnel is also shared by others. See Alfonso Castronovo, Selected Issues in Agricultural Research.

b. Magnitude of the Agricultural Manpower Demand

Apart from some global and regional estimates prepared by ISNAR of professional agricultural manpower needs to staff national research systems, no detailed manpower studies (by specific disciplines or fields) exist in the CA/P region. Nevertheless, the ISNAR study is useful as an indicator of the magnitude of the problem. Based on a number of assumptions concerning the contribution of agriculture to GDP growth, research expenditures as a percent of GDP, research expenditures per scientist and attrition, ISNAR estimated that over 5,000 new agricultural scientists would have to be trained at the M.S. level by 1990 in the Central American/Caribbean region. Obviously, an equivalent number would also have to be trained at the undergraduate level. These estimates do not take into account additional demand for agricultural professionals from the private sector in crop diversification activities or to fill the production-oriented research gaps resulting from the retrenchment of multinational companies from humid tropical lowland crop production. Likewise they do not reflect the need for quality and relevance in the training of these agricultural professionals.

While there is a dearth of detailed manpower demand data, some indicators of the demand for agricultural training in the region is available. For example CATIE has been able to accept only 114 of the 675 students who have applied for entrance since 1982. Similarly, at the Panamerican Agricultural School in Honduras, a significant portion of all applicants are turned down each year due to lack of space. Another indicator of the demand for graduate level training in agriculture is the Caribbean and Latin American Scholarship Program (CLASP). CA/P Missions estimated that 212 students could participate in M.S. level agricultural training at U.S. universities during FY 1984-89. At the undergraduate level (which historically has not been part of AID's target group), the agriculture sector is also receiving considerable attention because of the high demand for well-trained agriculturalists. These data indicate that at most 20 percent of the M.S. level training needs indicated by ISNAR can be achieved under existing graduate training programs.

USAID Mission projects in the CA/P region which require professional level agriculturalists were also analyzed. In Honduras, under various projects (Agriculture Sector II, Rural Technologies, Small Farmer Livestock, and Small Farmer Coffee Improvement) aiming at production and productivity increases of tropical crops rely on substantial involvement of agricultural scientists and extensionists to introduce new technologies as they become available and needed, and to guide farmers as they move into new crops on different soils. The demand for well-trained, production-oriented agriculturalists can only increase over time as productivity increases become more and more important.

Also in Honduras, the Agricultural Research Foundation Project alone will create positions for at least 43 M.S. level (or higher) agriculturalists to handle its various research activities in cacao, coffee, citrus, vegetables, peach palm, spices, corn, sorghum, beans, and pastures programs. In addition, approximately 25-30 research assistant positions will

require technicians trained to the M.S. level to move into the research scientist positions filled initially by expatriate scientists.

In Costa Rica, AID's assistance to private sector agricultural export promotion through the creation of the Private Investment Corporation relies upon the availability of agriculturalists with specialized (B.S. and M.S. level) skills in production, disease control and germ plasm quality for crops such as macadamia, african oil palm, peach palm, cacao, citrus, and other non-traditional export crops. Also in Costa Rica, an IDB project in "Increased Agricultural Productivity" projects the need to train at least 18 professionals to work on that project.

In Guatemala, agricultural diversification projects in the highlands and agriculture export promotion projects most certainly will need qualified technicians to deal with the sophisticated production and processing methods needed to produce high quality products. In Panama, the Agricultural Technology Transfer Project will rely on a decreasing supply of locally-trained B.S. level technicians and CATIE or extra-regionally trained M.S. level technicians.

Another type of USAID investment in the region that will draw heavily on trained agricultural specialists involves resettlement and colonization of tropical lowlands on the Atlantic coast. The Northern Zone Development and the Agrarian Settlement and Productivity projects in Costa Rica and the Guatemala Resettlement project have all shown that the lowlands will be increasingly colonized as population grows and basic infrastructure is provided in the lowland areas. These projects also show that unguided, unscientific agriculture will be unproductive and extremely damaging to the fragile environments of the tropical lowlands. The lowland areas settled under these development schemes need well-trained specialists as extension agents, bank loan officers and agribusiness personnel to guide resource flows to the right soils and crops under appropriate management regimes. This will be especially important over the long term, since the small to medium-sized farmers in colonization programs will begin farming the new areas with traditional crops such as corn, beans and fruits, but may eventually be better advised to shift to the production of non-traditional crops.

There is an additional demand for short-course and specialization training of mid-career professional agriculturalists which should also be considered. These professionals need to keep abreast of improvements in technology, agronomic practices and the detection and solution of critical pest and disease problems.

c. Higher Agricultural Education Institutions in the Region

It has become clear to both U.S. and Latin America agriculturalists that to effectively address the region's agricultural production problems, agricultural professionals must receive training that includes a rigorous theoretical knowledge of the agricultural sciences as well as a practical understanding of the production systems encountered in the region. At the undergraduate stage of their professional formation, students should have a good practical hands-on knowledge of crops and limiting

agroclimatic conditions. At the graduate level, professionals should be provided with the technical knowledge and research tools which will enable them to acquire a problem-solving approach to relevant production constraints that they can use throughout their professional careers.

Unfortunately because of unstable funding, limited staff and infrastructure, a lack of emphasis on practical field work, and weak or non-existent linkages between research and teaching, national agricultural education institutions in the region have been unable to supply quality agricultural professionals at either the undergraduate or graduate level1/.

As detailed below, the problem is particularly acute at the undergraduate level in providing students with the necessary practical and theoretical skills on the cropping, livestock and agroclimatic conditions of the lowland tropics.

1. Undergraduate Training in the Region

According to ISNAR the faculties of agriculture at Latin American universities... generally suffer from a chronic and profound shortage of teaching, scientific and technical leadership".2/ They are characterized by:

- A scarcity of human, physical and financial resources to support an undergraduate program;
- a lack of integration between the theoretical classroom instruction and the application of that knowledge on actual production problems; and
- weak or non-existant linkages with national research programs and priorities.

The U. S. Presidential Agricultural Mission to Honduras agreed with this sober assessment in its recommendation to improve the education and training of Honduran agriculturalists at the University Center for the Atlantic Basin (CURLA), the agricultural university in La Ceiba. The Presidential Mission noted the need for a fundamental change in the philosophy, organizational structures, and priorities for the training of agricultural scientists. The Presidential Mission repeated a litany of constraints that are applicable, in varying degrees to all of the national undergraduate programs in the region including: the lack of well-trained teachers; the lack of appropriate curricula; inadequate laboratory and other facilities; insufficient financial support; and a philosophy of university education that precludes rigorous education and achievement. In summary, none of the existing public sector institutions are currently in a position to rapidly and easily make the fundamental changes to improve the quality of their undergraduates.

1/It is generally acknowledged that the University of Costa Rica has done a better training job then most at the undergraduate level, but it too faces to varying degrees the problems just mentioned.
2/ ISNAR, Selected Issues in Agricultural Research in Latin America 1984 p. 20

The current state of undergraduate agricultural education also provides an answer to the apparent contradiction that there is a shortage of trained personnel to fill agricultural research and production positions while agricultural faculties are producing graduates that are not being employed in the agriculture sector. For example, substantial numbers of "ingeniero agronomo" (agronomists) cannot find employment in Panama, Costa Rica and Honduras. The problem according to Latin American and other professional agriculturalists is one of quality. A rather striking example is offered to support this conclusion -- the Panamerican Agricultural School (EAP) at Zamorano, Honduras.

The privately-funded EAP provides a three-year rigorous theoretical/practical agricultural education leading to a diploma. Established in 1943, its graduates have been highly respected throughout the region and occupy prominent positions in public and private sector institutions. It is often said that EAP graduates lack the "ingeniero agronomo" title but do not lack for jobs. However, due to its location in a dry tropical area, EAP students are not exposed to the agronomic conditions and crop/livestock/forestry systems prevalent in the humid tropical lowlands. EAP realized the limitation of its current location several years ago when it began consideration of the establishment of a campus in the humid tropical lowlands of Costa Rica.

In summary, few opportunities exist in the region where financial stability and freedom from political constraints exist such that if required fundamental changes are made in curriculum and educational philosophy, strong theoretical/practical agricultural undergraduate education focusing on the humid tropical lowlands can be provided (see Section II.B.1 for further discussion of alternatives).

2. Graduate Training in the Region

The 1980 Presidential Mission on Agricultural Development in Central America and the Caribbean found that opportunities for graduate level training were extremely limited throughout the CA/P region. The only two graduate agricultural programs. These include a highly specialized and discipline-oriented program at the University of Panama (which awards an M.S. degree in entomology) and the crops, livestock and natural resources M.S. programs which are offered at CATIE under a cooperative agreement with the University of Costa Rica (UCR).

The program at the University of Panama is too narrowly focused and underfunded to address the broad graduate M.S. level training requirements of the region. It is also doubtful that national M.S. programs could be developed to easily interact with priority production-oriented research activities. Instead, any such efforts would be limited to the particular research interests of individual professors, as is now the case in national undergraduate programs. In addition, because of their national orientation and constant funding problems which affect staff, infrastructure, equipment and overall research and training programs, national universities in the region are ill-equipped to serve the graduate study needs of the region. While they can handle limited faculty exchanges and international linkages,

they would be unable to create and maintain a critical mass of teaching/research professionals working on the region's technology development, adaptation and application problems. Nor could they attract significant additional assistance and expertise from outside the region. For the above reasons the countries in the region have traditionally relied on U.S. and European universities, as well as CATIE to handle a significant portion of their graduate level training requirements.

Formal postgraduate education in the agricultural sciences began in 1946 at the Graduate School of the Inter-American Agricultural Sciences Institute (IICA) in Turrialba, Costa Rica. Since 1973 when CATIE was established as a non-profit autonomous organization, it has continued offering an M.S. degree under an Agreement with the University of Costa Rica. The University establishes the student selection criteria, graduation requirements, and awards the degree in conjunction with CATIE. CATIE provides the staff and facilities for the graduate training program (see Annex II.A.2 for a detailed description). Over the years, CATIE and IICA's predecesor graduate program have trained over 800 students at the M.S. level and, since 1974, offered short-courses and seminars for approximately 4,500 individuals.

CATIE was organized as a non-profit scientific and educational institution with the mandate to promote and stimulate research, training and technical cooperation in animal, crop and forestry production in the Central American and the Caribbean tropics. It has a strong research and training tradition. CATIE is best known for its research center for the development of high-yielding and pest-resistant coffee varieties, monilia resistant cocoa varieties, crossbred criollo and imported meet/dairy cattle, and in forestry and watershed management.

CATIE has over $13 million in existing infrastructure, including student/staff housing, classroom and administrative buildings, a renowned library on tropical agriculture, laboratory facilities and experimental farm sites which serve both teaching and research activities.

Although relatively independent and undisturbed by public sector budgetary fluctuations which often limit the activities of national agricultural research and training programs, CATIE too has been restricted in its activities due to financial considerations. In recent years, CATIE has relied increasingly on donor-financed, project-oriented research which, in turn, has drawn heavily on existing facilities and core budget staff as counterpart contributions to the projects. This tendency has restricted CATIE's ability to provide the time, effort and stability of staff to maintain the graduate and related short course programs' high standards (see Annex II.A.2). Without assistance to strengthen and provide continuity to CATIE's graduate program, the region is in jeopardy of losing its only existing institution capable of supplying quality agricultural professionals with a knowledge of the region's complex agricultural production problems.

B. Project Strategy and Rationale for Regional Approach

1. Alternatives to the Project Design

Prior to and during the PP preparation, ROCAP and USAID/CR carefully examined several alternatives to address the critical problem of a lack of quality agricultural human resources in the region. Alternatives were analyzed separately at the undergraduate and graduate level. Specifically at the undergraduate level, the project team focused on alternative institutional mechanisms to supply a cadre of quality undergraduates with a vigorous practical/theoretical background of humid lowland production systems, technologies and constraints. At the graduate level, the focus was on how to most cost effectively supply quality professional agriculturalists with a production and results oriented research background who would be capable of generating, adapting and applying technology to the complex agricultural problems of the region.

a. Undergraduate

Four alternatives for providing quality undergraduate training, other than through the creation of a new institution, were examined: upgrading existing national universities, expanding EAP into the humid tropics, expanding CATIE to include an undegraduate program, and increasing the level of scholarships for undergraduate training in the U.S.

1) Upgrading National Universities

Two options were considered under this alternative: (a) assisting the universities in each country concurrently, and (b) incorporating a hands-on learning-by-doing approach to one selected university and give it a regional scope. The first option was rejected because of the clear duplication of effort and significant costs that would be involved. In addition, there would be controversy in those countries which have more than one agricultural program over which university should be selected for this purpose.

With respect to the second option, most universities in Central America are highly politicized which makes it difficult to introduce new ideas, even in relatively technical (and theoretically non-controversial) areas. Changing the focus of an existing national university and providing it the autonomy required to operate independently, as well as locating it in the humid tropics and with an area of sufficient size to permit application of the learn-by-doing approach, if politically feasible, would require that considerable resources be invested in additional staff, land and facilities. In essence, it would require the creation of a separate branch campus. Educators with experience in establishing branch campuses have indicated that little, if any, cost savings are realized relative to the establishment of an entirely new institution.

2) Expanding Zamorano

The Board of Directors of EAP has been considering an expansion of enrollment and the possiblity of adding a fourth year of

instruction to the curriculum in order to offer a formal degree for a select group of its students; however, the debate among members of the Board continues and it is unknown when a final decision will be made. A more important consideration than either the length of study or degree offered is the location of a branch campus in the lowland humid tropics. At one time, considered establishing such a campus in Costa Rica because of the perceived need for training in humid agriculture. As noted above, the establishment of a branch campus results in only marginal cost savings. Experience also shown that savings are quickly offset by the additional costs entailed in administering two campusis in separate locations (in this case two different countries). Savings in faculty and management costs could be achieved if the second campus were oriented only toward the last two years of training; however the design team found this arrangement to be impractical because of the negative impact it would have on the espirit de corps of the students, which is one of the key factors of the EAP model. This alternative would also require a complere rewrking of the curriculum at EAP, which is based on teaching a specific discipline each year and does not offer a B.S. degree. The cost and administrative adjustments required by such a radical shift would be significant and would necessitate a major shift in the current training of EAP's Board.

3) Expanding CATIE

This alternative would have the advantage of building on CATIE's long and well-established reputation as an international institution. However, the principal focus of CATIE's teaching efforts is through graduate level research. The addition of a new undergraduate school concurrent with the efforts of this project to strentehen then the graduate program would threaten the potential for achieving that objective. That is, it would be adding a burden that, institutionally, CATIE would have severe difficulty in managing. This alternative would also be affected by the cost implications of additional staff, facilities and land. There is also the possibility that adding an undergraduate program would result in the research orientation of the graduate program dominating that of the undergraduate level.

4) Increased Training in the U.S.

Following the recommendation of the NBC Commission, the level of undergraduate and graduate training in the U.S. is projected to increase significantly in the coming years. This increased training is important, but will complement, not supplement, the need for training in the local environment and under the conditions in which graduates will be expected to work. The ability of U.S. universities to provide hands on training of direct relevance to the characteristics and needs of the lowland humid tropics is weak at best. Also, technology is often too specialized for the conditions in Central America. Increased levels of training in the U.S., therefore, should complement local training and not be viewed as an alternative to such local training.

b. Graduate Level

Several institutional mechanisms were also examined as alternatives to strengthening and upgrading the existing graduate program at

CATIE. These alternatives have limitations, however, when analyzed within the context of the types of training experience required, and the long-term nature of the region's human resource contraint problem. The process of technology generation, adaptation and application is a continuing one.

1) Creation/Strengthening of National Graduate Programs

As indicated earlier, national universities in the region suffer from chronic financial contraints which already limit their capacity to supply qualified agricultural undergraduates. A solid financial and teaching research base on which to create viable national graduate study programs simply does not exist in the region. Support for strengthening CATIE's existing graduate program from the Ministers of Agriculture (see Annex II.A.2), the University of Costa Rica, and the EAP provide ample evidence that the economies of scale of a regional graduate program are well recognized. Likewise, any national graduate program would first and foremost serve the much narrower needs of the country and be more susceptible to varying political and financial support. It would not be cost effective to duplicate the $13 million existing infrastructure of CATIE in one or more of the countries nor to create a critical mass of professionals under such uncertain conditions.

2) U.S. Universities

Another alternative would be to send CA/P students to the U.S. for their M.S. training. Universities in the U.S. have always had an important role in training the region's professionals, and it is expected that this will continue in the future (as evidenced by the Caribbean and Latin American Scholarship Program). However, the training and research that students receive abroad is not always directly relevant to the needs or conditions of the region. For example, with one or two exceptions, no U.S. university is able to provide actual research training opportunities on tropical crops or match the agroclimatic conditions of the CA/P region. U.S. professors and their graduate students actively pursue linkages with national universities in the region and with CATIE in particular to keep abreast of developments in tropical agriculture and to establish relevant research and thesis opportunities for themselves and their students. A strong regional graduate training institution such as CATIE complements overseas training programs in the U. S., and CATIE benefits from the research and training linkages that are established with U. S. institutions.

Due to language difficulties, many otherwise qualified candidates cannot take advantage of graduate training opportunities overseas. For example, the EAP has begun to consider a special program with CATIE to channel some of its students with English language difficulties or desires to specialize in a tropical crop or problem, to CATIE for graduate training. A strengthened CATIE M.S. program will greatly favor this possibility. The language problem is particularly acute for mid-career professionals in the public sector, universities and the private sector who wish to upgrade their skills. Graduate level as well as short/specialization course training in Spanish is therefore essential.

Due to the above, it is a generally held opinion throughout the region that a strong CATIE M.S. program is essential to the development process in the agriculture sector. A development assistance program based solely on training in the U. S. would be extremely expensive over the long run, and would not satisfy the demand for personnel trained in the tropics.

In summary, strengthening CATIE's graduate program is seen as the only viable means for supplying the quality graduate level of tropical agriculturalists required by the region. In the process, this project will build on CATIE's existing:

- facilities, equipment, field experiment sites, and teaching/research staff.
- linkages with international and national agricultural institutions both public and private.
- knowledge base on tropical agriculture and natural resource problems.
- traditions and experience of training professional agriculturalists in its formal graduate program as well as short and specialization courses.

2. Project Strategy

a. Agriculture School

This component of the project relates to the current and future requirements in the region for professional agriculturalists with the knowledge and applied experience needed to expand the productivity of the agriculture sector. The specific focus of this component will be the lowland humid tropics, where increasing pressure is being placed on the land but where the human resource base is weak. Currently available training either has a limited focus on the lowland humid zones or does not provide the "hands-on" experience that has been shown to prepare quality professionals whose inputs make a difference.

The strategy of this component, therefore, is to strengthen the technical quality of the human resource base in lowland humid agriculture. The focus will be on undergraduate level training aimed at developing professionals capable of working immediately on production, marketing and credit problems, as well as creating an expanded pool from which individuals can be selected for further study at the graduate level (for example, at CATIE) which is important to continued development and adaptation of technologies for increasing productivity.

The project will establish a new undergraduate school patterned after the learn-by-doing approach which has proven successful at Zamorano. It will be located in a lowland humid zone in Costa Rica. Project resources, both foreign exchange and local currency, will finance the costs of construction, administrative, staff and curriculum development, and student recruitment required to begin instruction. The first class is planned to start in January, 1987.

In establishing a new institution, an important element of the project strategy is to provide sufficient support over an extended period of time to assure that the institution is on solid footing both technically and financially. For this reason, a ten-year implementation period is planned with the activities of this component carefully designed so that this long-term objective can be fulfilled.

b. CATIE

The strategy in the case of CATIE is to build upon the existing strengths of the institution while overcoming some of the weaknesses identified in its current education program. These weaknesses and needs are as follows:

1) The need to ensure continuity and stability of teaching staff at CATIE first in core teaching areas and courses required of all students and to create a critical mass of teaching/research faculty in the specific specialization areas of the departments. The aim of the strategy is to establish a strong base for the graduate program which would complement existing and future project financed research and personnel, allow for the gradual improvement of the quality of instruction, improve faculty-student contact in courses and during the thesis preparation phase, provide an environment at CATIE that would stimulate the establishment of effective and substantive linkages with national and international agricultural reseach and education institutions, and provide a base for further expansion of the education program.

2) The need to improve currently inadequate facilities and equipment that form an integral part of the graduate program, such as faculty and student housing, classroom and office space, laboratory equipment and field experiment stations. These improvements would complement research project activities and support the CATIE short-course/specialization program.

3) The need to improve the overall administration of the graduate and other training programs at CATIE in the areas of admissions, student life and alumni affairs.

4) The need to support the establishment and maintenance of linkages with national and international agricultural institutions which will enable the graduate program to benefit from the interchange of ideas on technology developments and emerging agricultural problems of the region.

5) The need to broaden and stabilize the financial resources for CATIE so that it can maintain and extend its reputation as a center of excellence in research and training.

3. Relationship to AID Policy and Strategy

a. Conformity with Jackson Plan

This project will contribute to one of the main purposes of increased levels of bilateral economic assistance as proposed by the National Bipartisan Commission on Central America (NBCCA) -- "...to stop the continued decline in economic activity..." One solution to the problem of a declining economy is to reverse the current trend in decreasing agricultural productivity of traditional food crops and to help diversify the export base in the agricultural sector. To accomplish this, and to do it in a way which has medium and long-term impact on the development process in the region, support to training of agriculturalists and the linking of this training to research on new crops and more efficient technologies is proposed.

The NBCCA Report emphasizes the strengthening of educational and training opportunities in Central America as one of the principal cornerstones for promoting democracy and prosperity in the region. Highlights of the report include:

> "Although over the past twenty years there have been improvements in the system, educational quality continues to be generally poor. Educational content often has little relevance to the practical needs of students, and there is a mismatch in all countries between needed skills and the supply of persons trained in those skills. Poorly trained and motivated teachers, as well as inadequate physical facilities, textbooks, teacher's guides, basic educational materials and supplies are pervasive problems."
>
> "The problems of the primary education system extend through the secondary, vocational and higher education systems."
>
> "Universities suffer from over-extended facilities, overemphasis on traditional fields (such as law) at the expense of applied disciplines (such as business, management, the natural sciences, engineering and agriculture), poorly trained instructors..."; and
>
> "We agree with the many Central Americans who told us that a substantial improvement in the availability and quality of educational opportunities must begin at once and proceed as rapidly as possible."

The project is designed to respond directly to the problems identified in the NBCCA Report. The project proposes to provide funds to improve the region's agricultural higher education capabilities by producing a professional human resource base trained in the complex agricultural system of the CA/P region.

It is worth emphasizing here that the problems identified by the NBCCA can only be resolved by a long-term commitment to the educational institutions of the region. The NBCCA recommendations recognize this situation and implicitly agree that a short-term injection of assistance will not be sufficient to overcome the problems. For this reason, the proposed project takes a long-term view and does not attempt to provide an immediate impact on the program; rather, it leaves it to programs such as the Central American Peace Scholarships (CAPS) to respond to that concern.

b. AID Policies

PD-6 Environmental and Natural Resource Aspects of Development Assistance: The project is consistent with the Policy Determination which calls for AID to support strengthening of LDC institutions and training programs which help put into practice new land management systems which will overcome "...practices which result in problems such as: desertification and range degradation; declining soil productivity; fuelwood shortages;..." The training and research to be provided at CATIE and the Agricultural School are aimed at the implementation of sustainable production systems through a more informed, scientifically-based application of new technologies.

PD-7 Forestry Policy Programs: The Project is supportive of PD-7 in that both address the need to "...develop human resources...to effectively design, implement, and evaluate forestry policies and programs...," and recognize the "...critical role of applied and adaptive research in the development and transfer of technologies for meeting fuelwood needs..." Forestry and agroforestry will be important components of both CATIE and the College, as well as soil and water management, which are crucial to sustainable land cultivation systems. Reforestation training at CATIE concentrates on fast growing, multi-purpose species, and forest management training includes classification and protection of important wildlands and watersheds, all areas called for in the PD and targeted for strengthening under this project. In the same vein, this project is compatible with AID policy and program guidance on humid tropical forests. Appropriately trained agriculturalists, and the research on tropical lowland ecosystems, which CATIE and the Agricultural School will produce, are critical inputs to decisions related to agriculture development to avoid: (a) the elimination of unique reservoirs of genetic materials; (b) expansion of inappropriate traditional farming methods into fragile lowland areas; and (c) destruction of valuable forest resources needed for long-term development and ecological stability for short-term benefits which destroy land productivity.

Food and Agricultural Development Policy: This project contributes directly to one of the main thrusts of this policy, which is to develop " a domestic human and institutional capacity that permits a country to develop and apply food and agricultural science and technology". Additionally, it supports "...the identification, transfer, and adaptation of existing appropriate technologies, as well as the carrying out of food and agricultural research and application of improved technologies through...regional...institutions". This project directs significant resources to activities which enhance a country's ability to marshall its own

human...resources for food and agricultural development ", and "enable individuals to obtain access to the skills, resources, and services needed to increase their productivity..." in agriculture in tropical Central America. The Policy Paper recognizes that "the creation and strengthening of institutional capacity, including development of the human resources needed for effective institutions, often requires a long-term commitment and effort...from AID..."

Institutional Development Policy: This policy paper makes explicit the Agency's desire that institutional development support projects "...link such support to a definite schedule according to which local resources will be increasingly used to meet the needs of the institutions concerned particularly with regard to recurrent expenditure." This project has proposed a 6 and 10-year period of direct support to the institutional development of CATIE and the Agricultural School, but has at the same time assured that planned and sufficient coverage of recurrent costs will be insured through fund raising activities, reprogramming of core staff at CATIE, and more effective financial management.

4. Relationships to Other ROCAP Projects

ROCAP has four on-going and one planned research, training, and technical cooperation projects at CATIE which will influence, and be influenced by, this project. They are:

Title of Project	ROCAP Contribution ($000)	FY Initial Obligation	FY Final Obligation
Small Farm Production Systems (596-0083)	8,000	79	84
Fuelwood & Alternative Energy Sources (596-0089)	4,260	79	85
Regional Integrated Pest Management (596-0110)	6,750	84	87
Regional Tropical Watershed Management (596-0106)	6,000	83	87
Tree Cropping & Fuelwood Prod.	9,000	85	91

The Small Farm Production System (SFPS) Project will terminate in mid-1985. Consequently, there will be little direct influence between the two projects. However, the strengthened faculty capabilities provided under this project will help replace the teaching that has been done by the SFPS. Project staff and the farming systems research methdologies and results produced by the SFPS project will be utilized in the M.S. program by professors in class presentations and by students for thesis material. Much of the data collected under the SFPS project will be evaluated and published by professors and students at CATIE over the next few years, extending the outputs of the SFPS project well beyond those proposed and delivered under the Project Agreement. This linkage between research and education is critical to increasing the level of technology being applied in CA/P agriculture.

The Regional Integrated Pest Management (IPM) and The Regional Tropical Watershed Management projects were both designed to contribute to the upgrading of M.S. level specializations in the Crop Production and Renewable Natural Resources Departments, respectively. Project resources, in all cases, will provide the following:

a. Scholarships for M.S. students to study at CATIE;
b. Technical assistance to design programs of instruction in IPM and Watershed Management;
c. Research results incorporated into formal academic course work for short-term workshops designed to train technicians and other users of IPM and watershed management research results;
d. Upgrading of library;
e. Formal participation of Project technicians and scientists in teaching and student thesis counseling;
f. Maintenance of formal and informal linkages with national public and private institutions which are suppliers of students, employers of graduates and collaboration in thesis/research work.
g. Laboratory and office facilities for research and teaching staff.

The Fuelwood & Alternative Energy Sources Project, which ends in 1985, was designed to carry out applied research on fast-growing, short-rotation fuelwood producing tree species, and give training to CA/P country technicians working in fuelwood production projects. The project provided scholarships for M.S. students to study related subjects at CATIE, and a wealth of research data for M.S. thesis. The planned follow on to this project, the Tree Cropping and Fuelwood Production Project, will continue some of the research and short-term training, but is designed to more directly strengthen the formal education program in the Renewable Natural Resources Department by providing technical assistance to design programs (courses) of instruction in wood production and marketing, create a forestry data base management system, upgrade the library, and provide more time of the project technicians for teaching and student thesis counseling in the M.S. program.

In all cases, project inputs and activities have been designed to take into account the needs and plans of the M.S. program. All scholarships, seminars and training courses and teaching functions provided under these projects are approved and coordinated by the newly-appointed Head of the Education Department at CATIE.

Additionally, the ROCAP-funded "Regional Coffee Pest Control" project (No.596-0090) has strengthened CATIE's program in genetic improvement of coffee varieties. The project, funded by a grant to IICA/PROMECAFE, provided resources for the construction of a tissue culture and genetic improvement laboratory, as well as a pilot coffee bean processing plant on the CATIE campus. These facilities, plus additions to the CATIE coffee germplasm collection and the establishment of permanent field trials of rust resistant coffee varieties have greatly increased the capacity of CATIE to provide M.S.-level students with specialized training in coffee culture.

5. Relationship to Other AID Projects and Other Donors

As with other ROCAP-funded activities, various levels of interactions exist between the proposed project and projects funded by the bilateral USAIDs and other donors as well as other ROCAP projects. It is these inter-project relationships that render the project objectives obtainable and significant.

This project is to be jointly funded by ROCAP and USAID/Costa Rica. This combination of U.S. dollar resources for international personnel, technical assistance and material imports, and local currency generations for local personnel and construction costs, increases the effectiveness of joint project activities. The joint project development process also assure coincidence of ROCAP and USAID/Costa Rica program objectives. The resultant collaboration between the Agricultural School and CATIE should be an exemplary case of inter-institutional collaboration.

As the Agricultural School develops and CATIE's M.S. program is strengthened, it is expected that an increasing number of USAID-funded educational scholarships will be awarded to students for study at these institutions. Through linkages with U.S. universities and other research and education institutions, the CATIE M/S. degree will be relevant to the needs of more participant trainees than has been the case in the recent past. The subject matter concentrations proposed for both the College and CATIE are aimed at the technologies future agricultural sector technicians and scientists will need to greatly increase agricultural productivity of basic food crops and agricultural exports and to protect the natural resource base upon which future agricultural production will depend.

Projections of available funding of scholarships for study at CATIE indicate that doubling the number of students from 50 to 100 can be financed from a combination of traditional and new sources. The Director of CATIE has contacted the three major contributors to the scholarship fund (British, Dutch and German governments), and each has expressed an interest and ability to increase these contributions as the program is strengthened through this project. Initial contact, with the OAS training program have been made and negotiations have begun to formalize a contribution to the scholarship program. It is anticipated that similar financial support will be made available for undergraduate degree studies at the Agricultural College.

III. PROJECT DESCRIPTION AND ELEMENTS

A. Goal and Purpose

The goal of the project is to increase agricultural productivity in Central America and Panama, thereby enhancing rural economic growth and employment opportunities. This is essential if the region is to increase basic food production for an expanding population, remain competitive in the production of traditional and non-traditional export crops, and provide an adequate level of income for those people who earn their livelihood in agriculture.

The purpose of the project is to produce a professional human resource base with practical and educational experience needed to address the agricultural production problems of the Central America and Panama (CA/P) region. The increased availability of suitably trained agriculturalists for employment in agriculture will, along with appropriate policies and investment in research, lead to increased generation, adaptation and application of cost-effective agricultural technologies. That these agriculturalists will be produced on an annual basis is appropriate and necessary to reviving agricultural productivity and to take advantage of expanding opportunities for agricultural production for domestic and export markets.

B. Expected Accomplishments

The project will have achieved its purpose when the Agricultural College reaches full operation and is graduating at least 100 suitably trained students per year and when CATIE has strengthened and enhanced its graduate and professional training programs and is providing 60 M.S. level graduates per year and upgrading the skills of some 800 mid-career agriculturalists annually through short courses and specialization seminars. Specific achievements to occur under the project include the following:

a) Creation of a new four year learning-by-doing undergraduate agricultural school;

b) Expanded and upgraded graduate studies and non-degree programs at CATIE;

c) Approximately 400 undergraduates in training annually;

d) Approximately 100 B.S. degree graduates per year;

e) Approximately 60 M.S. degree graduates completing training annually;

f) Approximately 4,000 professionals trained through short and specialization seminars; and

g) Increased institutional linkages through networking activit

As described in Section IV, "Cost Estimates and Financial Plan" and detailed in Annex II, these achievements are to be realized through a combination of ROCAP dollar financing and existing USAID/Costa Rica local currency resources.

C. Project Elements

An integrated and complementary set of activities has been designed to meet the region's needs for qualified undergraduate and graduate level agricultural professionals.

The four activities which will be financed under each component of the project are: (a) staff development; (b) facilities and equipment; (c) curriculum and administrative development; and (d) networking. In addition, a local currency endowment for the Agricultural School will be created and financed by the Project.

1. Agricultural School

The project will provide the resources needed to create a new regional undergraduate school and permit it to achieve financial viability. The creation of the new Agricultural College with a focus on the humid tropics responds to a gap in currently available educational opportunities in an area of growing importance to the future productive potential of the region's agriculture sector. The School will follow an applied, learning-by-doing approach which, from the EAP experience in Honduras, has proven to be highly effective in producing skilled technicians with the ability to work on a wide range of agricultural problems.

The principal elements of this component will be the development of the professional staff (faculty/administration) required by the School and the physical creation of a campus. Developing and installing a curriculum responsive to the needs of the humid tropics and which follows the principles of the learning-by-doing approach is also critical to the long term success of the school.

a. Staff Development

The most critical element to the preparation of well-trained agriculturalists is a permanent staff of sufficient size and with the appropriate mix of expertise to work with the students. This applies to both the teaching faculty and the administrative personnel responsible for the daily operation of the College.

(1) Faculty

Achieving the full benefit of the learning-by-doing approach adapted for the School requires maximum contact between student and teacher. This suggests that the faculty to student ratio should be kept as low as possible without making it prohibitively expensive from an economic and financial point of view. At institutions in the United States where emphasis is given to hands-on learning activities, ratios of 12-14 to one are considered ideal. At the EAP, a ratio of 9-10 to one is maintained.

Since this project is creating a new institution that will have a relatively small student population of 400 when at full capacity, the design team has recommended a faculty-to-student ratio of approximately nine to one. This will permit contact between student and teacher at a level where individual attention will be possible, yet it will not be financially taxing for the School. During the early years of operation, this will be particularly important to the school as it is establishing a reputation for high quality and intensive training.

As shown in Table 1, the size of the faculty will expand with the projected growth of the student population. A full complement of 40 faculty is planned when the school reaches full capacity after year 8. Table 2 also shows the composition of the faculty by areas of specialty. This mix has been judged to be adequate not only to meet the technical requirements for agricultural training but also to provide the courses needed to satisfy the requirements for a B.S. degree.

Of the proposed faculty, approximately 32 will be "international", with the remainder being from Costa Rica. Scopes of work for the initial group of faculty members have been prepared and are attached in Annex II.B.1. In general, criteria for hiring faculty will include academic experience, knowledge of the humid tropics, willingness to work with students in the field as well as the classroom, and Spanish language ability.

At the recommendation of the educators on the task force which assisted in designing this project, a contract with a U.S. university is planned which will include assistance in identifying and recruiting staff in the early years of the project and, subsequently, providing special training for faculty upgrading.

2) Administrative Personnel

Three key administrative positions will be required for the School: the Director, Assistant Director for Academic and Student Affairs, and Assistant Director for Business and Finance (appropriate support staff will be associated with each of the latter two positions). Scopes of work for each position have been developed (see Annex II.B.1) based on what experience in other educational institutions has shown to be both feasible and necessary to operate such an institution.

Each of these positions will be filled early in the project, beginning with the Director, since their input will be essential as policies are translated into procedures, as operating systems are developed, and as the design of the curriculum is finalized.

A final key administrative position to be filled in the project is that of a fund raiser. The long-term financial viability of the School will, in part, depend on funds being raised from a variety ofsources that will be used to capitalize a dollar endowment fund. As is the case with CATIE, the School will look to major corporations and international organizations and foundations to provide contributions, and special programs designed to generate those contributions will be developed. In addition,

programs to receive gifts and promote the School will be developed. As appropriate, technical assistance will be provided to carry outthe fund raising activities. A target of $3.0 million has been established.

TABLE 1

SUMMARY OF FACULTY REQUIREMENTS FOR AGRICULTURAL COLLEGE

Year	1987	1988	1989	1990	1991	1992	1993	1994
Students Admitted	75	75	75	75	100	100	100	100
Studentes Graduate	-	-	-	75	75	75	75	100
Total Enrolled	75	142	209	276	301	324	347	370
Number of Faculty								
Class 1	8	8	8	8	.			
Class 2		8	8	8	8			
Class 3			8	8	8	8		
Class 4				8	8	8	8	
Class 5					10	10	10	10
Class 6						10	10	10
Class 7							10	10
Class 8								10
Class 9								
TOTAL FACULTY	8	16	24	32	34	36	38	40
STUDENTS/FACULTY	9.4	8.9	8.7	8.6	8.9	9.0	9.1	9.3

Table 2

FACULTY COMPOSITION

COURSES AND FACULTY	SEMESTER										
1	2	3	4	5	6	7	8	9	10	11	12
2 crops	2	2	2	2	2	1	1 Elect	1 Int.	2	2	2 Sr. Pro
2 Diver. Agric.	2	2	1	1	1	2	2	2	1	1	1
1 Ag.Mech.	1	1	1	1	-	-	-	-	-	-	
1 English	1	1	-	-	-	-	1	-	-	-	
1 math	1	1	-	-	-	-	-	-	-	-	
1 Lib/Comp	1	1	2	2	2						
	biology	botany	chemistry	Chem.							
	-	-	1	1	1						
			Po.Sci.	History							
						2	1	1	2	2	2
						Ento.	Plant Phy.	Elec.	Elect.	Elec.	Elec.
							1	1			
							Plant Pest	Elec.			
						1	1	1	1	1	1
						Fm Rec.	Fm. Mot.	Intern.Ag	Mkt.	Ag.Com.	Ag. Fin.
							1	1	1		
							Nut.Foods	Elec.	Food Pres.		
						1			1	2	2
						Genetics			Internship	Forestry	Forest Mgt

b. Facilities and Equipment

To create a new institution, the project will identify and purchase land at a site located in the humid tropics, finance the construction of the complete physical plant and provide the equipment necessary to operate and maintain the School as a teaching institution.

Several potential land sites in Costa Rica have been examined for the location of the school. The criteria established for the land include: that it have characteristics of the humid tropics (including soils), that it be of sufficient size for the campus and field activities, and that it have reasonable proximity to San Jose and CATIE. Based on these criteria, the department of Limon in the high elevations near the town of Guapiles has been selected for the School. In that area, the School will be less than an hour by road from CATIE and, when a new road is completed in late 1985, only about the same distance from San Jose. Although it is located in the humid tropics, the land chosen will have areas of higher that, for using and classrooms, elevation will provide some relief from the heat which is characteristic of the area. It is planned to purchase approximately 3,000 hectares which will satisfy the needs for the campus, fields for experimental and demonstration plots and fields for commercial farming. At the time the PP was being drafted, offers for land were being solicited via advertisements in the local papers. Final selection of the land site(s) will be made in late March or early April.

Construction of the physical facilities will be accomplished through a four-phase program over the initial five years of project implementation. Facilities to be constructed include an administration building, classrooms and laboratories, animal and crop production units, student dormitories, faculty housing, recreation facilities and maintenance facilities. Figure 1 provides a schematic of the campus layout and indicates which facilities will be constructed during each phase of the program. The timing of the construction has been planned to coincide with both the growth of the student population and the offering of specific areas of study in accordance with the curriculum that has been developed for the college. Details on the construction plans and costs are provided in Annex II.B.2. In addition to the campus for the school, the project will finance the construction of a small building in San Jose to provide temporary lodging for faculty and short-term consultants upon arrival in Costa Rica. The building will also include limited office space and meeting rooms.

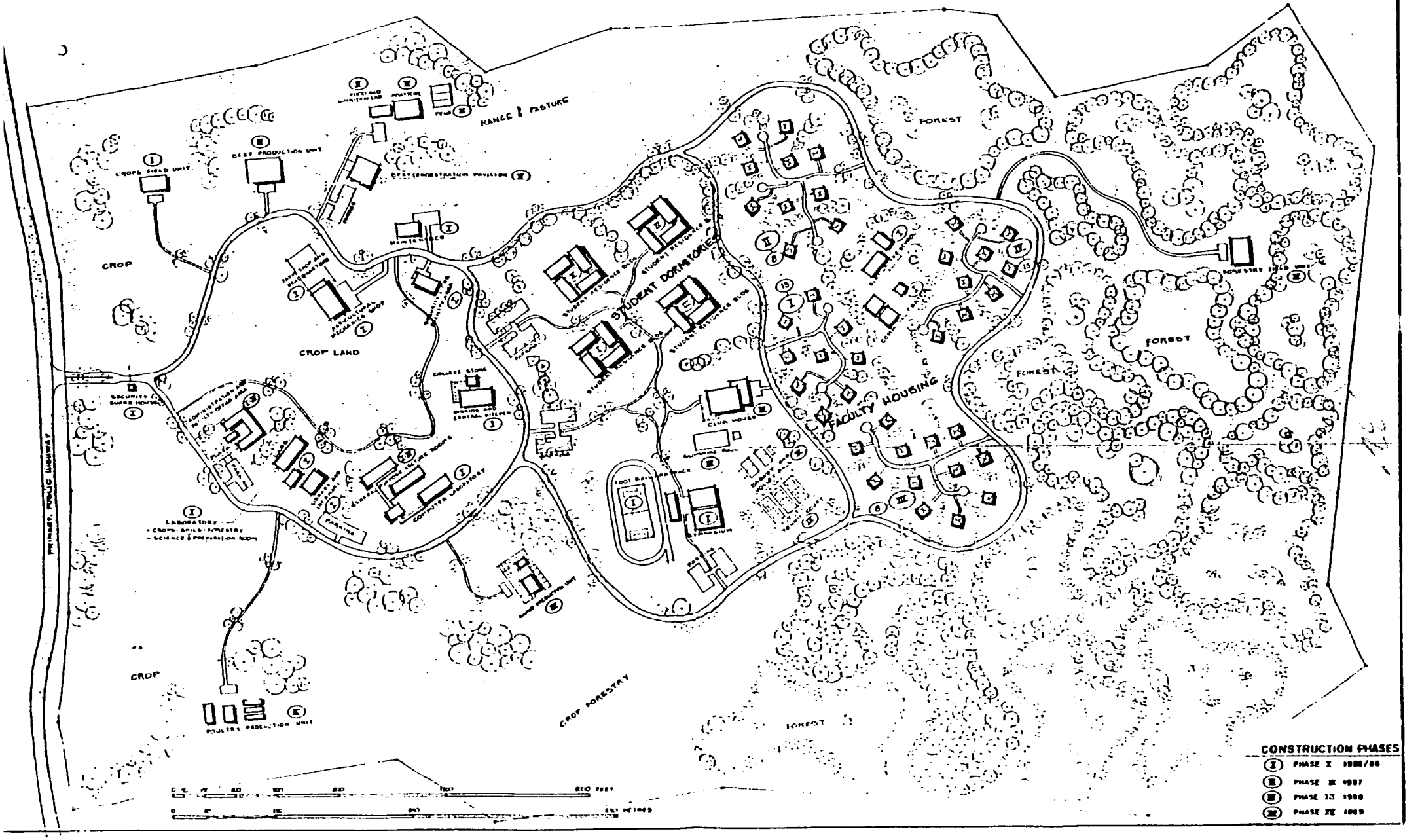
A listing of all equipment required for each aspect of the School's activities has been prepared based on experience in other institutions and is included in Annex II.B.2. The list contains equipment needed for classroom, laboratory and field teaching, and basic supplies and furnishings for dormitories and faculty housing. Replacements for expendable items as well as for equipment that will wear out during the life of the project are also included on the list. To the maximum extent possible, equipment that is available locally will be purchased from Costa Rican suppliers. With this in mind, the list estimates a breakout between the local currency and foreign exchange requirements associated with those purchases.

INTER-AMERICAN AGRICULTURAL SCHOOL - **GUAPILES, COSTA RICA**

PROPERTY AREA 200 Ha.

SAMPLE CAMPUS MASTER PLAN

SCALE 1" = 400' ESC. 1:5000 12 FEB. 1985



c. Curriculum Development

The curriculum for the School has been designed to provide a B.S. degree over a four-year period. In that sense, the curriculum is modeled after the traditional undergraduate course work that is found in U.S. universities. It is in sharp contrast to the curriculum at EAP where specific technical areas are the focus of instruction each year.

An initial curriculum program has been developed and is summarized in Table 3 (see Annex II.B.1 for additional details). The curriculum is based on the learning-by-doing approach and is designed so that the students will spend approximately 50% of their time in the field working on practical applications to the classroom instruction they will receive.

Prior to initiating classes, the proposed curriculum will be refined under the direction of the Assistant Director for Academic and Student Affairs. Short-term consultant services will be provided to assist in this effort through the institutional support linkage to be created with a U.S. university.

d. Networking

The long-term institutional strength of the School will be enhanced by the creation and maintenance of linkages with other universities and institutions which are involved in agricultural development. At one level are national and international institutions which will be kept apprised of the work of the School and its students. When appropriate, faculty and students from those institutions will be invited to participate in various activities.

The linkages between the School and CATIE are many, and will evolve as the School grows and has both more to offer to CATIE and a greater demand on what CATIE can offer. Areas where the linkage between the two institutions will be developed include cross listing of courses, common research activities, use of library materials, computer hookups and data sharing, sponsoring of seminars, faculty exchanges, and CATIE graduate students serving as teaching assistants. Eventually, a certain number of graduates from the Agricultural School will continue on to receive an M.S. degree at CATIE.

A third level of linkage that will be created by the project is with a specific U.S. university to provide general support to the institutional development and growth of the new School. This will include providing limited numbers of faculty, short-term consultants and general backstopping and support as the School goes through the growth process. The emphasis of this linkage will be in the early years of the project when the school will be most vulnerable. Provision has been made, however, to finance some services throughout the life of the project.

e. Local Currency Endowment

Over 50 percent of the School's operating costs will be for expenses in Costa Rica that can be financed with local currency (e.g. salaries of local staff, maintenance, equipment replacement). To cover the local currency operating costs, an endowment will be established with local

TABLE 3
SUMMARY OF CURRICULUM

Major		Support		Breadth	
Crops	31	Electives	22	English	24
Ag. Mgt	15	Ag. Project	24	Biology	17
Intern	15	Work Exp.	12	Chemistry	11
Ag. Mech.	13			Math	9
Soils	8			Accounting	3
Forestry	7			Pol Sci.	3
Foods/Natr.	6			History	3
Seminar	3			Library/Comput.	2
TOTAL	100	TOTAL	58	TOTAL	72

Twelve Semester Total: 230

230 total credits: 12 semesters = 19.16 credits/semester

230 total less 36 credit for project/work experience = 194 : 12 semesters = 16.16 credits/semester.

currency available from USAID/Costa Rica's Economic Stabilization and Recovery Program. The endowment will be owned and controlled by the Board of Trustees of the School.

The resources made available for the endowment ($50 million equivalent) are resources that must be "demonetized" due to the limitations contained in the 1985 stabilization program agreed to by the Government of Costa Rica and the IMF. When placed in the endowment, the funds will be invested in GOCR interest bearing instruments. Thus, the principal amount of the endowment will not enter into the economy and will be effectively demonetized. The interest earned, however, is not subject to the limitations and, as seen in the Financial Analysis, provides a stream of income that is sufficient to meet local currency costs.

2. CATIE

Overall, CATIE needs to be transformed from a struggling post-graduate institution into a fully functional quality training institution. Under the project, the scope and relevance of CATIE's training will be expanded and strengthened to meet the critical agricultural human resource needs of the region. As mentioned above in Section II, CATIE has admitted only a small fraction of the students who have applied, due primarily to limitations on faculty and facilities.

The essential elements to achieve this will be staff development and the physical expansion of CATIE to accomodate the increased student body, faculty and staff. Additions to the curriculum and institutional programs are also critical. The description of each of the project components is discussed below, and their justification and interelationships to existing CATIE activities are described as well and are also detailed in the technical analyses, engineering cost estimates, implementation and financial plans.

a. Staff Development

The most important component of the project will be the strengthening of a permanent core teaching faculty at CATIE. Building upon existing staff resources of some 150 professionals (as detailed in Annex II.A.2), this additional staff development will provide greater stability and continuity of staff, improve the quality of instruction and enhance the role of the graduate and professional training programs at CATIE.

As described below, a total of sixteen additional teaching faculty, consisting of ten Ph. D. and six M.S. level faculty members will be provided to the three teaching departments at CATIE and one overall generalist for the computer center. As detailed in the financial plan, CATIE will begin to absorb the costs of some of these positions in year five of the project, thereby spreading the recurrent costs of faculty over time.

1) Animal Production Department

Currently, the animal production department has a teaching faculty of six (see Annex II.A.2) with the phase out of a research project in June, 1985 the department will have only four core staff available for both research and training activities. An additional seven teaching faculty are required in order for the department to fully strengthen the three departmental specialty areas of animal nutrition, pastures and forages; genetics; and animal breeding; and a fourth area of animal management and production which combines aspects of all three specialites.

The seven additional positions are as follows:

- Agricultural Farm Economist
  Management Specialist (M.S.);
- Pasture Agronomist (Ph.D.);
- Grassland Management Specialist (M.S.);

- Animal Nutritionist (Ph.D.);
- Animal Physiologist (Ph.D);
- Animal Health Specialist (M.S.); and
- Genetist (Ph.D.)

2) Plant Production Department

This department is in the process of contemplating its existing emphasis on farming systems methodologies by adding a focus on production-oriented crop problems and on providing a greater variety of disciplines. This will include export crops, food crops and tropical fruit. Three disciplinary areas to be emphasized are soils and plant nutrition, crop protection and tropical crop production. A revised curriculum is now being developed which will provide a balance of basic and applied subjects.

Currently, there are six core budget faculty, several of which are unable to teach due to full-time commitments to contract research projects. A total of five new faculty members will be required in conjunction with the reassignment of core faculty over time to teaching duties. The five additional positions are as follows:

- Tropical Soils Specialist (Ph.D.);
- Plant Genetic Resources Specialist (Ph.D.);
- Tropical Horticulturist (Ph.D.);
- Tropical Plant Pathologist (Ph.D.); and
- Plant Nutritionist (M.S.)

3) Renewable Natural Resources Department

This department offers three specialization areas: forestry, agroforestry and wildlands and watershed management. The department has in the past relied heavily on other than core staff to teach courses in these specialty areas. Currently, there are twenty-two members on the teaching faculty, of which only five are under the core budget.

The department will continue to offer the three specialization areas, yet increased attention, with the additional staff, will be devoted to integration of existing knowledge in reforestation and plantation management. Three professionals are needed by the department to make this change. Three additional positions are:

- Extension/Transfer of Technology Specialist (M.S.);
- Natural Forest Management Specialist (M.S.); and
- Forest Inventory and Mensuration Specialist (Ph.D.)

In addition to the main teaching department, one Biometrician (Ph.D.) will be provided to the computer center.
Although the majority of the faculty will be assigned departamentally, several of the faculty including the biometrician will be teaching core courses applicable to course needs of all departments. Other examples include the Tropical Soils Specialist (Plant Production Department), Genetist (Animal Production Department) and the Extension/Transfer of technology Specialist (Renewable Natural Resources Department). Anticipated teaching assignments and their relationships to existing faculty are detailed in the technical annex.

b. Facilities and Equipment

The joint AID and Coopers and Lybrand institutional analysis of CATIE completed in January 1984 determined that CATIE's use of existing facilities and equipment had reached their peak utilization level. Based in part on this evaluation, the project development team used CATIE's five year development plan, as adjusted to take into account a growing student and faculty population, to determine the mix and timing of the facilities and equipment to be utilized under the project to support the provision of additional teaching faculty and increased training activities.

As described more fully below, construction will consist of student housing, faculty houses, a graduate education building with classroom and offices and a computer center. In addition, the La Lola agricultural experiment station will be rehabilitated and CATIE's basic water and electricity stations will be expanded. Limited vehicle, audiovisual and ancillary equipment for the laboratories, farm and computer center will be procured. Technical assistance will be provided to CATIE to develop master facilities and maintenance plan.

1) Housing

Construction of faculty housing and construction and upgrading of student housing will occur under the project based on projected increases in faculty and student population. Currently, CATIE has 54 houses for approximately one hundred fifty professional staff, leaving the institution to rely on the already heavily used facilities in local communities. A total of thirty houses will be constructed throughout the life of the project. These will be utilized by the project financed teaching and administrative staff and visiting professors to relieve unmet demand for housing existing staff and future expansion.

CATIE has three dormitories with fifty-four rooms and eight married student apartments. The project will finance badly needed renovation of two existing dormitories as well as the married student apartments. The project will also construct an additional 40-room student dormitory building and three one-story buildings, each of which will house 10 married students and their families. In total, CATIE will have housing for 132 students to be utilized for both graduate and non-degree training activities.

2) Graduate Education Building

A new classroom and office building will be constructed for the expanded CATIE graduate program. The building will have for four classrooms, four seminar rooms, nine faculty offices and numerous ancillary support rooms.

3) Computer Center

Even without the proposed expansion of the CATIE graduate program, the current computer center building cannot accomodate the additional upgrading and computer facilities expansion under existing core and donor-financed projects nor does it provide for adequate ventilation and security. A new computer center will be constructed in year two of the project. In addition, an uninterruptable power supply and limited equipment will be provided to augment equipment being provided under three ROCAP projects: Integrated Pest Management, Watershed Management and Tree Cropping and Fuelwood Production (planned for FY 1985).

4) Primary School

CATIE's one-story primary school for resident dependents consists of three classrooms and related support offices. The project will finance the construction of four additional classrooms, thereby allowing for the projected need for increased primary schooling resulting from the additional staff growth.

5) La Lola Experimental Station

Formerly operated by the United Fruit Company, the La Lola experimental station is a central feature of CATIE's research activities and an income earner to CATIE through the sale of seeds. With the budgetary constraints of the early 1980's, La Lola received very little maintenance and has deteriorated. Moreover, the proposed changes in discipline focus of the various departments requires an expanded usage of the station. Restoration of the station will occur in two phases (1986 and 1987). Phase I will consist of procurement of an additional 40 hectares for small crop production, construction of dormitories for students and professionals, a new office/laboratory building, and limited rehabilitation of existing buildings. Phase II will consist of improving road access, electrical and water systems and the construction of a cafeteria, hybrid seed lab, storehouse and a residence for the station administrator.

6) Water and Electrical Systems

To provide for the proposed expansion, project resources will be provided in two phases to upgrade CATIE's water and electrical systems. Phase I will consist of a new pumping station, main water lines, tank and distribution grid for the water system and installation of a direct power line to CATIE and improvement of the internal grid for CATIE's electrical system. Phase II consists of replacing the antiquated water system to the existing residential and academic areas as well as replacing deteriorated electrical grid lines to these areas.

7) Vehicles and Equipment

To support the expansion of the graduate program, project financing of vehicles and equipment is being provided. A total of vehicles are planned for use by the departments for farm and La Lola research

related activities. As detailed in Annex II.B.2, the farm will receive equipment support and the teaching departments will receive laboratory and research equipment.

8) Master Plan Construction Technical Assistance

Prior to the initiation of construction activities, project financed technical assistance will be provided to develop a master facilities and maintenance plan for CATIE. In addition, limited AE related construction supervision is provided throughout the life of the project.

c. Curriculum and Administrative Development

This activity will assist CATIE's new Graduate Studies and Training Department in carrying out the overall curriculum development and administration of the teaching program. Funding will also be provided to initiate a three-year fund raising program. It is envisioned that in addition to fully strengthening the two-year graduate program, the newly developed Graduate Studies and Training department will also provide non-degree training for CATIE graduates and other professionals currently working in productive agriculture.

Short-courses, seminars and in-service training are an important dimension of CATIE's overall education program. Short courses vary from one week to 10 weeks and are generally more formalized than is in-service training. Audiences differ depending on the discipline and objective of the course but are most frequently working professionals. Usually, morning classes consists of theory and principles and afternoons are given to practical applications.

Seminars are generally technical meetings lasting from one day to one week. Again audiences vary depending on the training objectives and subject matter to be addressed. In-service training ranges in length from two weeks to six months depending on the discipline. Generally students, para-professionals and professionals travel to CATIE to work side-by-side with CATIE scientists on a specific problem of interest, but CATIE has increased the number of seminars held in CA/P countries, especially those related to contract research and training projects in which outreach to member country institutions is an important objective.

1) Staffing

To provide continuity to the expanded graduate program and to supervise the overall strengthening and reorientation of the training programs, a coordinator will be financed for the entire life of project. This individual will be an experienced agriculturalist with a minimum of five years experience as a dean or department head and have Ph.D. level training in a relevant discipline. Equally important will be the daily administration of the non-degree training programs and the development of alumni affairs. The latter is particularly important for CATIE in order to ascertain current allumni profiles, increase alumni involvement in fund raising and student selection and develop greater technical input toward

research and training activities. Under the project, a Director of Non-Degree Training will be financed as well as a Director of Alumni Affairs, the latter to begin in year three of the project, allowing for full implementation of the training activities. Both individuals will have appropriate degree training and a minimum of five years of relevant experience.

2) Non-Degree Training Programs

This component will supplement existing donor support for training activities. Under the project, CATIE will hold a series of twelve annual in-service training seminars for recent graduates, agricultural professionals and scientists in the areas of speciality of the graduate program.

3) Fund raising

As part of project paper preparation, technical assistance for fund raising was provided to develop a three-year plan for fund raising. As more fully detailed in Exhibit A, the three year program consists of the minimum level of staffing, consulting services, travel, promotional advertising and operation expenses.

The overall purpose of the program is to assist the institution to achieve longer-term self-sufficiency. It is anticipated that CATIE will accumulate an estimated $3 million over the 6-year life of project. These resources will be utilized to cover recurrent dollar costs of the institution, including fund-raising activities. The specific programs identified to be carried out under this component are as follows: (a) corporate relations program, (b) international organizational and foundations relations program, (c) major gift program, (d) development publications/promotion program, (e) special consultation programs.

4) Library Materials

The Orton Memorial Library was established at IICA in Turrialba in 1943, as a result of a donation of library resources from the Tropical Plant Research Foundation of Yonkers, New York. Since then, the library has been improved and enlarged through donations by many individuals, donor institutions, and private foundations. Since 1978, the Library has been jointly maintained and operated by IICA and CATIE. Its listing of more than 80,000 publications, including valuable periodicals, makes it one of the most complete libraries in Latin America in the field of tropical agriculture. In 1984, a new building to house the Orton Memorial Library was completed through financial assistance from the Overseas Development Authority of the British Government.

Two critical needs which have been identified are the lack of sufficient periodical documents supportive of the teaching programs and the need of a new copying machine. Each teaching department has identified extensive listings of periodicals which are currently needed. Under the project, $30,000 will be provided annually to finance subscription costs of the needed reference materials and a new copying machine will be procured.

5) Curriculum Technical Assistance

Expansion of the graduate degree program will occur in conjunction with an evolving focus of the institution to a more discipline oriented curriculum. Over the six-year life of the project, the newly created academic department working with the individual teaching departments will finalize the development of a new curriculum. In year four of the project, external short-term technical assistance will be provided to each of these departments to review the current status of their curriculum and to make recommended changes as appropriate. This short-term assistance will also work with CATIE administration to plan for continuation of teaching activities following the life of project financing.

d. Networking

Developing program and professional linkages with international centers of excellence is an important component of the project. This activity will enable CATIE staff to:

- learn about current research development in other areas;
- take advantage of these developments for their own research projects;
- avoid duplication of efforts;
- upgrade their own technical skills through professional relationships with peer groups; and
- strengthen linkages with national level research activities in CATIE member countries.

Networking is not new to CATIE. For example, in 1983, CATIE related in various forms with some 60 centers of excellence. These included faculty exchanges, visiting professors and shared research activities. The problem for CATIE, however, is that in the past these activities were ad hoc and did not necessarily contribute to the longer-term objectives of the institution.

Under the project, this component will finance networking activities coordinated by CATIE's planning office in consultation with the Graduate Studies and Training department. Funding, as appropriate, will be provided to the teaching departments in support of teaching and research activities impacting on the training programs. While the specific plan for networking will be developed in year one of the project, it is envisioned that networking activities will be concentrated in the fields of graduate specialty for those students connected with the graduate program. Examples of this include corn (CIMMYT), cacao (American Cocoa Research Institute), Dairy (ILCA, CIAT) and soils (North Carolina State, USDA).

IV. COST ESTIMATES AND FINANCIAL PLAN

The proposed budget for is $ 25.0 million in ROCAP dollar resources and approximately $ 97.0 million in USAID/CR local currency generations. Table 1 contains a summary of total A.I.D. resources for both components.

As project financing will cover project activities over a six year period for the CATIE component and over a ten year period for the agricultural college, financing for each component is detailed separately below.

A. CATIE

The CATIE component of the project includes A.I.D. resources as follows: $7.0 million dollar financing and $6,342 million equivalency in local currency generations and CATIE's counterpart contribution of $ 8.65 million. Table 5 presents a total summary of both A.I.D. and CATIE contributions. Table 3 presents a yearly summary of A.I.D. and CATIE financed activities. Table 4 details total A.I.D. dollar and local currency contributions to the component.

TABLE 4
ESTIMATED YEARLY FINANCIAL PLAN
(A.I.D. CONTRIBUTIONS: $000)

COMPONENT	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6		YEAR 7		YEAR 8		YEAR 9		YEAR 10		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
I CATIE	693	335	1414	3304	1388	1253	1565	987	947	447	993	16	--	--	--	--	--	--	--	--	7000	6342
II Agric. School	1786	34044	1367	30423	1407	3065	1904	5199	2162	5293	1729	1977	1820	2222	2007	2407	1820	2704	1998	2843	18000	90177 1/
	2479	34379	2781	33727	2795	4318	3469	6186	3109	5740	2720	1991	1820	2222	2007	2407	1820	2704	1998	2843	25000	96519 1/

1/ Includes $16,420,000 in local currency costs financed by interest income from the local currency endowment for the Agricultural School.

TABLE 5

(CATIE)

FINANCIAL PLAN PROJECTED COSTS

($000)

	PROJECT ACTIVITY	A.I.D.1/	CATIE2/	TOTAL
I.	Staffing	3,221	5,272	8,493
II.	Facilities and Equipment	7,301	2,509	9,810
III.	Curriculum and Administrative Development	2,034	472	2,506
IV.	Networking	300	--	300
V.	Land	--	400	400
VI.	Evaluation	60	--	60
VII.	Miscellaneous/Contingency	426	--	426
	TOTAL	13,342	8,653	21,995

1/ A.I.D. resources reflect combined dollar and local currency financing as detailed in Table IV.

2/ CATIE counterpart includes applicable costs to training activities, including maintenance of facilities, staffing, value of land, etc.

TABLE 6

PROJECTED EXPENDITURES OF AID[1/] AND CATIE[2/] RESOURCES

($000)

ACTIVITY	1985		1986		1987		1988		1989		1990		TOTAL	
	A.I.D.	CATIE	A.I.D.	CATIE	A.I.D.	CATIE	A.I.D.	CATIE	A.I.D.	CATIE	A.I.D.	CATIE	A.I.D.	CATIE
I. STAFFING	--	393	318	827	782	868	796	912	660	1,112	665	1,160	3,221	5,272
II. FACILITIES/EQUIPMENT	606	—	3,834	129	1,238	434	972	567	441	650	10	729	7,301	2,509
III. CURRICULUM/ADMIN	139	10	377	96	478	85	620	89	210	93	210	99	2,034	472
IV. NETWORKING	--	--	60	—	60	—	60	—	60	—	60	—	300	--
V. LAND	--	--	--	400	--	--	--	--	--	--	--	--	--	400
VI. EVALUATION	--	--	--	—	—	--	20	--	—	—	40	—	60	--
VII. MISC/CONTINGENCY	83	--	129	--	83	--	84	--	23	--	24	--	426	--
TOTAL	1,028	403	4,718	1,452	2,641	1,387	2,552	1,568	1,385	1,855	1,009	1,988	13,342	8,653

1/ A.I.D. resources reflect combined dollar and local currency financing as detailed in Table IV.

2/ CATIE counterpart includes applicable costs to training activities, including maintenance of facilities, staffing, value of land, etc.

TABLE 7

DETAILED ANNUAL A.I.D. RESOURCES: CATIE COMPONENT

($000)

COMPONENT	1985		1986		1987		1988		1989		1990		TOTALS	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
I. STAFFING														
A. 10 Ph.D	--	--	318	--	530	--	544	--	440	--	445	--	2,277	--
B. 6 M'S	--	--	--	--	252	--	252	--	220	--	220	--	944	--
SUBTOTAL	--	--	318	--	782	--	796	--	660	--	665	--	3,221	--
II. FACILITIES/EQUIP														
A. Clas/Office	--	20	--	396	--	--	--	--	--	--	--	--	--	416
B. Staff Housing	--	77	--	1,485	--	465	--	443	--	--	--	--	--	2,470
C. Student housing	--	97	--	974	--	425	--	425	--	425	--	--	--	2,346
D. Computer CTR	--	9	125	170	--	--	--	--	--	--	--	--	125	179
E. Primary School	--	--	--	--	--	--	--	70	--	--	--	--	--	70
F. Lab Rehab	--	--	--	168	--	178	--	--	--	--	--	--	--	346
G. Labs & Equip	373	--	300	--	10	--	10	--	10	--	10	--	713	--
H. Water/Elec	24	67	5	77	--	142	--	--	--	--	--	--	29	286
I. Vehicles	--	--	110	--	--	--	--	--	--	--	--	--	110	--
J. TA	84	55	--	24	--	18	--	24	--	6	--	--	84	127
SUBTOTAL	481	325	540	3,294	10	1,228	10	962	10	431	10	--	1,061	6,240
III. CURRICULUM/ADMIN														
A. Coordinator	27	--	53	--	55	--	55	--	56	--	56	--	302	--
B. Dir/Non-Degree Trn	27	--	53	--	55	--	55	--	56	--	56	--	302	--
C. Dir/Alumni Aff	--	--	--	--	--	15	--	15	--	16	--	16	--	62
D. Non-degree Trn	--	--	52	--	52	--	52	--	52	--	52	--	260	--
E. Fund Raising	--	10	179	10	261	10	277	10	--	--	--	--	717	40
F. Library Mats	75	--	30	--	30	--	30	--	30	--	30	--	225	--
G. Curriculum TA	--	--	--	--	--	--	126	--	--	--	--	--	126	--
SUBTOTAL	129	10	367	10	453	25	595	25	194	16	194	16	1,932	102
IV. NETWORKING														
A. Inst Linkages	--	--	60	--	60	--	60	--	60	--	60	--	300	--
SUBTOTAL	--	--	60	--	60	--	60	--	60	--	60	--	300	--
V. EVALUATION	--	--	--	--	--	--	20	--	--	--	40	--	60	--
VI. MISC/CONT	83	--	129	--	83	--	84	--	23	--	24	--	426	--
VII. TOTALS	693	335	1,414	3,304	1,388	1,253	1,565	987	947	447	993	16	7,000	6,342
														13,342

NOTES: (1) Budget includes 15% misc/cont item for non-staff costs which are adjusted per IICA salary schedule.

(2) Fund Raising costs assumed by CATIE in 1989.

B. Agricultural School

The agricultural school component of the project includes A.I.D. dollar financing of $18.0 million and local currency (dollar equivalent) financing of approximately $90.2 million. Table 8 presents a total summary of A.I.D. dollary and local currency contributions overall for each activity. Table 8 presents a yearly summary of projected expenditures. Further detailed explanations and cost estimates are found in Exhibit B.

TABLE 8

AGRICULTURE SCHOOL
FINANCIAL PLAN - PROJECTED A.I.D. COSTS
($000)

	ACTIVITY	FY	LC	TOTAL
I.	OPERATING EXPENSES			
	A. Staff	9,803	9,015	18,818
	B. Instructional Materials	90	255	345
	C. Physical Plant	—	594	594
	D. Equipment Replacement	527	2,145	2,672
	E. Miscellaneous	848	4,411	5,259
	SUBTOTAL	11,268	16,420 1/	27,688
II.	CAPITAL EXPENSES			
	A. Construction	2,760	15,660	18,420
	B. Equipment	1,900	1,829	3,729
	C. Land	—	6,000	6,000
	SUBTOTAL	4,662	23,489	28,151
III.	OTHER EXPENSES			
	A. Local Currency Endowment	—	50,000	50,000
	B. Support University	1,872	268	2,140
	C. Evaluations	200	—	200
	SUBTOTAL	2,072	50,268	52,340
	TOTAL	18,000	90,177	108,177

1/ Financed by interest income from the local currency endowment for the Agricultural School.

TABLE 9

AID YEARLY EXPENDITURES: Agricultural School

($000)

	1985		1986		1987		1988		1989		1990		1991		1992		1993		1994		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
OPERATING EXPENSES																						
1. Academic and Admin. Staff	225	288	227	353	452	520	713	744	1,017	930	1,277	1,140	1,364	1,189	1,451	1,218	1,495	1,298	1,582	1,327	9,803	9,015
2. Instructional Material	--	--	10	10	10	16	10	21	10	27	10	33	10	34	10	36	10	38	10	40	90	255
3. Physical Plant	--	--	--	66	--	66	--	66	--	66	--	66	--	66	--	66	--	66	--	66	--	594
4. Equipment Replacement	--	--	--	--	4	17	9	36	19	78	33	123	71	205	100	399	132	570	159	637	527	2,145
5. Miscellaneous	--	--	41	105	54	222	70	342	89	460	105	380	113	618	120	655	125	696	131	733	848	4,411
6. Total Operating Expenses	225	288	278	534	520	841	802	1,209	1,135	1,561	1,425	1,950	1,558	2,192	1,681	2,374	1,762	2,668	1,882	2,803	11,268	16,420 1/
CAPITAL EXPENSES																						
7. Construction	280	1,610	840	4,730	350	1,870	660	3,770	650	3,680	--	--	--	--	--	--	--	--	--	--	2,760	15,660
8. Equipment	1,211	1,129	141	141	333	334	190	198	25	27	--	--	--	--	--	--	--	--	--	--	1,900	1,829
9. Land	--	6,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6,000
10. Total Capital Expenses	1,491	8,739	981	4,871	663	2,204	850	3,968	675	3,707	--	--	--	--	--	--	--	--	--	--	4,662	23,489
OTHER EXPENSES																						
11. Local Currency Endowment		25000		25000																--	--	50,000
12. Support University	70	17	78	18	224	20	252	22	302	25	304	27	262	30	266	33	58	36	56	40	1,872	268
13. Evaluations	--	--	30	--	--	--	--	--	50	--	--	--	--	--	60	--	--	--	60	--	200	--
																						(16,420) 1/
14. TOTAL EXPENDITURES	1786	34044	1367	30423	1407	3065	1904	9199	2162	5,293	1,729	1,977	1,620	2,222	2,007	2,407	1,820	2,704	1,998	2,843	18,000	73,757

Note: 1/ The local currency expenditures identified above are detailed expenditures per year for carrying out project financed activities. However the costs of carrying out these activities are to be financed from interest income from the local currency endowment established in year one of the project and not from additional local currency resources.

V. PROJECT ANALYSES

A. Summary Technical Analysis

1. CATIE

a. Introduction

The Ministers of Agriculture of the region, the Presidential Mission on Agricultural Development in Central America and the Caribbean, and many knowledgeable Central American agriculturalists have indicated the need to upgrade and strengthen the graduate and professional training programs at CATIE. Currently, CATIE provides the only viable graduate training opportunity in the region where students can be provided with a training/research experience on the crop, livestock, natural resources problems and agroclimatic conditions of the region. In the past, CATIE has served the needs of students, particularly mid-career professionals, who because of language difficulties and costs have not been able to pursue graduate studies in the U.S. The graduate studies program at CATIE has also been used along with research projects as the base for numerous short and specialization courses to upgrade the skills of agriculturalists in the region.

Demand for graduate training either at U.S. universities or CATIE continued unabated as indicated by the applications at CATI and the Caribbean and Latin American Scholarship program. When compared to the 5,000 agricultural scientists that ISNAR has estimated will be needed by the year 1990 indications are that there will still be unsatisfied demand. More important than increasing the mere quantity of trained agriculturalists, according to most professional, is that the quality of the graduates be improved and maintained. Unfortunately, the quality of CATIE's graduate program has declined in recent years as the institution devoted more of its scarce facilities and staff to support contract research projects. If CATIE is to continue to provide the region with quality professional agricultural degree and non-degree training, it will have to provide greater support to its education program. The CATIE Administration is cognizant of this need and has stated its intention of restoring the reputation of its educational program. It is within this context that ROCAP proposes to assist with the upgrading and strengthening of CATIE's graduate and non-degree professional training program.

The essential questions regarding the technical components of the project fall into two major areas: 1) educational considerations regarding overall and individual departmental objectives and areas of specialization of the M.S. and non-degree professional training programs, faculty required, curriculum, teaching-research relationship, and 2) related physical facilities (laboratories, classrooms, field experiment stations, and housing) and equipment required to upgrade the training program.

b. Overall Findings

One of the main objectives of CATIE is to train specialists required by countries in the tropical areas of the Caribbean and Latin America to strengthen their national institutions and their agricultural development

programs. Trained human resources are key ingredients to food and agricultural development in all regions of the world. With its graduate studies programs, CATIE is in a unique position to continue its contribution to agricultural progress in the Central American Region. The potential is here and has been demonstrated over the years.

Graduate studies have not received the financial support and status equal to that given to research and other functions in CATIE's programs. The quality of the teaching programs has been declining in recent years as a result of demands placed upon the institution by international and foreign agricultural organizations to carry out research and extension programs. The new CATIE administration is cognizant of this decline and intends to reverse this trend by giving greater support and higher priority to graduate studies at CATIE, thereby improving the training of people who will assume positions of leadership in agriculture throughout the region.

Major improvements in CATIE's teaching (and graduate related research) program are needed if this objective is to be achieved. These improvements, which cut across the departments, are as follows:

Staff

Continuity and stability of teaching staff are essential for a successful and quality graduate program at CATIE. A larger proportion of staff is needed on core budget funds with specific responsibilities for teaching, along with some research. Excessive reliance on donor-financed research staff or professors not located at CATIE to teach core courses and electives has resulted in instability in course content, thesis research, areas of specialization and lack of interaction between professor and student. Contract research project personnel are a valuable complement to the graduate program but cannot substitute for core teaching staff. More core teaching staff will also improve the quality of instruction in the graduate program.

Curriculum

CATIE will continue its effort to improve the curriculum with a series of basic courses applicable to all departments and taught by permanent core faculty. These courses should include soils, genetics, statistics/experimental design, farm economics/budgeting and technology transfer. Elective courses taught by core teaching staff should be provided in the areas of specialization offered by the departments.

Facilities and Equipment

Considerable variation exists in the teaching and research facilities among the three academic departments. Most of the existing classrooms are adequate, but additional and specialized classrooms and laboratories are necessary for upgrading the quality of teaching and handle an increased student population. For example equipment and facilities at the Animal Production experimental farm and the lowland humid tropics La Lola station need to be improved. The existing computer center is housed in a building that cannot handle current or future staff/student needs. Due to the fiscal limitations of the past few years, the library has not maintained or expanded subscriptions to many core scientific journals that are an essential part of any graduate program. Finally, existing student and dormitory housing is inadequate to permit any improvement/expansion of the graduate program.

2. Agricultural School

This analysis reviews the technical factors associated with the proposed design of this component of the project and assesses the adequacy of the approach to addressing the constraint of a weak human resource base to expanding agricultural production, particularly at the undergraduate level and as it relates to the humid tropics.

a. Design Alternatives

The activities of this component flow directly from the decision to create a new institution. That decision, however, was made after considering several alternative approaches to the problem, including:

1) Panamerican Agricultural School (EAP)

Expanding EAP so that it would offer specialization in the humid tropics during the final two years and to provide a B. S. degree was considered and rejected for several reasons. First, the education experts on the design team advised that success with the learning-by-doing approach relies heavily on close contact between the students and staff throughout the period in school, and this would be lost if the training were split between the existing EAP campus and a site in the humid tropics. Also, the current curriculum at EAP would have to be restructured so that the first two years would include the necessary courses, required for a B.S. degree. Finally, establishing a new site (branch campus) does not result in any significant cost savings because it would still be necessary to buy land, build facilities and expand staff.

2) Adding an undergraduate program at CATIE

This alternative would also require considerable investment for additional land, facilities and staff. There is also the

possibility that undergraduate training would tend toward the research orientation of CATIE rather than the planned learning-by-doing approach. In addition, since CATIE is not a private institution but operates under an agreement signed by the government of Costa Rica and IICA, with a governing board made up of CA/P country representation, the private, independent status sought for the School would not be possible. Finally, it is believed that the addition of an undergraduate program at CATIE should not be considered until the success of strengthening the M.S. program is insured.

2) Expanding National Universities

The principal problem with this alternative is political, i.e. whether it would be possible to include an independent, privately run institution as part of a national public university. The consensus of the design team is that the public sector would inevitably become involved and influence operations negatively. Other factors considered in reviewing this alternative include the possibility that the regional character of the institution could not be guaranteed. Also, the level of resources required for land, facilities and staff, if the investment in this type of educational activity is made in more than one country, would be prohibitive.

4) Increased Training at U.S. Universities

Training at U.S. universities had and will continue to have an important role in the education of professionals from the region and, in response to a recommendation by the NBCCA, the number of participants sponsored by AID will increase significantly over the next few years. Nonetheless, training in the U.S. provides only a partial response to the long-term problem of developing and maintaining the human resource base of the region. Such training, therefore, can only complement, not replace, the training done locally. Also, local training has the advantage of working with students under conditions and using technologies that, as professionals, they will ultimately apply. Finally, language does not become a barrier to receiving a first quality education.

At the same time these alternatives were rejected, the following considerations argued forcefully for the creation of a new institution:

- The school will be established as a private international institution, free from external political pressures.
- The learning-by-doing approach can only be instituted based on a specific curriculum designed to provide the type of training for which the demand for graduates is high.
- The institution can have a regional scope with an international faculty and student population.

b. Technical Design Alternatives

With the determination that the creation of a new institution is the best approach to take for this component of the project,

the technical questions to be answered related to the structure of the school and its ability to provide the type of education required. Within this context, the mix of activities proposed under this component have been carefully selected to assure the technical soundness of the design. Specifically:

- -- the curriculum is designed with a learning-by-doing methodology;
- -- faculty size and composition are proposed based on the demands of the curriculum;
- -- the physical plant for the school is consistent with the curriculum and projected staff and student population; and
- -- a direct linkage with a U.S. university is planned to assist in the long-term institutional strengthening of the School.

B. Summary Institutional Analysis

1. CATIE

a. Summary History

CATIE is situated near the city of Turrialba, 70 kilometers southeast of San Jose, Costa Rica. The valley of Turrialba was selected in 1942 as the site for the headquarters of the Inter-American Institute of Agricultural Sciences (IICA) of the O.A.S. When the General Directorate of IICA was transferred to San Jose in 1960, it maintained at Turrialba those activities initiated in 1942; training and research in agriculture, animal husbandry, and forestry. On January 12, 1973, IICA and the Government of Costa Rica executed an agreement to create the Centro Agronomico Tropical de Investigacion y Ensenanza (CATIE). This non-profit autonomous organization, scientific and educational in nature, was created to promote and carry out research at different levels in the areas of agriculture, forestry and animal husbandry, with the purpose of responding to the needs of the American tropics, particularly the countries of Central America and the Caribbean.

b. Objectives and Programs

CATIE has as its main objectives the following:

- To conduct research for generating technology that will solve the agricultural problems of the tropical areas of Central America and the Caribbean, thereby benefiting the small-scale farmers.
- To train professionals from Latin America and the Caribbean at different academic levels, in order to provide specialists required by the countries to strengthen their national institutions and their agricultural development programs.

- To provide technical cooperation services to the countries, especially those of Central America and the Caribbean, working with them to strengthen their national institutions and to assist them in executing their agricultural research, training and development programs.

CATIE offers a Master's degree program through the technical departments, under terms of an agreement with the University of Costa Rica. The Center receives an average of thirty new students per year. At another academic level, the Center offers short courses, seminars, and in-service training in special fields. From 1974 to 1984, 4,500 professionals from Latin America and the Caribbean will have received specialized training in different fields.

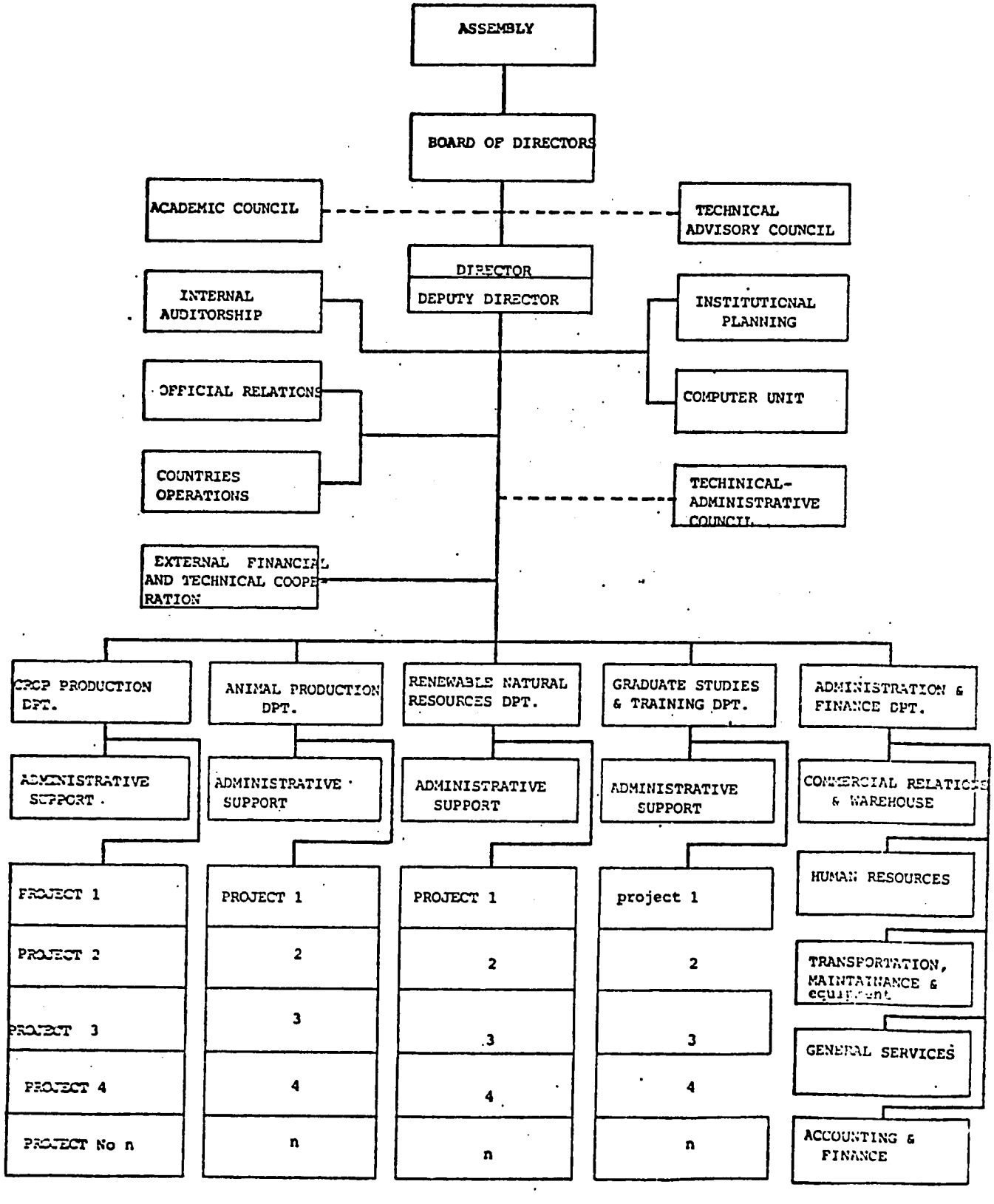
CATIE conducts research on a wide range of topics. Problem oriented research is focused in four major areas: annual crops, perennial plants, animal production, and renewable natural resources. In addition, CATIE sponsors disciplinary support research in several areas.

c. Current Organization Structure

In late 1984, CATIE reorganized its organizational structure to more effectively coordinate and implement research and training activities (see Figure 2). The center has its own Board of Directors, comprised of six members, who function as its highest executive body. The board is counseled by the Technical Advisory Council which advises the Board on policies and strategies in the field of research, training and technology transfer and by the Academic Council which advises on curriculum and relevant policies affecting the educational programs. The Director is responsible for the Center's operation, and is elected by the Board members for a four-year term which is elegible once for renewal.

Assisting the Director and Deputy Director in centralized operations are a variety of units. The Office of Institutional Planning has an important role in providing longer-term planning in strengthening CATIE'S responsiveness to member countries. This office in conjunction with the Technical-Administrative Councils also serves to coordinate inter-departmental programming. The internal audit office provides accounting services and has linkage as well to the Office of External Financial and Technical Cooperation which serves to coordinate the wide range of donor financed projects. Finally, the Office of Official Relations and the Computer Center provides support in public relations and computer services, respectively.

FIGURE 2


ASSEMBLY
BOARD OF DIRECTORS
ACADEMIC COUNCIL
TECHNICAL ADVISORY COUNCIL
DIRECTOR
DEPUTY DIRECTOR
INTERNAL AUDITORSHIP
INSTITUTIONAL PLANNING
OFFICIAL RELATIONS
COMPUTER UNIT
COUNTRIES OPERATIONS
TECHINICAL-ADMINISTRATIVE COUNCIL
EXTERNAL FINANCIAL AND TECHNICAL COOPERATION
CROP PRODUCTION DPT.
ANIMAL PRODUCTION DPT.
RENEWABLE NATURAL RESOURCES DPT.
GRADUATE STUDIES & TRAINING DPT.
ADMINISTRATION & FINANCE DPT.
ADMINISTRATIVE SUPPORT
ADMINISTRATIVE SUPPORT
ADMINISTRATIVE SUPPORT
ADMINISTRATIVE SUPPORT
COMMERCIAL RELATIONS & WAREHOUSE
PROJECT 1
PROJECT 2
PROJECT 3
PROJECT 4
PROJECT No n
PROJECT 1
2
3
4
n
PROJECT 1
2
3
4
n
project 1
2
3
4
n
HUMAN RESOURCES
TRANSPORTATION, MAINTAINANCE & equipment
GENERAL SERVICES
ACCOUNTING & FINANCE

There are five parallel departments which will impact on this project. These are Administration and Finance Department, Department of Crop Production, Department of Renewable Natural Resources, Department of Animal Production, and, finally, Department of Graduate Studies and Training.

d. Infrastructure

CATIE's central facility covers 1,069 hectares of the Turrialba Valley, bordering the western side of the City of Turrialba. Most of this land is relatively flat. The soil lends itself to such crops as coffee, sugar cane, cacao, improved pasture, citrus and other fruit trees, vegetables, and forest trees as well as livestock. There are seven major soil series found at CATIE: Reventazon, Turay, Institute Clay, La Margot, Cervantes, Colorado, and Birrisito (as well as other miscellaneous soils). Of the total land areas some 266 hectares are devoted to crop research programs, 287 to animal research production, and 100 to the natural renewable resources program (including forests). 396 hectares are used for residential areas, buildings, and land-scaped areas (the remainder is in commercial production or a reserve).

Some 60 kilometers from Turrialba, between Siquerres and Port Limon on the Atlantic slope of Costa Rica, CATIE has another farm, "La Lola", 100 hectares in size. The climate there is warm and humid with an annual average rainfall of 3500 milimiters. The original vegetation of the area was wet tropical forest. Presently, it is dedicated principally to production research development and multiplication of cacao hybrid seed and the commercial production of cacao. Some combined agriculture and forestry studies also are being undertaken at this facility.

CATIE's main facilities include four office buildings, a conference hall and other meeting rooms, classrooms, and teaching laboratores. There are also laboratories and facilities for soils, plant pathology, computer technology, entomology, plant physiology, animal nutrition and physiology, and languages. The Center has numerous greenhouses, a herbarium, two cold chambers for genetic materials, an arboretum, nurseries, and a meteorological station. In addition there are a 24-room dormitory, a warehouse/workshop and a tissue culture laboratory.

Added since the creation of CATIE have been a building for the Cattle and Small Animals Program and one for the Soils Laboratory, a cold chamber for genetic resources, an apartment building to house visiting scientists, an enlarged potable water supply with an internal purification system, and facilities for drying and processing cacao seeds. Most of these facilities have been built with funds derived from the sale of lands.

The Orton Memorial Library was retained by IICA upon the creation of CATIE but is still located in Turrialba, serving the region's countries as well as technicians and students at CATIE. This library, reputedly the finest agricultural library in Latin America, houses over 80,000 volumes, 2300 titles of periodicals, and 110 titles of bibliographical and abstracts. A new library facility was built in 1983.

Other CATIE facilities include three dormitories for single students, 8 apartments for married students, one guest house, one apartment building for visiting scientists, 54 residences for technicians, a cafeteria, a recreation center with swimming pool and sports areas, and two school buildings, one for an elementary school and the other for a kindergarten.

2. Agricultural School

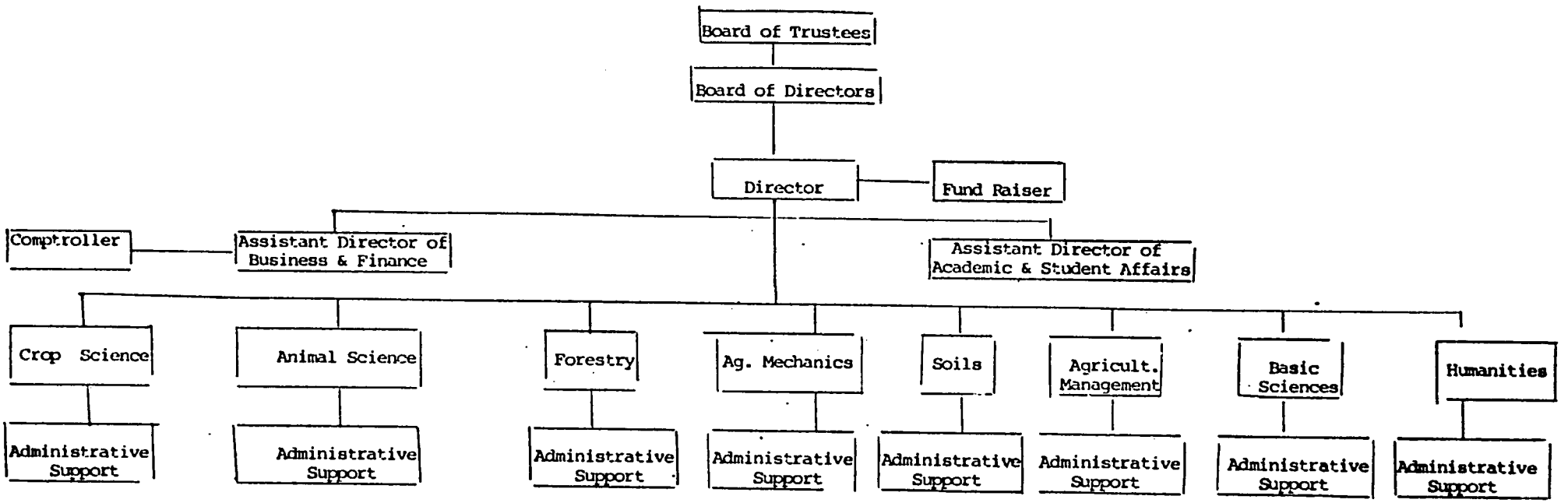
The institutional structure proposed for the Agricultural School is based on recommendations by a task force of leading educators funded by the W.K. Kellogg Foundation who assisted the Mission in the preliminary design stages of the School. Administratively, a three-tier organization is planned consisting of a Board of Trustees, a Board of Directors, and a Director. Figure 3 presents an organizational chart for the School.

The Board of Trustees will be composed of three to five persons whose basic function will be the control and surveillance of the economic resources of the School. The Board of Directors will consist of approximately 12 members, of which the members of the Board of Trustees, ex officio, will be a part. The basic function of this group will be to select and appoint the Director and to formulate academic and administrative policies under which the Director will develop and manage the institution. The Director will appoint faculty members and principal administrative officers with the consent of the Board of Directors. Other staff will be appointed by the Director. The Board of Trustees will meet at least once a year and the Board of Directors at least four times a year.

Assistance in identifying potential candidates for membership on the Board of Directors will be provided by California Polytecnic State University. The final selection of Board members will be made by AID, W.K. Kellogg Foundation, and the Government of Costa Rica. Initial appointments will be made for different lengths of time in order to establish a pattern of staggered terms of office. Normal terms will be for six years with the provision that members may be reappointed for additional terms of office. After the initial appointment, all subsequent appointments will be made by election of members of the Board themselves.

FIGURE 3

AGRICULTURAL SCHOOL ORGANIZATION CHART



a. Faculty and Staff

No set of decisions will have a greater impact on the quality of this institution and its graduates than the decisions on hiring faculty. Therefore, it is essential that high standards be set for recruitment and selection. Following the learning-by-doing philosophy and model, the expected ratio of students to faculty will be 9 to 1.

This ratio will permit instruction accross the breath of the planned curriculum at the level of sophistication expected of a high quality, baccalureate degree program. For effective instruction, class size will not exceed 30 students. To accomodate a student body of 400 students planned for the School, the faculty and administrative staff will number approximately fifty when the School reaches full operation. Faculty members will be expected to provide 12 weighted teaching units (wtu) of instruction each week plus 3 wtu of other assigned responsibilities such as supervision of student activities, student academic and personal advisement, and other duties as assigned.

Criteria for the recruitment and selection of the faculty have been developed with the assistance of the task force and will provide a qualified international faculty with practical and academic experience.

b. Student Body

The target student population will be from all classes of society who qualify according to merit entrance examinations and interviews by country selection committees. Finally, the student body will be almost entirely from the CA/P region, while it is expected that the composition of the student body will eventually become more international, students from the region will continue to form the majority of the population. For a student to be accepted into the School, he or she will not only be academically qualified but will also demonstrate interest and country need for learning about humid tropic agriculture.

No shortage of applicants for the School will exist and every effort will be made to attract the best candidates and to select them on the basis of fair, objective, efficient and uniform criteria and procedures. The School will admit 100 freshmen a year when operating at full capacity, but will start with 75 in its early, formative years.

c. Infrastructure

1) Land

Since the School will be a teaching agricultural School, sufficient land will be purchased not only to build

the necessary infrastructure, i.e. dormitories, classrooms, faculty housing, administrative buildings, etc., but land will also be needed for agricultural purposes, including for teaching and commercial agricultural production. Sections of land will be used by students for projects and some areas will be left untouched and allowed to continue in their natural state to better understand the humid tropical ecosystem. Approximately 3,000 hectares has been determined to be adequate to meet the needs of the School.

Upon studying the different geographic locations the humid tropic zones of Costa Rica, the task force recommended the area near the city of Guapiles to the Northeast of San José. This area is preferred because of the infrastructure available, e.g. the close proximity to San Jose and CATIE, the better environment, an airport, a hospital and better living conditions adequate for support staff and faculty. The Banana Growers Association (ASBANA) and the Ministry of Agriculture (MAG) humid tropics agricultural experiment stations are also located in the Guapiles area. ASBANA has their crop diversification program located at this station due to the overall representation of the area that Guapiles offers relative to the humid tropics. Upon completion of the new highway this year, Guapiles will be only 45 minutes by car away from San Jose and less than an hour from CATIE. Even though faculty will be housed at the School, the proximity to San Jose will improve the living conditions for dependents, because of access to good high schools, shopping and cultural activities. It is expected that these characteristics will improve the chances of recruiting more permanent qualified faculty.

2) Building and Facilities

The School will have academic buildings and facilities, housing for faculty and staff, housing for students, dining and recreational facilities, health unit, elementary school, guest house, laundry, greenhouses, storage units, farm machine shops and other farm buildings. Construction will take place in phases according to the growth and necessities of the school. Initially the most important buildings will be those academic buildings and facilities that are needed for the first year's curriculum: student dormitories and dining halls, farm buildings required by the program, residences for the initial faculty and administrative staff and outdoor sport facilities.

A small apartment building will be built in San Jose and will be used as the School's San Jose base. During the initial phase, this building will be used to house faculty, staff and short term consultants who are involved in the early development of the School. After the School is completed, this building will be very useful as a place where staff and faculty can stay or meet in San Jose, or for other exigiencies, such as the illness of a child that requires hospitalization and special medical attention.

A complete equipment list has been developed for the School (see Exhibit B). The equipment consists of all that is necessary, for instruction, physical plant and farm operation. Some of the equipment will have to be imported, however, a large portion can be either purchased or built using local currency in Costa Rica. The purchase of the equipment will be over a period of four years and will be according to the curriculum, construction and farm development needs.

C. Summary Financial Analysis

1. CATIE

As a non-profit organization, CATIE's operational objective is to match income with expenses while placing what is possible into an operational reserve. In doing so, CATIE is able to maintain the research, training and technical outreach activities of the institution. Prior to 1982, CATIE continiously fell short of that objective and was often forced to operate through deficit financing. The net result was an uncertain financial picture which threatened the ability of the institution to function effectively in carrying out its three primary activities.

Beginning in 1981, CATIE placed top priority on improving its financial situation. A first step was to embark on an austerity program in which expenditures were reduced to a minimum while measures to control long-term costs more effectively were studied. In addition, ROCAP contracted with the local Price Waterhouse firm to conduct an exhaustive review of the financial and administrative mechanisms at CATIE. A series of recommendations made by Price Waterhouse have been developed and accepted by CATIE. Also, CATIE now has an Administrator on the staff whose primary function is to oversee the financial operations of the institution.

Due to the policies instituted in 1981, CATIE's 1982 Statement of Income and Expenses shows an excess of income over expenses in 1982 and 1983, with the deficits from previous years completely eliminated (see Table 10).

As indicated in Table 10, CATIE has continued to maintain a surplus in each succeeding year.

In addition, the financial analysts on ROCAP's staff periodically visit CATIE to review matters related to the financial status of ROCAP projects as well as other financial matters which may arise. As a result, the Mission is completely current on the financial situation at CATIE and can state that CATIE has adequate accounting systems, sufficient administrative expertise and financial capability to undertake the proposed project.

a. Budgetary Analysis

CATIE relies on quota payments from member countries ($250,000 per year), an annual contribution from IICA (currently $1.0 million) and contributions from the international community for the majority of its core budget, which is used to meet basic operating expenses. In addition to these sources, CATIE generates income from the sale of agricultural crops, rental of on-campus residences and seed bank sales. The farm income has not been heavily relied upon because a significant percentage of it consists of export crops (coffee and sugar) for which world market prices fluctuate considerably, and which recently have been quite low.

TABLE I

CATIE
COMPARATIVE CONSOLIDATED INCOME AND EXPENDITURES FOR THE 1984 PERIOD

	1980	1981	1982	1983	1984 1/
INCOME					
Basic Activity Budget	2,992	2,872	2,558	2,706	3,123
Special Funds (Convenants)	4,996	4,467	5,377	5,461	6,171
TOTAL INCOME	7,988	7,339	7,935	8,167	9,294
EXPENSES					
Basic Activity Budget	3,883	2,185	2,053	2,684	3,522
Special Funds (Convenants)	4,996	4,467	5,377	5,461	5,544
TOTAL EXPENSES	8,879	6,652	7,430	8,145	9,066
Excess (Deficit) Income Over Expenses	(891)	687	505	22	228
Beginning of Year (Deficit) Surplus	(108)	(1,062)	(375)	130	152
Auditor's Adjustment	(63)	--	--	--	--
End of Year Surplus (Deficit)	(1,062)	(375)	130	152	380

1/ Unaudited figures

As a consequence, CATIE does not have a fixed minimum, guaranteed annual core budget and must maintain tight control of its normal day to day operations. As part of its financial, accounting, and administrative reorganization, CATIE has succeeded in its efforts to lower these costs. The net result of this is reflected in Table 11.

One recent policy change which has helped CATIE improve the financial stability of the institution, relates to the charging and collecting of an overhead fee on projects and contracts which require additional

administrative and logistic support. ROCAP, among others, encouraged CATIE to adopt this policy This is important for CATIE since, in 1982, approximately 76 percent of its total income came from contracts for project specific activities. In the past, most projects included only a small amount for such support, forcing CATIE to draw upon its core budget. In effect, CATIE was spending funds it did not have to support project activities. This was a major factor contributing to its financial difficulties. CATIE's Balance Sheet for the preceeding five years is presented in Table 12. The combined austerity measures and initiation of realistic overhead charges have contributed since 1982 to CATIE having a stronger financial viability over the longer-term.

Currently, CATIE has 39 agreements with international and national organizations totalling approximately $36 million. These resources are spread over the longer-term throughout the research, training and technical outreach activities of the institution. The finalized operating budget for CATIE in 1985 is as follows:

Activity	Core Budget	Agreements	Productive Activities	TOTAL
Governing Board	56,850	—	—	56,850
Administration	991,387	—	—	991,387
Admin.&Finances	1,511,980	—	263,016	1,774,996
Dept.of Production	693,043	3,591,133	101,973	4,386,149
Dept.of Animal Product.	464,517	378,500	17,674	860,691
Dept.of RNR		404,082	3,521,835	3,925,917
Dept.of Post Graduate/Train.	191,271	500,820	—	692,091
			TOTAL	12,685,081

TABLE 11

DETAILED INCOME AND EXPENDITURE STATEMENT

	1980	1981	1982	1983	1984[1/]
INCOME					
Member Quotas	844	923	990	1,211	1,257
Services and Assets Administration	712	754	482	590	1,266
Convenants & Contract Adm.	709	708	655	580	517
Special Funds for Covenants & Contr.	4,996	4,467	5,377	5,461	6,171
Currency Fluctuations	415	142	-	-	-
Donations	-	64	141	46	25
Other Income	312	281	290	179	58
	7,988	7,339	7,935	8,167	9,294
OTHER COSTS AND EXPENSES					
General Direction	160	181	153	192	419
Technical Programs and Coordination	1,389	783	931	1,361	943
Support & Adm. Expenses	1,146	662	592	698	1,159
Substructure Expenses	-	-	132	-	-
Field Operations	433	241	179	355	374
Special Funds Programs	4,996	4,467	5,377	5,461	6,171
General Expenses	533	198	-	20	-
Financial Expenses	98	120	39	36	-
Asset Replacement	124	-	-	-	-
Currency Fluctuations	-	-	27	22	-
	8,879	6,652	7,430	8,145	9,066
Excess (Deficit) of Income Over Exp.	(891)	687	505	22	228

1/ Unaudited figures

TABLE 12

STATEMENT OF ASSETS, LIABILITIES AND GENERAL WORKING FUND

Assets	1980	1981	1982	1983	1984 1/
Cash and Banks	379	799	432	766	524
Investments	-	135	503	559	15
Accounts Receivable	401	463	494	645	1331
Inventories	195	247	172	165	97
Prepaid Expenses	19	1	5	-	-
Special Funds (Covenants & Contracts)	694	272	207	309	-
Other Assets	-	-	-	-	-
TOTAL ASSETS	1,688	1,917	1,813	2,444	1,967
Liabilities & Gen. Working Fund					
Loans Payable	390	-	-	-	-
Accounts & Other Expenses Payable	1,149	849	110	54	1,340
Provisions	558	672	882	1,011	247
Special Funds (Covenants & Contracts)	653	771	691	1,227	-
	2,750	2,292	1,683	2,292	1,587
Emergency Working Fund (deficit)	(1,062)	(375)	130	152	380
TOTAL LIABILITIES & GENERAL WORKING FUND	1,688	1,917	1,813	2,444	1,967

1/ Unaudited figures (Source: Administrative and Financial Unit)

b. Recurrent Costs Analysis

Recurrent dollar and local currency costs will be associated with the following activities: (a) retention of faculty (teaching), (b) continued operations of curriculum and administrative component, (c) maintenance of constructed facilities and equipment procured, and (d) continued support of project initiated fund raising activities. Fund raising costs begin to be absorbed in Year Four of the project and three faculty positions are absorbed beginning in Year Five of the project.

Total projected recurrent costs (combined US & local currency) have been tentatively calculated as follows:

($000)

Component	1989	1990	1991	1992	1993
1. Faculty and staff	154	155	820 1/	861	904
2. Curriculum/Admin	--	--	231 2/	242	254
3. Facilities Equipment	--	--	766 3/	804	844
4. Fund Raising	286	315	362	416	437
TOTALS	440	470	2,179	2,323	2,439 4/

Notes: 1/ Total project financed faculty total $820,000, or 46% of the costs for maintaining overall teaching faculty.

2/ Includes absorption of project financed administrative staff.

3/ Essentially maintenance costs on existing facilities.

4/ CATIE estimates that annual amounts beyond 1993 will remain constant except for a 5% adjustment for inflation and local currency fluctuations.

Under the local currency provided through 1993, CATIE will receive approximately the dollar equivalent of $13 million, of which $6.3 million will be utilized during the life of project. The remaining $6.7 million, combined with the projected $5.0 million to be generated by fund raising activities, will help meet the recurrent costs after the life of the project. Under a separate USAID/CR local currency Project entitled "Coffee Diversification and Technification", loan financing will be provided to approximately 11,000 small farmers. As part of that project, a trust fund totalling the equivalent of $20 million will be established over an eight-year period in CATIE's name. It is planned that interest income from that trust fund for CATIE will total approximately $6.3 million over the first six years. However, as CATIE will need up front financing for facilities development, staffing and other administrative support costs in initial years of this project, CATIE will forward finance these through advances activities against future interest earnings of this fund.

c. Method of Implementation and Financing

The direct reimbursement financing method will be used for all project expenditures. This method has been employed in all previous project with CATIE and is judged to provide good internal control with low

vulnerability. Given the regional nature of the project and that CATIE operates in many countries in the region, reimbursement will be made in U.S. dollars to a separate bank account which CATIE will maintain for the project in the United States.

Based upon periodic assessments of the accounting and internal control systems of CATIE by both independent auditors and ROCAP financial analysts, a Certified Summary Disbursing Report, accompanied by a SF-1034 to process reimbursement to the institution, is accepted by ROCAP's Controller's Office to document project expenditures. Post payment reviews are performed by ROCAP's Financial Analysts based on randomly selected samples of vouchers which are large enough to provide reasonable assurance that the voucher approval is correct and well supported by appropriate documentation.

As a non-profit institution with a limited internal cash flow available to apply to project activities, advances are required to assure adequate implementation of project activities. The amount of each advance is based upon Treasury and AID guidelines and is only for immediate disbursing needs. This procedure is currently used under other ROCAP-financed projects with CATIE, and experience has shown that it is effective and can be carefully controlled.

d. Audit Coverage

As a regional institution with funding received from many sources, CATIE policy requires an independent annual audit and submits copies to ROCAP upon completion. Included in the 1982 audit, at ROCAP's request, was a detailed review of ROCAP project costs. This information is to be included in all future annual audits. Additionally, ROCAP financial analysts perform periodic reviews of CATIE's internal control and voucher approval/processing system. In light of these procedures, it has been determined that there is no need for expanded audit coverage or tightened internal financial controls; therefore, no project funds have been budgeted for additional audits.

2. Agricultural School

The School will be established as a private, non-profit institution under special law to be passed by the Legislative Assembly of Costa Rica. As a non-profit institution, the School will work to maintain expenses at a level consistent with or lower than its income. All excess income will be placed in the local currency and dollar endowments to be established for the School and invested so as to provide a source of continued revenue.

This analysis examines the dollar and local currency funding available for the Agricultural School both during the ten-year life of project and for a ten-year period thereafter. The intent of the analysis is to demonstrate that the school will be financially viable in the sense that sufficient dollar and local currency resources will be available to cover recurring costs after AID project funding end.

a. Local Currency

The local currency funding will consist of two parts: (1) resources to meet start up costs associated with the purchase of land, construction of physical facilities and purchase of equipment available on the local market; and (2) resources to capitalize a local currency endowment which will generate income to cover operating expenses that can be financed with local currency.

The total local currency required will be $73.8 million equivalent, broken down between land ($6.0 million), construction ($15.7 million), equipment ($1.8 million) other expenses ($0.3 million) and the endowment ($50.0 million). These resources will be provided from local currencies created under USAD/Costa Rica's Economic Stabilization and Recovery Program.

Local currency start-up costs have been estimated based on prices in effect in 1985 with an inflation factor built in for construction activities and equipment purchases after the first year. Land costs were developed from a survey of land prices in the area between Guapiles and Limon where the school will be located. A total of 3,000 hectares at an average price of $2,000 per hectare. Construction costs were prepared in consultation with a Costa Rican A&E firm which has considerable experience in working in the humid tropics and has accurate cost data. Similarly, equipment costs were developed based on a survey of current market prices in the San Jose area. Based on the above considerations, the design team has determined that the start up costs of $23.8 million in local currency equivalent is sufficient to meet the requirements of the Agricultural School.

Local currency will also be used to capitalize an endowment to be created for the School. A total of $50 million equivalent will be deposited in equal installments in the endowment over the first two years of the project. The funds will be invested in short-term GOCR bonds which are projected to provide a real return of 4.5 percent. Currently, the GOCR is maintaining an interest rate schedule at approximately 4-5% above inflation and as part of policy dialogue with AID and other donors, has committed itself to keeping a positive rate in the future.

Given those conditions, a cash flow analysis was performed which shows that, beginning with the first year of the project, income generated from investments will be more than sufficient to meet operating expenses during the life of the project and all local currency recurring costs for ten years thereafter (Note, since these initial start up costs are financed by interest income from the endowment, they are not counted in the total life of project budget). As seen in Table 13, local currency operating expenses will not reach the level of income generated by the endowment until year nine which allows the endowment to increase its capital base over that period. Beginning in year nine and continuing through year 20, the income of the endowment will be slightly less than projected expenses, resulting in a slow decapitalization of the fund. However, the rate of decapitalization is such that it would be year 26 before the endowment would return to the starting level of $50 million equivalent.

From the above analysis, the design team has concluded that sufficient local resources will be available to meet all local costs of the School, including recurrent costs, for more than 20 years.

b. Dollar Costs

The project is designed to finance all dollar costs of the school for a ten-year period for two reasons: first, achieving the objective of creating a new institution requires a longer implementation period than the five years normally associated with AID projects; and second, the extended period of support will provide the school with additional time to develop and capitalize a dollar endowment from other sources which, after the AID assistance ends, will be available to provide dollar income on a continuing basis.

For the first 10 years, therefore, the project will finance all dollar costs, ($18.0 million), so that all other dollar income coming to the school will go to the endowment. The endowment will continue to capitalize itself over this period, with the first drawdown being made in year 11. From the detailed budgets that have been prepared for the Project (see Exhibit B), the recurrent dollar costs the school will face will be slightly more than $1.8 million annually. The endowment, therefore, must generate an income stream of at least that amount if the school is to meet its dollar costs.

The following assumptions were made regarding the sources of funding to accrue to the endowment:

- Using the EAP model, it is estimated that 20 percent of the students will receive full tuition scholarships and that the remaining students will pay 30 percent of their tuition costs. For the eight year period beginning with the entrance of the first class, tuition income will generate approximately $6.2 million.

- Fund raising activities, coordinated by a staff member of the college, will generate $3.0 million.

- In the final three years of the project, the School's farm will produce a total income of $900,000 from earnings on export crops sold.

In addition to these sources, the Government of Costa Rica has agreed to exchange $5.0 million for local currency which will constitute the initial capitalization of the endowment.

Table 13 shows the projected growth of the endowment, which after the ten-year life of the project will have reached a level of approximately $19.7 million. The dollar funds will be placed in a U.S. trust account and will be invested in accordance with the policies established by the School's Board of Trustees. It is expected that a real return of 4.5 percent on investment will be realized.

Beginning in year 11, recurrent dollar costs will be paid from the income of the endowment. As seen in the Table, the income of the endowment will be less than that of dollar cost requirements. However, since income from tuition payments and farm production will continue to accrue to the endowment, sufficient funds will be available not only to cover dollar costs but also to allow the endowment to continue to capitalize although at a much reduced rate. Thus, after 10 years of covering all recurrent dollar costs, the endowment will have grown from $19.7 million to $25.8 million and will continue to grow in the future.

TABLE 13
AGRICULTURAL SCHOOL DOLLAR ENDOWMENT
($000)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
1. LC to Dollars by GOCR	--	5000	--	--	--	--	--	--	--	--
2. Farm Production	--	--	--	--	--	--	--	300	300	300
3. Matriculation Fees	--	--	327	484	646	810	901	972	1605	1124
4. Fund Raising & Other			500	500	500	500	500	500		
5. Beginning Balance		5000	6052	7308	8783	10488	12361	14690	16716	18892
6. Real Interest 4.5		225	272	329	395	472	556	661	752	850
7. Total Income		5225	6324	7637	9178	10960	12918	15351	17468	19742
8. Recurrent Cust After EDP	--	--	--	--	--	--	--	--	--	--
9. Ending Balance		5225	6324	7637	9178	10960	12918	15351	17468	19742

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1. LC to Dollars by GOCR	300	300	300	300	300	300	300	300	300	300
2. Farm Production	1124	1124	1124	1124	1124	1124	1124	1124	1124	1124
3. Matriculation Fees	--	--	--	--	--	--	--	--	--	--
4. Fund Raising & Other	--	--	--	--	--	--	--	--	--	--
5. Beginning Balance	21166	21661	22177	22717	23282	23871	24487	25131	25804	26507
6. Real Interest 4.5	952	975	998	1022	1048	1074	1102	1131	1161	1193
7. Total Income	22119	22635	23175	23740	24329	24945	25589	26262	26965	27700
8. Recurrent Cust After EDP	1882	1882	1882	1882	1882	1882	1882	1882	1882	1882
9. Ending Balance	20237	20753	21293	21858	22447	23063	23707	24380	25083	25818

AGRICULTURAL SCHOOL LOCAL CURRENCY ENDOWMENT
($000)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
1. Beginning Balance	25000	50274	52003	53502	54701	55601	56155	56490	56658	56540
2. Real Interest at 4.5%	562	2262	2340	2408	2462	2502	2527	2542	2550	2544
3. Operating Expenses	288	534	841	1209	1561	1948	2192	2374	2668	2803
4. Ending Balance	25274	52003	53502	54701	55601	56155	56490	56658	56540	56281

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1. Beginning Balance	56281	56011	55728	55433	55124	54802	54465	54113	53745	53361
2. Real Interest at 4.5%	2533	2520	2508	2494	2481	2466	2451	2435	2419	2401
3. Operating Expenses	2803	2803	2803	2803	2803	2803	2803	2803	2803	2803
4. Ending Balance	56011	55728	55433	55124	54802	54465	54113	53745	53361	52959

From this analysis, the design team has determined that sufficient dollar resources can be mobilized by the School to create an endowment that will provide sufficient income to meet all recurring dollar costs.

The conclusion reached from this analysis, therefore, is that the School is financially viable and will be able to function in the future without additional financial flows from AID.

D. Summary Social Analysis

1. Socio-Cultural Context

Agriculture has long been a major source of wealth and employment in the CA/P region. Despite experiencing a reduction in relative importance compared to other sectors of the region's economies, the agriculture sector continues to represent an important element of economic and political stability as well as a critical source of foreign exchange earnings. Being a major source of wealth, land ownership is also a major source of economic inequality. The concentration of land ownership and control in the region is great. However, increases in the agricultural efficiency of small producers, in concert with land reform and the prospect of the opening up of new lands in the lowland tropics, offer hope for the amelioration of some of these economic inequalities.

The proposed project will impact three elements of the region's socio-cultural context: population trends, education and malnutrition. The CA/P countries are among the most rural in the world, with 45 to 63 percent of their populations living in rural areas as compared to 22 percent of the population of industrial market economies (see Annex II.C., Table 3). Food production per capita in 1980-82, however, was substantially below 1969-71 levels in Honduras and Nicaragua. Only in Guatemala did per capita food production rise as rapidly as in the industrial countries. While starvation is rare, malnutrition is endemic, particularly in rural areas. Substantial increases in the food supply will be necessary to help offset the region's projected population growth, which will expand from 24.5 million in 1984 to 35.8 million in 2020 (an increase of 146 percent).

With respect to education, the percent of age group enrolled in higher education ranges from only 4 percent in El Salvador to 27 percent in Panama. While proportions of total enrollment in primary schools in industrial market economies are the same as in the CA/P region, the proportion enrolled in secondary and higher education in industrial market economies are substantially higher. Females in CA/P countries account for well under 50 percent of enrollments in higher education and under 10 percent in agricultural higher education.

2. Beneficiaries

The direct beneficiaries of the project will be the faculty, administration and students of both the Agricultural School and CATIE. The

prime beneficiaries are students whose level of skill and earning capacity will be enhanced by virtue of the project. Students are to be selected without regard for sex or the ability to pay. Consequently, social class background as a factor influencing admission will be reduced. Students will come from every country of the region. It will be the policy of the institutions to give preference, other factors being equal, to rural youth.

Due to population pressures, the tropical lowlands have already begun to be occupied and will, increasingly, be the destination of a significant number of internal migrants in search of land to farm or in search of farm employment. If these lands are to be used efficiently, with adequate safeguards against soil degradation and erosion, training will need to be given in the appropriate agricultural practices and the appropriate technologies diffused.

Other sectors will also be favorably affected by the infusion into the societies of the region of an expanded supply of trained agricultural technicians. Data from a recent survey illustrate that graduates of the University of Costa Rica and of the EAP are employed in a great variety of public agencies and priate sector enterprises and, in addition, a significant fraction is self-employed. A majority have experience in the tropical lowlands and believe in the potential of this area. It is clear that manpower trained in agriculture has a broad impact on the society and on the economy. The strengthening of the human resource base in agriculture will have a positive impact on the social and economic well-being of the region as a whole.

E. Summary Economic Analysis

The CA/P region in recent years has been characterized by a series of disruptive socio-political, economic and ecological issues which have led to a reversal of economic growth rates and attendant increases in unemployment, underemployment and poverty. Political instability has led to declining domestic and foreign investments which have been partially responsible for increasing rates of inflation and increasing food imports. These negative conditions have been further compounded by continued low prices for traditional exports and high population rates.

These forces have triggered an array of actions that have impacted and will continue to impact on the lowland areas of the region, and especially humid lowland tropics. Among these are increasing rates of migration, increasing numbers of landless families, an increased search for subsistence conditions, pressure for more land reform and, among others, poorly conceived and implemented colonization activities.

The high rates of rural to rural migration to the humid tropics is likely prompted by high expectations. A reliable data set on such migration does not exist; however, available evidence indicates that migration rates are high and will likely continue. This trend in migration has been accompanied by several forms of ecological degradation: erosion, declining soil fertility, a changing mix of species and deforestation. A failure to address this situation will result in continual declines in real incomes associated with increased costs for subsistence or commercial agriculture in the humid tropics.

Reducing the ecological degradation, destruction of the natural resource base and the decline in real income caused by the use of inappropriate production technologies by migrants to the humid tropics depends in large part on building a science-based agriculture. To do so requires developing and maintaining an indigenous capacity to work in the agriculture sector. The investments in human capital and research proposed by the project, therefore, can have an enormous impact by generating necessary technologies, developing a system to deliver the technologies and increasing the rates at which such technology is adopted. Included among the areas where research can generate technologies to reduce ecological degradation and increase unit productivity are: land clearing, rotation and crop mixes, crop varieties selection, agroforestry, forestry, livestock management, no till-cultural systems and others.

Investments in agricultural education result in direct and indirect benefits that accrue to the individual, to the indigenous location and to external investors. Similarly, investments in research yield net benefits that impact on a region's foreign exchange balances, its competitive position and indirect benefits relating to social and political stability as real food prices show long-term declines.

As explained in greater detail in Annex II.D, evidence from similar projects indicates that the proposed agricultural education investments, even though long term in nature, can be expected to yield net returns above the opportunity cost of capital. A review of the literature on this subject, which is pertinent to the humid tropics, reveals net returns to research and educational investments on the order of 20 to 100%. The investment will alter the development process from historical patterns of expanding the amount of land being cultivated to a combination of increases in output per unit of input and income and employment multiplier effects from expanding factor and product markets. Migration and cultivated land expansion will continue to occur, but higher rates of economic development will arise when these lands and human resources also become technically and economically more efficient through knowledge and skills made possible by the application of improved, science-based agriculture methodologies.

VI. MONITORING AND IMPLEMENTATION

A. ROCAP Monitoring Responsibilities

ROCAP's Rural Development Office located in San Jose, Costa Rica, will have primary responsibility for managing CATIE component of the the project. The Rural Development Officer, or his designee, will serve as the project technical coordinator with day to day responsibility for monitoring implementation status. Within ROCAP, an implementation committee has been established with representatives from the Project Development and the Controller's offices. As needed, they will assist the Rural Development Officer in addressing any implementation issues that may arise.

From its experience with other projects, CATIE is familiar with the general administrative requirements, such as progress reports and financial controls, and has demonstrated its capacity to comply with them. In light of this experience, no administrative problems are anticipated.

B. USAID/CR Monitoring Responsibilities

Within USAID/CR, the Rural Development Office will have overall responsibility for monitoring the activities of each element of the Agriculture College component of the project. A USDH staff member of the office will be assigned as project manager for this purpose. The Mission's FSN engineer, however, will maintain direct contact with the A&E firm selected for the design of the new campus and, once construction starts, with the firm contracted to carry out the construction work. A project implementation committee will be named to assist the project manager and engineer address implementation issues as they arise. In addition to the project manager and engineer, the committee will have representatives from the Controller, Contract and Project Development Offices.

C. CATIE Monitoring Responsibilities

CATIE, through the Department of Graduate Studies and Training, will have overall responsibility for project implementation. The Director of the Department and the project-financed coordinator of the M.S. program will work, as required, with other relevant officers of CATIE to ensure that construction, procurement and ancillary project elements are carried out on a timely basis. It is envisioned that initial implementation will require daily consultations with the Director of CATIE and other administrative units.

After the project agreement is signed, CATIE will submit a time phased implementation plan for the first calendar year of the project. This will include faculty recruitment, construction, curriculum and administrative development, procurement, etc. The Project Manager for the project will be the project financed coordinator of the M. S. program. He will work closely with all faculty members and maintain close liasion with the individual technical departments. Finally, the Project Manager will serve as the contact for ROCAP staff on all implementation matters.

D. Agriculture School Responsibilities

The Board of Directors of the School will establish the basic policies and procedures to assure adequate controls over all aspects of operating the School. Among others, this will include personnel, financial and procurement management as well as general administrative guidelines. The Board will name a Director responsible for implementing the policies and overseeing daily activities. The Director will be the primary counterpart and, through the project manager, will provide necessary liaison between the Mission and the School.

For the purpose of monitoring the A&E and construction activities, the Director will be assisted by a resident engineer who will be hired by the School. The engineer will work directly with the Mission's engineer on all contruction-related activities.

E. Implementation Plan

1. CATIE

Given the need to undertake certain construction activities (eg. housing) prior to faculty recruitment, ROCAP and CATIE have agreed to adopt an initial start-up period to effectively plan and coordinate uses of dollar and local currency resources. Accordingly, the first 6 months following signature of the Project Agreement will be devoted to these effects. The single exception will be the recruitment of the coordinator, which will begin immediately upon satisfaction of conditions precedent. ROCAP staff, supplemented by project financed local currency financed contractors (primarily A & E related), will be available to assist CATIE as needed.

The schedule of all major events as they are currently planned over the life of the project is presented in Table 14. The project staff will, however, update the schedule each year as part of the annual work plans which are required. Changes will be based on progress to date and take into consideration factors not forseen at the time, including, as an example, delays in faculty recruitment.

2. Agriculture School

Implementation of the elements under this component of the project can be split between activities associated with the design and construction of the campus for the school and those related to staff and curriculum development. For the construction activities, a detailed schedule has been developed (Table 15), first with the target of completing Phase I in time for the start of the classes in January, 1987 and, subsequently, for completing all construction by late 1989. For the staff and curriculum development, key events over the life of project have been identified and are shown in Table 16. As implementation begins, project staff from the Mission and the School will revise this schedule. At a miminum, this will be once a year but, in the early stages of the project, is likely to be more often.

F. Procurement Plan

1. CATIE

CATIE will serve as its own agent for the procurement of goods and services required for the project. From its experience with previous ROCAP projects, CATIE is familiar with AID procurement regulations and, with limited assistance from ROCAP, has the capacity to carry out the planned procurement activities.

TABLE 14

CATIE
PROJECT IMPLEMENTATION PLAN

____ indicates a continuing, major emphasis
0 indicates a single event or an event which occurs at specific times
.... indicates an activity which occurs or may occur at times which cannot be specified at this point

ACTIVITY	85	86	87	88	89	90
A. Administration and coordination activities						
1. Sign initial project agreement CATIE/ROCAP	0					
2. Prepare initial implementation letters	0					
3. Prepare detailed work plan and budget for ROCAP approval	0	....	....	....	....	
4. Obtain first disbursement	0					
5. Preparation and finalization of implementation letters		___	___	___	___	___
6. Evaluations				0		0
B. Staff Development						
1. Search for, select and recruitment of teaching faculty	___					
2. Initial Faculty on Board		0				
3. All faculty on board		0				
4. Faculty teaching		___	___	___	___	___
C. Facilities and Equipment						
1. A&E design work and supervision	___	___	___	___	___	___
2. Development of Master Plan	0					
3. Undertake construction activities	___	___	___	___		
4. Initial procurement of lab. and farm equipment	___					
5. Continued lab equipment procurement		___	___	___	___	___
6. Vehicle Procurement	0					
D. Curriculum & Admin. Development						
1. Coordinator selected and employed	0					
2. Coordinator supervision of training		___	___	___	___	___
3. Director of Non-degree Training selected and employed	0					
4. Director of Non-degree Training supervising activities		___	___	___	___	___

ACTIVITY	85	86	87	88	89	90
5. Director of Alumni Affairs selected and employed		0				
6. Director of Alumni Affairs supervising activities			—	—	—	—
7. Non-degree (project financed) training carried out		—	—	—	—	—
8. Fund raising activities (project financed)	—	—	—	—		
9. Library materials procured	—	—	—	—	—	—
10. Curriculum TA					0	
E. Networking						
1. Institutional linkages are pursued (project financed)		—	—	—	—	—

TABLE 15

AGRICULTURAL SCHOOL

A&E IMPLEMENTATION CALENAR FOR THE BUILDING IN SAN JOSE AND FOR THE CAMPUS IN THE GUAPILES AREA

Activity	Date
1. Purchase of land in Guapiles area	April, 1985
2. Purchase of land in San Jose for building	April, 1985
3. Sign contracts for A&E and construction	May, 1985
4. Initiate design work for San Jose site	May, 1985
5. Initiate design work for Phase I constrution at main campus. Preliminary building plans of campus, Phase I begin.	July, 1985
6. Construction of San Jose building begins	July, 1985
7. Complete design and plans for Phase I construction	September, 1985
8. Initiate design work for Phase II construction at main campus	September, 1985
9. Construction begins on infrastructure for Guapiles site	October 1985
10. San Jose building completed	January, 1986
11. Phase I construction begins at main campus	February, 1986
12. Phase II construction begins at main campus	August, 1986
13. Phase I construction completed	October, 1986
14. Phase II construction completed	May, 1987
15. Phase III construction for campus begins	February, 1988
16. Phase III construction completed	October, 1988
17. Phase IV construction for campus begins	February, 1989
18. All construction activities completed	October, 1989

TABLE 16

AGRICULTURAL SCHOOL
IMPLEMENTATION CALENDAR

Activity	Date
1. Project Paper approved	March, 1985
2. Project Agreement signed	March, 1985
3. Initiate identification and naming of Board of Directors	March, 1985
4. Search for Director and initial administrative	April, 1985
5. First meeting of Board of Directors	April, 1985
6. Selection of Director by Board of Directors	May, 1985
7. Director brought on board	June, 1985
8. Initial staff brought on board	August, 1985
9. Costa Rican Legislative Assembly approves special law for Agricultural School	September, 1985
10. Institutional support contract signed with U.S. university	September, 1985
11. Local currency endowment established	September, 1985
12. Development begins	October, 1985
13. Recruitment of faculty begins	January, 1986
14. Faculty begins to come on bvoard	May, 1986
15. Student recruitment begins	June, 1986
16. All faculty for first year in place	November, 1986
17. First evaluation	November, 1986
18. First year classes begin	January, 1987
19. Second year faculty in place	September, 1987
20. Second year of classes begin	January, 1988
21. Third year faculty in place	September, 1988

TABLE 16 (Continued)

Activity	Date
22. Third year of classes begin	January, 1989
23. Fourth year faculty in place	September, 1989
24. Fourth year of classes begin	January, 1990
25. First graduating class	December, 1990
26. Second evaluation	January, 1991
27. Third evaluation	November, 1992
28. Final evaluation	November, 1994

a. Technical Services

Long and short-term services will be procured for the project. To satisfy these needs, CATIE will contract individually for each position. This is its normal practice a large pool of potential candidates from which to draw.

The long-term requirements consist of senior (Ph. D.) and junior (M. S.) staff. Some of the staff must be recruited from outside the CA/P region because few individuals with sufficient expertise are available in the region. It is expected that of the seventeen project-funded positions, most, but perhaps not all, will be filled from the U. S. As a result, it may be necessary to recruit certain members of the senior staff from other LAC or Code 941 countries. If so, requests for Code 941 waivers will be submitted to AID/W.

To recruit for these staff positions, as well as projected short term consulting services, CATIE will place announcements in newpapers and technical publications and the USAIDs will also be requested to identify potential candidates. Scopes of work will provided to all interested individuals. After reviewing each application CATIE will hire the most qualified individual for each position.

b. Commodities

Project financed commodities will be purchased by CATIE following the guidance provided in Handbook 11. Most of the project commodities will be purchased in the United States. Some, however, may be bought locally in the CA/P region. The detailed cost estimates in Exhibit A contains a list of the commodities needed to support the training and support services to be provided by the project. This includes computer equipment, audiovisual equipment, farm equipment, laboratory supplies, vehicles, etc.

2. Agriculture School

The School will serve as its own agent for the procurement of goods and services required for the project. Procurement procedures will be developed by the School administration with assistance from the Mission in order to assure that they are consistent with AID regulations. The Mission will also provide considerable follow-up assistance until it is satisfied that the procedures are well understood and being applied in all cases.

a. Personnel

The School will recruit to fill the faculty and administrative positions created by the project on an individual basis. Recruitment will take place primarily in the U.S. although up to 10 percent of the staff will be from the region. Assistance to help identify potential candidates will be provided by a U.S. university contracted for this purpose. The university will utilize its professional contacts and place announcements in newspapers and professional journals in order to develop the largest

possible pool of candidates. Scopes of work will be prepared for each of the positions and provided to all interested individuals. After reviewing each application, the college will hire the most qualified individual for each position.

As a new institution, the School must begin with the best staff possible if it is to gain a good reputation, in a relatively short period of time. Consequently, it may not be possible or desirable to recruit all faculty and administrative staff from the U.S. or within the region, although every attempt will be made to do so.

b. Commodities

Project financed commodies will be purchased by the School following the guidance provided by the Handbook 11. To the maximum extent possible, commodities will be purchased locally although a considerable amount of equipment will be bought from the U.S. Annex II.B contains a detailed list of all the commodities to be financed by the project and indicates whether they will be bought locally or in the U.S.

G. Evaluation Plan

1. CATIE

As project implementaion moves forward, it is anticipated that needs for modification will emerge. Regular monitoring and evaluation will have an important role in both the identification and implementation of these modifications. The project design includes two levels of reviews to maximize achievement of project objectives.

A final evaluation using contracted technical assistance will be conducted in 1988 to examine the progress of activities under each component. This will include (a) on examination of facilities constructed to ensure usage in support of training activities, (b) the appropriateness of the training to be provided (this will be augmented by technical assistance provided to each department at the start of that year), (c) type, mix and use of faculty recruited, (d) degree and benefit to which specialization courses and networking activities are being carried out, and (e) overall management of the project.

The second and final evaluation will occur in December, 1990, toward the end of the CATIE component of the project. It will focus on overall success of the project and also serve to be a planning tool for continuing appropriate project activities after the life of the project.

Complementing the formal evaluations will be quarterly reports and annual informal evaluation reports provided to ROCAP by CATIE. These will cover all major activities and accomplishments, including actual versus planned progress; factors affecting implementation; financial status; and, based on these, recommendations for activities during the next year. The ARDO and CATIE Project Manager, in consultation with the project implementation committee, will be responsible for designing the monitoring system that will

result in these reporting requirements being completed and ensuring that will they be useful in assessing progress and adjusting the content and focus of discrete project activities as appropriate.

2. Agriculture School

In that this component of the project will create a new institution, evaluations will have a crucial role in assessing project progress, determining the appropriateness and quality of training provided relative to that originally envisioned, and identifying potential problem areas which can be corrected before becoming well entrenched within the institutions. With this in mind, a series of four evaluations has been planned at key points over the life of the project.

The first evaluation will be conducted just prior to the initiation of classes in January, 1987. At that time, the staff required to start classes will be in place, all operating procedures will be defined and in effect, and construction sufficiently advanced to permit the start of classes. The evaluation will focus on the progress achieved versus the original activity schedule and a determination made on whether the schedule is too ambitious. If appropriate recommendations will be made on changes that will facilitate implementation as the project moves into formal training activities.

The second two evaluations will occur at intermediate positions in the life of the project when it will be possible to focus on the quality of the training, the composition of the student body and staff, the overall growth of the institution relative to projected at the design stage, and the financial situation of the School. The first evaluation will occur after year five when one class has graduated, and the second in year eight when the School will be operating at full potential. The second mid-point evaluation will also review the employment pattern of the first graduates of the School.

A final evaluation will be conducted toward the end of the project. The orientation of the evaluation will be on assessing the degree to which the objectives established for the School have been met. Of particular concern in the final evaluation will be the size of the dollar endowment that the School will establish and a further assessment of the employment patterns of the graduates.

H. Waivers

The ability of both CATIE and the Agricultural School to provide the highest level of training to their students will depend on the quality of the faculty to be financed by the project. While it is anticipated that most of the required faculty will be hired from the U.S. and from within the region, the possibility exists that both institutions will need to go to other countries in order to obtain the services of the best quality people. If this becomes necessary, requests for Code 941 waivers will be submitted to AID/W. No other waiver requirements are anticipated for the project.

I. Disbursement Procedures

No deviation from established AID disbursement procedures is anticipated. Funds will be disbursed upon presentation of monthly vouchers in the required format indicating expenditures made in conformance with the financial plan of the project. As described above in the Implementation Plan, updated annual work plans will be required. These will serve as a basic guide to control the flow of project funds.

J. Conditions, Covenants and Negotiating Status

1. CATIE

a. Conditions Precedent to Disbursement

1) First Disbursement

The standard conditions precedent to initial disbursement of the grant will apply, including the designation of official representatives for CATIE, and the provision of specimen signatures of the representatives. An additional condition precent to initial disbursement, other than for the hiring of a coordinator for the graduate program, will require CATIE to submit a detailed workplan for the first year of the project.

2) Subsequent Disbursements

A condition precedent to disbursement for construction activities will require CATIE to submit a master plan for facilities and maintenance and a detailed plan for all construction activities to be completed during the first year of the project.

b. Covenants

In addition to the standard covenant on evaluations, CATIE will covenant to: (1) provide annual work plans and budgets for review by ROCAP; (2) use its best efforts to maintain a student body characterized by a predominance of individuals from the Central America and Panama Region; (3) use its best efforts to ensure that financial need is taken into consideration when determining scholarship eligibility; (4) use its best efforts to ensure coordination with the governments of the region when formulating its institutional plan and strategies so as to be consistent with the human resource needs of the region.

c. Negotiating Status

The CATIE Director and his staff have participated actively in all phases of the development of this component of the project. No outstanding issues remain to be resolved and a Project Agreement can be signed immediately upon authorization of the Project. ROCAP is satisfied that funds can be obligated prior to March 31, 1985.

2. Agricultural School

a. Conditions Precedent to Disbursement

1. First Disbursement

The standard conditions precedent to initial disbursement of the Grant will apply.

2. Subsequent Disbursements

Conditions precedent to disbursement, other than for hiring the Director of the School, will include the submission of evidence that (a) the special law creating the School and granting it legal status in Costa Rica has been approved by the legislative Assembly; (b) the Board of Trustees and Board of Directors have been constituted and empowered in accordance with the law; and (c) a detailed work plan has been prepared.

b. Covenants

In addition to the standard covenant on evaluations, the School will covenant to provide annual work plans and budgets for review, by USAID/Costa Rica, and to use its best efforts to maintain a student body characterized by a predominance of individuals from the Central America and Panama region.

c. Negotiating Status

The GOCR has participated actively in all phases of the development of this component of the project. In addition, Costa Ricans from outside the government have been instrumental in the design process. No outstanding issues remain to be resolved and a Project Agreement can be signed immediately upon authorization of the Project. The Mission is satisfied that funds can be obligated prior to March 31, 1985.

ACTION ROCP INFO AMB DCM AID ECON CHRON/5

VZCZCGT0533
OO RUEHGT
DE RUEHC #8739/01 0470249
ZNR UUUUU ZZH
C 160243Z FEB 85
FM SECSTATE WASHDC
TO RUEHGT/AMEMBASSY GUATEMALA IMMEDIATE 2169
INFO RUEHSJ/AMEMBASSY SAN JOSE IMMEDIATE 3172
BT
UNCLAS STATE 048739

16-FEB-85
TOR: 19:54
CN: 64325
CHRG: RCCP
DIST: RCCP

AIDAC GUATEMALA FOR RCCAP (ADO JOSLYN)

E.O. 12356: N/A
TAGS:
SUBJECT: RCCAP REGIONAL AGRICULTURAL HIGHER EDUCATION (596-0129), PID

REF.: (A) PANAMA 00660 (B) TEGUCIGALPA 00450
(C) GUATEMALA 00660

THE DAEC REVIEWED AND APPROVED SUBJECT PID JANUARY 17, 1985. MISSION IS AUTHORIZED TO PROCEED WITH THE PREPARATION OF THE PROJECT PAPER IN ACCORDANCE WITH FOLLOWING GUIDANCE. PLEASE NOTE: 1) THE BUREAU HAS BEEN ADVISED BY LEGISLATIVE AFFAIRS AND GC THAT THE ESTABLISHMENT OF DOLLAR ENDOWMENTS FOR THE PROJECT IS NOT ADVISABLE AT THIS TIME. BUREAU HAS DECIDED NOT TO PURSUE THIS MATTER FURTHER. 2) BECAUSE OF THE DESIGN IMPLICATIONS OF THIS DECISION AND THE MANY ISSUES RAISED IN THE DAEC REGARDING IAAC (SEE BELOW), IT IS THE BUREAU'S RECOMMENDATION THAT MISSION TRADE 1984 SUPPLEMENTAL MONIES FOR 1985 FUNDING TO ALLOW TIME FOR A CAREFUL REVISION OF PROJECT DESIGN.

1. INTERAMERICAN AGRICULTURAL COLLEGE

A. PROJECT RATIONALE

1. THE PROJECT RATIONALE SHOULD PRESENT A STRONG CASE FOR THE AGRICULTURAL COLLEGE BASED ON THE PROJECTED EFFECTIVE DEMAND FOR ITS GRADUATES AND THE ROLE THE COLLEGE WILL PLAY IN THE AGRICULTURAL DEVELOPMENT OF THE REGION.

2. GIVEN THE LIMITED NUMBER OF GRADUATES FROM CENTRAL AMERICA PROJECTED FOR THE SCHOOL DURING ITS FIRST FIVE TO TEN YEARS OF OPERATION AND THE AMOUNT OF PROJECT FUNDING PROPOSED, THE RATIONALE SHOULD SHOW WHY THE PROJECT IS THE FASTEST, MOST COST EFFECTIVE MEANS OF ACHIEVING THE PROJECT PURPOSE AND FOR ADDRESSING THE CONCERNS OF THE NBCCA REGARDING CONDITIONS IN THE REGION IN GENERAL, AND THE STATUS OF HIGHER EDUCATION IN PARTICULAR.

B. GEOGRAPHIC FOCUS. THE PP SHOULD ELABORATE ON THE PROBLEMS ASSOCIATED WITH CURRENT SETTLEMENT AND DEVELOPMENT TRENDS IN THE LOWLAND TROPICS OF CENTRAL AMERICA, WITH PARTICULAR REFERENCE TO HOW THE INTENDED PROJECT ACTIVITIES SHOULD ADDRESS THESE PROBLEMS. A STRONG JUSTIFICATION SHOULD BE PROVIDED FOR AN AID INVESTMENT OF THIS TYPE AND SIZE WHICH FOCUSES ON THE LOWLAND TROPICS.

C. COMPETITION FOR RESOURCES. THE NEW AGRICULTURAL COLLEGE SHOULD NOT COMPETE FOR FUNDING, FACULTY, AND STUDENTS WITH OTHER, EXISTING INSTITUTIONS IN THE REGION. TO THIS END, OTHER INSTITUTIONS AND THEIR PROGRAMS IN THE REGION SHOULD BE EXAMINED AND APPROPRIATE MECHANISMS (SALARY SCALES, TUITION, ADMISSION STANDARDS, RECRUITMENT PRACTICES, ETC.) SHOULD BE DESIGNED TO ASSURE THAT THE NEW COLLEGE NOT WEAKEN THOSE INSTITUTIONS. SPECIFICALLY, BUREAU ASKS THAT CONCERNS EXPRESSED IN TEGUCIGALPA 00450 BE FULLY ADDRESSED IN PP:

1. IN LIGHT OF THE ASSERTION BY USAID/HONDURAS THAT A) THE FIRST TWO YEARS OF AGRICULTURAL EDUCATION WOULD BE SIMILAR FOR BOTH DRYLAND AND HUMID TROPICS (PARAGRAPH 6A), B) PAAS (ZAMORANO) HAS THE PHYSICAL PLANT TO DOUBLE ITS STUDENT BODY (PARAGRAPH 8), AND C) PAAS BELIEVES IT WOULD BE MOST COST EFFECTIVE TO ESTABLISH A SEPARATE CAMPUS IN COSTA RICA UNDER PAAS DIRECTION (PARAGRAPH 6B), MISSION IS ASKED TO TAKE ANOTHER LOOK AT THE NEED FOR IAAC AND ITS CURRENT DESIGN AS PROPOSED IN THE PID.

GRICULTURAL COLLEGE PROVIDE FREE EDUCATION THROUGH THE ENDOWMENT TO ALL STUDENTS WHO ENTER IAAC, USAID/HONDURAS IS CONCERNED THAT PAAS WILL BE IN UNFAVORABLE POSITION IN ATTRACTING THE BEST STUDENTS AND QUESTIONS THE LONG TERM QUOTE VIABILITY UNQUOTE OF PAAS (PARAGRAPH 6C).

THE PP SHOULD PROVIDE A STRONG JUSTIFICATION FOR THE DECISION TO PROCEED WITH AN ENTIRELY NEW AGRICULTURAL SCHOOL AND REFLECT A CONSIDERATION OF THE ISSUES RAISED BY USAID/HONDURAS.

D FUNDING CONSIDERATIONS. THE PP SHOULD EXAMINE CAREFULLY THE FUNDING PROVISIONS FOR THE COLLEGE TO ASSURE THAT BUDGETED AMOUNTS ARE ADEQUATE AND THAT PROJECTED INCOME FROM THE COLON ENDOWMENT BE SUFFICIENT TO COVER RECURRING COSTS AFTER THE END OF THE PROJECT. THE NEW INSTITUTION MUST LIVE WITHIN ITS MEANS. MISSION SHOULD INCLUDE A RIGOROUS COST/REVENUE ANALYSIS IN PP WITH COMPLETE EXPLANATION OF KEY ASSUMPTIONS.

OF EQUAL INTEREST IS THE QUESTION OF OTHER FUNDING SOURCES, PARTICULARLY THOSE FROM PRIVATE SECTOR AND OTHER

GOVERNMENT SOURCES IN LATIN AMERICA, AND HOW MUCH THESE OTHER SOURCES MIGHT BE EXPECTED TO CONTRIBUTE TO THE SCHOOL. A STRATEGY FOR THE INVESTMENT OF ENDOWMENT MONIES SHOULD BE DEVELOPED AND DRAFT AGREEMENTS SHOULD BE PREPARED WHICH OUTLINE THE STRATEGY FOR INVESTMENT AND FOR THE USE OF INTEREST INCOME. A DETERMINATION SHOULD BE MADE CONCERNING A.I.D. PARTICIPATION ON THE BOARD OF DIRECTORS AND THE DEGREE TO WHICH A.I.D. WILL EXERCISE CONTROL OVER THE ENDOWMENT FUND.

E. BENEFICIARIES. AGRICULTURAL SYSTEMS AND CROPS APPROPRIATE TO SMALL TO MEDIUM SIZED, FAMILY OWNED AND OPERATED FARMS SHOULD BE THE MAJOR FOCUS OF THE TRAINING ACTIVITIES.

F. STUDENT BACKGROUND. THE AGRICULTURAL COLLEGE SHOULD BE A REGIONAL INSTITUTION WITH A MULTINATIONAL, PREDOMINANTLY CENTRAL AMERICAN STUDENT BODY. ALL SOCIOECONOMIC CLASSES SHOULD BE REPRESENTED AND THERE SHOULD BE AN ACTIVE EFFORT TO RECRUIT STUDENTS FROM LOW INCOME RURAL FAMILIES.

G. GOAL STATEMENT. AGRICULTURAL SELF SUFFICIENCY SHOULD NOT BE AN ANCILLARY GOAL OF THE PROJECT.

H. STUDENT SCHOLARSHIPS. THE BUREAU FEELS STRONGLY THAT SCHOLARSHIPS FOR STUDENTS SHOULD BE BASED ON NEED. THOSE STUDENTS ABLE TO PAY SHOULD BE REQUIRED TO DO SO. ALL STUDENTS SHOULD PAY SOMETHING REGARDLESS OF NEED.

2. CATIE GRADUATE TRAINING STRENGTHENING

A. CATIE PRIORITIES. THE LONG TERM INSTITUTIONAL PRIORITIES OF CATIE SHOULD BE DISCUSSED IN THE PP AND PROJECT ACTIVITIES JUSTIFIED IN RELATION TO THESE PRIORITIES. MEMBER COUNTRIES AND OTHER DONORS SHOULD BE CLOSELY CONSULTED DURING PP PREPARATION.

B. CATIE STRATEGY. THE PP SHOULD ELABORATE ON THE RELATIONSHIP BETWEEN THIS PROJECT AND ROCAP'S LONG TERM STRATEGY FOR CATIE. ALSO, THE PP SHOULD DESCRIBE HOW THIS PROJECT WILL TIE IN WITH OTHER AID SPONSORED PROJECTS CURRENTLY UNDERWAY AT CATIE. EVERY EFFORT SHOULD BE MADE TO ACHIEVE ECONOMIES THROUGH THE CREATIVE INTEGRATION OF A.I.D. FUNDED PROJECT ACTIVITIES AND THE MOST EFFICIENT USE OF A.I.D. PURCHASED VEHICLES AND EQUIPMENT.

C. STAFF REQUIREMENTS. INCREASING THE NUMBER OF FACULTY FOR THE ENHANCED GRADUATE TRAINING EFFORT SHOULD BE DONE ONLY AS A LAST RESORT. CATIE SHOULD CONSIDER UTILIZING ITS CURRENT STAFF, INCLUDING RESEARCHERS, TO BETTER ADVANTAGE. IF CURRENT CONTRACTS RESTRICT THE TEACHING ACTIVITIES OF RESEARCHERS, CONTRACTS SHOULD BE RENEGOTIATED TO ALLOW RELEASE TIME FOR TEACHING IN THE NEW GRADUATE TRAINING ACTIVITES. THE ADDITION OF NEW MONIES SHOULD BE ACCOMPANIED BY A QUID PRO QUO FROM CATIE IN THE FORM OF TIGHTER MANAGEMENT AND BETTER STAFF

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UTILIZATION.

3. GENERAL GUIDANCE

A. AGRICULTURAL COLLEGE - CATIE COOPERATION. THE PP SHOULD DETAIL THE KINDS OF COOPERATION/INTERACTION BETWEEN CATIE AND THE AGRICULTURAL COLLEGE WHICH ARE CONTEMPLATED. THE MECHANICS OF THIS ACTION SHOULD BE SPELLED OUT IN THE PP.

B. BILATERAL MISSION INPUT. IN ADDITION TO THOSE ALREADY CITED, THE MISSION IS ASKED TO GIVE CAREFUL CONSIDERATION TO THE CONCERNS OF THE BILATERAL MISSIONS AS EXPRESSED IN REF CABLES. THE VIEWS OF THOSE MISSIONS WHICH HAD NOT RESPONDED TO ROCAP PRIOR TO THE PID REVIEW,

SHOULD BE TAKEN INTO ACCOUNT AND SHOULD BE CONTAINED IN THE PP. A.I.D. POLICY AND PROGRAM GUIDANCE ON HUMID TROPICAL FORESTS CONTAINED STATE 328482 (1984) SHOULD BE CONSULTED TO ASSURE PROJECT CONFORMITY TO AGENCY POLICY

C. PAYMENT VERIFICATION. THE MISSION IS REMINDED THAT ALL PROJECT PAPERS MUST FOLLOW THE GUIDANCE PROVIDED ON PAYMENT VERIFICATION POLICY PROVIDED BY AA/M TO MISSION DIRECTORS ON DECEMBER 30, 1983, PARTICULARLY PP. 6-8 WHICH DEAL SPECIFICALLY WITH PP.

D. EVALUATION PLAN. A DETAILED PROJECT EVALUATION PLAN SHOULD BE PRESENTED IN THE PP.

E. GRAY AMENDMENT. GRAY AMENDMENT PRESCRIPTIONS AND PROSCRIPTIONS SHOULD BE CAREFULLY CONSIDERED DURING PP PREPARATION. A PLAN FOR THE UTILIZATION OF MINORITY AND WOMEN OWNED BUSINESSES SHOULD BE PRESENTED IN THE PP.

F. PARTICIPATION OF WOMEN IN PROJECT. THE PP SHOULD DESCRIBE THE PROJECTED IMPACT OF THE PROJECT ON WOMEN AND

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THE WAYS IN WHICH WOMEN WILL PARTICIPATE IN AND BENEFIT FROM PROJECT ACTIVITES.

AFTER CONSIDERATION OF ABOVE, MISSION MAY DECIDE IT EXPEDIENT TO DIVIDE THE PROJECT INTO TWO SEPARATE PROJECTS TO FACILITATE DESIGN AND IMPLEMENTATION. BUREAU WILL LEAVE DECISION TO MISSION. IF DECISION IS MADE TO TRADE 1984 SUPPLEMENTAL MONIES FOR 1985 FUNDING, LAC/DP MUST BE NOTIFIED NO LATER THAN 25 FEBRUARY 1985.
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ANNEX I. B.

LOGICAL FRAMEWORK
REGIONAL AGRICULTURAL HIGHER EDUCATION
596-0129

NARRATIVE SUMMARY	OBJECTIVELY VERIFICABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Goal:			
To increase the agricultural productivity in Central America and Panama, thereby enhancing rural economic growth and employment opportunities	Positive GDP growth in the region's agriculture and employment generation.	Comparison with existing production and employment baseline data.	Central America and Panama ecosystems are conducive to increased levels of of agricultural production
Purpose:			
To produce a professional human resource base with practical and educational experiences needed to address the agricultural production problems of the Central American and Panama Region.	1. Establishment of a "learning-by doing" Agricultural School. 2. Strengthened and expanded CATIE graduate and professional programs, 3. Increased availability of appropriately trained professionals.	1. and 2. Site visits, annual reports, project status repots, etc. 3. Increased graduate employment in relevant government, private and academic institutions.	To overcome the productivity problems of this area, more and better qualified professionals are needed. Demand exists for these professionals as evidenced by increased employment of graduates.
Outputs:			
1. Creation of the InterAmerican Agricultural School and 2. Expansion and streng thening of CATIE's capacity to train graduate students and professionals, resulting in an increased human resource base in lowland tropical agriculture.	1. At end of project status up to 400 students enrolled in undergraduate 2. 30 new and additional graduate per annum, at CATIE, and 3. Up to 3,500 other professionals trained by CATIE.	Annual reports, project status reports, site visits, increased usage of students assistance packages, etc;	In addition to above demand asumptions, project assumes students are available for training proposed and demand for short-term CATIE professional training exists within the region.

NARRATIVE SUMMARY	OBJECTIVELY VERIFICABLE INDICATORS			MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs:	Agricultural School	CATIE	TOTAL	The inputs will be verified as part of project implementation and monitoring	Foreign exchange and local currency financing are available and provided for as needed.
		(US$)			
1. Staff development	9,803,000	3,221,000	13,024,000		
2. Facilities/Equipment	5,822,000	1,061,000	6,883,000		
3. Curriculum & Administrative Development	90,000*	1,932,000	2,022,000		
4. Networking	1,872,000	300,000	2,172,000		
5. Miscellaneous/Contingency	213,000	426,000	639,000		
6. Evaluation	200,000	60,000	260,000		
TOTALS	18,000,000	7,000,000	25,000,000		

*W.K. Kellogg Foundation will supply funds for the curriculum and administrative development of the School.

5C(2) PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only: B.1. applies to all projects funded with Development Assistance Funds, B.2. applies to projects funded with Development Assistance loans, and B.3. applies to projects funded from ESF.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1. FY 1982 Appropriation Act Sec. 523; FAA Sec. 634A; Sec. 653(b).

   (a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that amount)?

   a) Congressional Notification process.

   b) Yes.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,00, will there be

(a) engineering, financial or other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?	a) Yes. b) Yes.
3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?	Law to create Agricultural School has been submitted by Executive Branch to Legislative Assembly. President Monge has made passage of law a priority item for next session of Assembly.
4. FAA Sec. 611(b); FY 1982 Appropriation Act Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973? (See AID Handbook 3 for new guidelines.)	N/A
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?	Yes.

9b

6.	FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.	Project is a regional effort.
7.	FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	a. No. b. Yes. c. No. d. No. e. Yes. f. No.
8.	FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	U.S. universities and technical assistance will be utilized and commodities will be purchased from U.S. private enterprise.

9.	FAA Sec. 612(b), 636(h); FY 1982 Appropriation Act Sec. 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.	The programming of ESF local currency generations in Costa Rica was carefully considered in calculating the cost estimates and financial plan for this project.
10.	FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?	No.
11.	FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?	Yes.
12.	FY 1982 Appropriation Act Sec. 521. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?	N/A
13.	FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16? Does	Yes.

the project or program take into consideration the problem of the destruction of tropical forests?	Yes.
14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)?	N/A

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and	a) The project will expand the CA/P region's human resource base in order to develop, adapt and disseminate technologies which are necessary for increasing agricultural productivity. b) N/A

otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?	c) The Ministers of Agriculture of the CA/P countries have requested assistance to expand the human resource base in the agriculture sector. d) Every effort will be made by the two institutions of higher learning involved in this project to avoid discrimination by sex in student enrollment process. e) Project is a regional effort.
b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used?	Yes
c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?	Yes
d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activitiy with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?	Yes

e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"? (M.O. 1232.1 defined a capital project as "the construction, expansion, equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not less than $100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character.

Yes. A Congressional Notification has been submitted.

f. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

Yes.

g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage

The project utilizes the region's intellectual resources to strengthen the institutional capability of the region to meet the demand for a highly trained human resource base in agriculture.

institutional development; and supports civil education and training in skills required for effective participation in governmental processes esential to self-government.

2. Development Assistance Project Criteria (Loans Only)

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest. N/A

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan? N/A

c. ISDCA of 1981, Sec. 724 (c) and (d). If for Nicaragua, does the loan agreement require that the funds be used to the maximum extent possible for the private sector? Does the project provide for monitoring under FAA Sec. 624(g)? N/A

3. Economic Support Fund Project Criteria N/A

a. FAA Sec. 531(a). Will this assistance promote economic or political

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	stability? To the extent possible, does it reflect the policy directions of FAA Section 102?	
b.	FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities?	No.
c.	FAA Sec. 534. Will ESF funds be used to finance the construction of the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to nonproliferation objectives?	No.
d.	FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?	N/A

5C(3) - STANDARD ITEM CHECKLIST

Listed below are the statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by imposing limits on certain uses of funds.

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed?	Yes.
2. FAA Sec. 604(a). Will all procurement be from the U.S. except as otherwise determined by the President or under delegation from him?	Yes.
3. FAA Sec. 604(d). If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company?	Yes.
4. FAA Sec. 604(e); ISDCA of 1980 Sec. 705(a). If offshore procurement of agricultural commodity or product is to be	N/A

	financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.)	
5.	FAA Sec. 604(g). Will construction or engineering services be procured from firms of countries otherwise eligible under Code 941, but which have attained a competitive capability in international markets in one or these areas?	No.
6.	FAA Sec. 603. Is the shipping excluded from compliance with requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent that such vessels are available at fair and reasonable rates?	No.
7.	FAA Sec. 621. If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? If the facilities of other	Yes.

Federal agencies will be utilized, are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?	N/A
8. International Air Transport. Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available?	Yes.
9. FY 1982 Appropriation Act Sec. 504. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States?	Yes.
B. Construction	
1. FAA Sec. 601(d). If capital (e.g., construction) project, will U.S. engineering and professional services to be used?	No. Majority of construction costs will be in local currency not dollars.
2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?	Yes.

3. FAA Sec. 620(k). If for construction of productive enterprise, will agggregate value of assistance to be furnished by the U.S. not exceed $100 million (except for productive enterprises in Egypt that were described in the CP)?	N/A
C. Other Restrictions	
1. FAA Sec. 122(b). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?	N/A
2. FAA SEc. 301(d). If fund is established solely by U.S. contributions and administed by an internatioal organization, does Comptroller General have audit rights?	N/A
3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries?	Yes.
4. Will arrangements preclude use of financing:	
a. FAA Sec. 104(f); FY 1982 Appropriation Act Sec. 525: (1) To pay for performance of abortions as a method of family	a. (1) Yes.

planning or to motivate or coerce persons to practice abortions; (2) to pay for performance of involuntary sterilization as method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization; (3) to pay for any biomedical research which relates, in whole or part, to methods or the performance of abortions or involuntary sterilizations as a means of family planning; (4) to lobby for abortion?	
b. FAA Sec. 620(g). To compensate owners for expropriated nationalized property?	Yes.
c. FAA Sec. 660. To provide training or advice or provide any financial support for police, prisons, or other law enforcement forces, except for narcotics programs?	Yes.
d. FAA Sec. 662. For CIA activities?	Yes.
e. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained?	Yes.
f. FY 1982 Appropriation Act, Sec. 503. To pay pensions, annuities, retirement pay, or	Yes.

adjusted service compensation for military personnel?	
g. FY 1982 Appropriation Act, Sec. 505. To pay U.N. assessments, arrearages or dues?	Yes.
h. FY 1982 Appropriation Act, Sec. 506. To carry out provisions of FAA section 209(d) (Transfer of FAA funds to multilateral organizations for lending)?	Yes.
i. FY 1982 Appropriation Act, Sec. 510. To finance the export of nuclear equipment, fuel, or technology or to train foreign nationals in nuclear fields?	Yes.
j. FY 1982 Appropriation Act, Sec. 511. Will assistance be provided for the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?	Yes.
k. FY 1982 Appropriation Act, Sec. 515. To be used for publicity or propaganda purposes within U.S. not authorized by Congress?	Yes.

INITIAL ENVIRONMENTAL EXAMINATION

PROJECT LOCATION:	Central America and Panama
PROJECT TITLE AND NUMBER:	Regional Agricultural Higher Education - 596-0129
FUNDING:	$32 Million
LIFE OF PROJECT:	5 years (FY85-FY89)
IEE PREPARED BY:	Michael Deal, PDO, ROCAP
RECOMMENDED THRESHOLD DECISION:	Negative Determination

BY: John R. Eyre
TITLE: Acting Director, ROCAP
DATE: 12/27/84

I. Project Description

The goal of the project is to increase the agriculture productivity of the lowland tropics in Central America, thereby enhancing rural economic growth and employment.

The purpose of the project is to produce a professional human resource base with practical and educational experience needed to address the agricultural production problems of the lowland tropics.

The objective of this project is to overcome the lack of technology generation and agricultural human resources associated with lowland tropical agriculture through: 1) the creation of an Inter-American Agricultural College and 2) the strengthening and reorientation of CATIE's graduate and professional programs. With the resources to be provided under the project, these two institutions will be able to attract high-quality faculty and students and provide a vigorous and stimulating learning environment that has a production and problem-solving orientation.

For both the Agricultural College and CATIE the following five activities will be undertaken: (a) staff development; (b) facilities and equipment; (c) endowment fund; (d) curriculum and administrative development; and (e) networking.

II. Identification and Evaluation of Environmental Impacts

A. Education, Technical Assistance and Training Programs - Per Handbook 3, Appendix 2D, Section 216.2(c)(2)(i), educational, technical assistance and training programs not directly affecting the environment do not require an environmental assessment. The staff development, endowment fund, curriculum and administrative development and networking activities related to both the Agricultural College and CATIE components have no such direct effect on the environment.

B. Facility Development - Construction activities for the Agricultural College will consist of administration buildings, classrooms, laboratories, dormitories and dining areas. Under the CATIE component, construction of student dormitories, faculty houses, a graduate education building with class/seminar rooms and office, a computer center and a student

infirmary will be completed. For both components, local currency resources will finance the actual construction costs while project financed foreign exchange will be limited to imported construction materials and equipment. In order to insure that these construction activities do not result in any harmful consequences for the environment, the USAID/CR engineering office will carefully review all construction plans prior to completion of the PP. Any special concerns identified will be monitored during the course of project implementation.

An impact identification summary is provided in Attachment 1.

III. Conclusion and Recommendation

The concerns mentioned in Section II will be addressed during project design and implementation. As a result, no significant environmental effect will result from this project. It is recommended that no further environmental assessment be required and that a negative determination be made.

Attachment 1

Impact Areas and Sub-Areas	Impact Identification & Evaluation[1]
A. LAND USE	
1. Changing the character of the land through	
a. Increasing the population	N
b. Extracting natural resources	N
c. Land clearing	L
d. Changing soil character	N
2. Altering natural defenses	N
3. Foreclosing important uses	N
4. Jeopardizing man or his works	N
5. Other Factors	
_____	_____
_____	_____
_____	_____
B. WATER QUALITY	
1. Physical state of water	N
2. Chemical and biological states	N
3. Ecological balance	N
4. Other Factors	
_____	_____
_____	_____
_____	_____

1/N - No environmental impact
L - Little environmental impact
M - Moderate environmental impact
H - High environmental impact
U - Unknown environmental impact

C. ATMOSPHERIC

1. Air additives..... N
2. Air pollution..... N
3. Noise pollution..... N
4. Other factors

D. NATURAL RESOURCES

1. Diversion, altered use of water..... N
2. Irreversible, inefficient commitments..... N
3. Other Factors

E. CULTURAL

1. Altering physical symbols..... N
2. Dillution of cultural traditions..... N
3. Other Factors

F. SOCIO-ECONOMIC

1. Change in economic/employment patterns..... L
2. Changes in population..... N
3. Changes in cultural patterns..... N
4. Other Factors

G. HEALTH

1. Changing a natural environment..... L
2. Eliminating an ecosystem element..... N
3. Other Factors

H. GENERAL

1. International impacts..... N
2. Controversial impacts..... N
3. Larger program impacts..... N
4. Other factors

_____ _____
_____ _____
_____ _____

Luis Alberto Monge
Presidente de la República

San José, 5 de octubre de 1984
Casa Presidencial-Santa Ana
2235/84

Señor
Curtin Winsor, Jr.
Embajador de los Estados Unidos
de América
SU DESPACHO

Estimado señor Embajador:

Tengo el agrado de dirigirme a usted en esta oportunidad para plantearle algunas opciones que podrían ser consideradas dentro del programa de asistencia económica del Gobierno Norteamericano y que es administrado por AID. Hay dos ejes centrales en este planteamiento que busca soluciones permanentes al problema económico del país. El primero es el mejoramiento de la eficiencia institucional, y el segundo la creación y el fortalecimiento de un instrumento que pueda garantizar el desarrollo de la vocación agrícola costarricense.

Tomando en consideración la urgencia y necesidad de resolver los problemas creados alrededor de las empresas de CODESA, tanto los originados por razones propias de la entidad, como los de orden financiero que afectan al Banco Central de Costa Rica por el endeudamiento de esta corporación y que tienen una repercusión directa en todo el proceso de reactivación económica nacional, considero oportuno proponer a usted lo siguiente:

1.- Destinar parte importante de los recursos de apoyo financiero para realizar una transacción que permita aplicarlos a la adquisición de las empresas de CODESA, a través de un mecanismo que permita cancelar la deuda que agobia al Banco Central de Costa Rica y transferir al sector privado las instalaciones de estas empresas, dentro de las regulaciones legales vigentes y aprovechando la disposición política actual.

ANNEX I.G

CERTIFICATION PURSUANT TO SECTION 611(e) OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Daniel A. Chaij, the principal officer of the Agency for International Development in Costa Rica, having taken into account among other factors the maintenance and utilization of projects with the Center for Tropical Agricultural Research and Training (CATIE) previously financed or assisted by the United States, do hereby certify that in my judgement CATIE has both the financial capability and human resources capability to effectively maintain and utilize the facilities funded by the Project: Regional Agricultural Higher Education.

Also, after reviewing the design features and the financial analysis for the Inter-American Agricultural School, I have concluded and do hereby certify that in my judgement the Inter-American Agricultural School will have the financial and human resource capability to effectively maintain and utilize the facilities to be constructed for the School under the Project: Regional Agricultural Higher Education.

3/5/85
DATE

Daniel A. Chaij
Director
USAID/Costa Rica

Luis Alberto Monge
Presidente de la República

Sr. Curtin Winsor, Jr 2 5/10/84

2.- El Establecimiento de una Escuela Latinoamericana de Agricultura para el Trópico Húmedo, a nivel universitario, que permita consolidar procesos y tecnología de producción para las regiones de la Vertiente Atlántica costarricense, y que a su vez presenta condiciones similares a las zonas tropicales húmedas de la mayoría de los países de este continente.

Para garantizar el éxito de estos proyectos será de gran importancia canalizar hacia ellos los colones generados por el apoyo microeconómico de la AID. Me permito, señor Embajador, bosquejar a continuación algunos detalles sobre el impacto sobresaliente que ambos proyectos tendrían, subrayando así la importancia que le atribuyo a su ejecución inmediata.

1) Empresas de CODESA

Si logramos destinar toda la moneda nacional generada por las donaciones de la AID durante 1985 y 1986 para saldar la deuda de CODESA con el Banco Central, le ahorraríamos al Estado ₡1000 millones de intereses por año, reduciría la deuda pública hasta una tercera parte y apoyaría nuestra política monetaria, pues al no monetarizar una cantidad tan significativa de colones se contiene efectivamente el proceso inflacionario.

Para asegurar un efecto permanente de esta acción, CODESA no efectuará nuevas inversiones y se limitará su acceso a nuevos créditos con el Banco Central o con el Sistema Bancario Nacional. Al mismo tiempo estamos estudiando algunas soluciones económicas definitivas para las cuatro empresas restantes (CATSA, CEMPA, FERTICA Y ALUNASA).

Debemos basarnos, para el apoyo financiero a CODESA, en lo estipulado en la Ley de Equilibrio Financiero del Sector Público. De tal modo que, si ésta propuesta fuera aceptada, los -

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Luis Alberto Monge
Presidente de la República

primeros ₡500 millones de aporte se abonarían al Gobierno Central. Debe establecerse después, una reserva para liquidar el pasivo laboral de las empresas que pueden ser traspasados al sector privado, abonando entonces el saldo restante a la deuda de CODESA con el Banco Central.

Sería interesante estudiar la posibilidad de que la Corporación Privada de Inversiones, recientemente organizada y financiada por el AID y los bancos privados comerciales, recibiera las empresas de CODESA. La corporación podría contratar la valorización de las mismas a través de una firma internacionalmente reconocida que bajo criterios totalmente técnicos, defina su futuro, bajo el supuesto de que deben ser traspasadas al sector privado o disueltas como unidades productivas.

La corporación deberá crear un fideicomiso con el producto de la venta o liquidación de las empresas y destinar estos recursos exclusivamente para impulsar el desarrollo agropecuario del país, sin otro lucro que la comisión normal de fideicomiso. En todo momento se debe evitar cualquier crítica de manejo indebido o de enriquecimiento ilícito.

Si esta transacción se puede realizar antes del 1 de enero de 1985, se maximizaría la reducción en el servicio de la deuda pública para el próximo año, lo cual mejoraría notablemente las finanzas públicas.

2) Escuela Latinoamericana de Agricultura para el Trópico Húmedo.

Uno de los objetivos fundamentales de mi Gobierno y que ha sido planteado en muchas oportunidades es la democratización de la economía. Para poder pensar en el logro del mismo no sólo es necesario distribuir la tierra y la riqueza que ella genera, sino también maximizar su productividad.

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Luis Alberto Monge
Presidente de la República

Es por lo anterior que este segundo proyecto se dirige al desarrollo de tecnología de producción para Costa Rica y otros países, que permitan desarrollar agricultura de pequeña y mediana escala con un alto grado de productividad.

Esto permitiría levantar el nivel de ingreso de los pequeños y medianos agricultores y sobre todo romper el marco tradicional de la agricultura de subsistencia en un extremo y la agricultura extensiva en el otro extremo.

La Escuela Latinoamericana de Agricultura para el Trópico Húmedo debe ser establecida para ofrecer anualmente a 400 jóvenes de diferentes países, la oportunidad de "aprender haciendo"; de alcanzar un título profesional orientado a crear actividades productivas y no meramente académicas, viviendo y estudiando cerca de la tierra en un centro de estudios superiores de alto nivel académico. Será necesario institucionalizar este esfuerzo a través de una fundación o asociación privada sin fines de lucro, que podrá recibir reconocimiento como Misión Internacional. La Junta Directiva y el personal docente podría ser de carácter multinacional al igual que sus estudiantes, asegurando, sin embargo, que Costa Rica obtenga una representación adecuada en el cuerpo docente y en el Directorio, asi como una cuota estudiantil que satisfaga las necesidades de nuestras regiones de Trópico Húmedo que tan importantes son para el desarrollo del país.

El financiamiento de este proyecto requerirá de aproximadamente $10 millones para la compra de terrenos y la construcción de las instalaciones necesarias y $50 millones para la constitución de un fondo patrimonial invertido a perpetuidad en bonos del Banco Central.

La suma total podría coincidir con la donación suplementaria de AID que tuve el placer de firmar con usted el 30 de setiembre pasado.

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Luis Alberto Monge
Presidente de la República

Sr. Curtin Winsor, Jr 5 5/10/84

Este arreglo permitiría no monetarizar la mayor parte de la donación, facilitando así mantenernos dentro de las políticas monetarias establecidas.

Espero su compresivo y positivo apoyo a estas iniciativas para que podamos emprender su ejecución al menor plazo posible.

Agradeciéndole a usted y a la AID la positiva colaboración que nos brindan, me despido de usted con muestras de consideración y estima.

Cordialmente,

LAM/viria

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CENTRO AGRONOMICO TROPICAL
DE INVESTIGACION Y ENSEÑANZA

Turrialba - Costa Rica - Teléfonos: 56-64-31 - 56-[illegible]69 - Telex: 8005 CATIE C. R. - Cable: CATIE Turrialba

D-154
February 18, 1985

Mr. John Eyre
Acting Director
ROCAP
Guatemala, GUATEMALA

Dear Mr. Eyre:

During the past eight months, this Administration has made a considerable effort to identify education and research programs at CATIE which will effectively contribute to the urgently needed increases in production, productivity and employment opportunities in the agricultural sectors of Central America and Panama.

There seems to be complete agreement, here at CATIE as well as in the Member Countries, that the education and research programs that this Center has had in the ten years since its creation, primarily addressed to the problems of agricultural production in Central America and Panama, have been of undeniable benefit.

There is also agreement on the fact that as the use of low tropic lands for agricultural production increases, these programs should be reoriented and strengthened to reap the benefits of this major agricultural resource as well as to protect its fragile ecosystem.

We believe this is the most effective means to develop the technology and the human resources needed to overcome the problems associated with lowland tropic agriculture.

During the months of January and February of this year, an A.I.D. Technical Design Team visited CATIE to assist ROCAP with the Project Paper design for the Regional Agricultural Higher Education Project, and has prepared the necessary required documentation to be submitted to A.I.D. for its approval.

We believe this is a most important Project leading to higher production and productivity and thereby increasing the net income of farmers, especially small-scale producers.

I wish to inform you that I give my full support to the Regional Agricultural Higher Education Project as has been developed. Due to the importance of the Project, I request most respectfully that funds be approved by A.I.D. for this Project.

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I look forward to a favorable response on the part of A.I.D. through ROCAP to the Project Proposal, which will provide still another opportunity for a collaborative effort in a very important aspect of rural development in the Central American Isthmus.

With my very best wishes, I remain

Sincerely yours,

Carlos Sáenz
Acting Director of CATIE

c.c. Dr. David Joslyn - RADO/ROCAP, San José

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CONSEJO REGIONAL DE COOPERACION AGRICOLA
DE CENTROAMERICA, PANAMA Y REPUBLICA DOMINICANA

FORTALECIMIENTO DE LOS PROGRAMAS DE POSTGRADO EN CIENCIAS AGRICOLAS

Washington, D.C., Septiembre 1984

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Los Ministros de Agricultura de Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panamá y el Secretario de Agricultura de la República Dominicana, integrantes del Consejo Regional de Cooperación Agrícola de Centroamérica, Panamá y República Dominicana CORECA, reunidos en la ciudad de Washington, D.C.:

CONSIDERANDO:

Que los países necesitan capacitar un número creciente de profesionales agrícolas para atender las necesidades de personal técnico que demanda el desarrollo agrícola y rural de los países miembros del CORECA;

Que los programas de postgraduados en Ciencias Agrícolas que funcionan en América Latina muestran un debilitamiento de su nivel académico y en su capacidad de captar la demanda cuantitativa que se genera en los países latinoamericanos;

Que ese debilitamiento es más evidente en los centros de enseñanza de postgrado en ciencia agrícola donde tradicionalmente se han preparado profesionales de los países miembros del CORECA, y específicamente el Programa de Graduados del Centro Agronómico Tropical de Investigación y Enseñanza (CATIE);

Que los costos anuales por estudiante graduado en tales centros ha experimentado un constante aumento lo cual obliga a reducir las oportunidades de estudios a dichos niveles.

ACUERDAN:

1. Solicitar a la agencia para el Desarrollo Internacional de los Estados Unidos de América (AID), a la Organización de Estados Americanos y otras agencias especializadas de la Organización los recursos financieros necesarios para fortalecer los programas de postgraduados en Ciencias Agrícolas en América Latina, en especial el del Centro Agronómico Tropical de Investigación y Enseñanza (CATIE).

2. Solicitar a la AID aumentar los recursos destinados a becas de postgraduados a los niveles de maestría y doctorado para que un mayor número de profesionales en ciencias agrícolas de los países miembros del CORECA tengan acceso a estudios de tal naturaleza.

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que corresponda, en el interés de que la asistencia en referencia pueda ser una realidad a partir del nuevo año lectivo, que se inicia en Enero de 1985.

En fe lo anterior los Ministros integrantes del Consejo Regional de Cooperación Agrícola de Centroamérica, Panamá y República Dominicana firmamos el presente acuerdo en la ciudad de Washington, D.C., a las diez horas con treinta minutos del once de septiembre de mil novecientos ochenta y cuatro.

Ing. Carlos Aquilino Duarte
Ministro de Agricultura y
Ganadería de El Salvador

Ing. Rodolfo Perdomo
Ministro de Agricultura, Ganadería
y Alimentación de Guatemala

Ing. Miguel Angel Bonilla Reyes
Ministro de Recursos Naturales
de Honduras

Ing. Eduardo Hollman
Ministro de Desarrollo Agropecuario
y Reforma Agraria de Nicaragua, Por Le.

Ing. Ramón Sieiro Murgas
Ministro de Desarrollo
Agropecuario de Panamá

Ing. Domingo Marte
Secretario de Agricultura de la
República Dominicana

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ANNEX I.F

DRAFT PROJECT AUTHORIZATION

NAME OF ENTITIES:	Tropical Agricultural Research and Training Center (CATIE) Inter-American Agricultural School
NAME OF PROJECT:	Regional Agricultural Higher Education
NUMBER OF PROJECT:	596-0129

1. Pursuant to Section 105 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Regional Agricultural Higher Education Project with the Tropical Agricultural Research and Training Center (CATIE) and the Government of Costa Rica (GOCR) (the "Grantees"), involving planned obligations of not to exceed Twenty-Five Million United States Dollars ($25,000,000) in grant funds ("Grant") over a ten-year period from the date of authorization, subject to the availability of funds in accordance with the AID OYB/allotment process, to help in financing foreign exchange and local currency costs for the Project.

2. The Project ("Project") consists of the creation of an Inter-American Agricultural School and the expansion and strengthening of CATIE's graduate and professional programs to produce a professional resource base with practical and educational experience needed to address the agricultural production problems of the Central America and Panama region.

3. The Project Agreements which may be negotiated and executed by the officers to whom such authority is delegated in accordance with AID regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as AID may deem appropriate.

a. Source and Origin of Commodities, Nationality of Services

Commodities financed by AID under the Grant shall have their source and origin in Central American countries and Panama, or the United States, except as AID may otherwise agree in writing. Except for ocean shipping, the suppliers of commodities or services shall have Central American countries, Panama or the United States as their place of nationality, except as AID may otherwise agree in writing. Ocean shipping financed by AID under the Grant shall be financed only on flag vessels of the United States, except as AID may otherwise agree in writing.

b. Conditions Precedent to Disbursement

(1) Prior to any disbursement or the issuance of any commitment documents under the Project Agreement to finance costs arising out of the construction activities for the Inter-American Agricultural School other than the hiring of the Director in Costa Rica, the GOCR shall, except as AID may

otherwise agree in writing, furnish to AID, in form and substance satisfactory to AID, evidence that (i) the Costa Rican Legislative Assembly has passed a special law creating the Inter-American Agricultural School with all rights and privileges accorded to other international Missions in Costa Rica; and (ii) a Board of Trustees and a Board of Directors for the Inter-American Agricultural College has been duly constituted and empowered under Costa Rican law.

(2) Prior to any disbursement or the issuance of any commitment documents under the Project Agreement to finance costs arising out of the construction of the Inter-American Agricultural School's campus in Costa Rica, the Board of Directors of the School shall, except as AID may otherwise agree in writing, furnish to AID, in form and substance satisfactory to AID, evidence that (i) the title to the campus site in fee simple is vested in the Board of Trustees and (ii) no long-term debt has been assumed in connection with the acquisition of this title.

(3) Prior to the disbursement, or the issuance of any commitment documents, under the Project Agreement to finance activities other than for hiring the Director of the School, the Board of Directors of the Inter-American Agricultural School shall, except as AID may otherwise agree in writing, furnish, in form and substance satisfactory to AID, a detailed time-phased plan setting forth all activities to be completed during the first year of the project.

(4) Prior to the disbursement, or the issuance of any commitment documents, under the Project Agreement to finance curriculum and administration development activities, other than for the hiring of a coordinator for the graduate program, CATIE shall, except as AID may otherwise agree in writing, furnish, in form and substance satisfactory to AID, a detailed time-phased plan setting forth all activities to be completed during the first year of the project.

(5) Prior to the disbursement, or the issuance of any commitment documents, under the Project Agreement to finance construction activities, CATIE shall, except as AID may otherwise agree in writing, furnish in form and substance satisfactory to AID, a master plan for facilities and maintenance and a detailed time-phased plan setting forth all construction activities to be completed during the first year of the Project.

c. Covenants

(1) Prior to undertaking project activities for each year after the first year of the Project, CATIE will furnish, in form and substance satisfactory to AID, a consolidated work plan and budget for activities for that year.

(2) Prior to undertaking project activities for each year after the first year of the Project, the Inter-American Agricultural School will furnish in form and substance satisfactory to AID, a consolidated workplan and budget for activities for that year.

(3) CATIE and the Inter-American Agricultural School shall covenant to use their best efforts to ensure that their student bodies are characterized by a predominance of individuals from the Central America and Panama region.

(4) CATIE shall covenant to use its best efforts to ensure that financial need is taken into consideration when determining scholarship eligibility.

(5) CATIE shall covenant to use its best efforts to ensure coordination with the governments of the region when formulating its institutional plan and strategies so as to be consistent with the human resource needs of the region.

CATIE -INSTITUTIONAL ANALYSIS

A. ORGANIZATION

1. Summary History

CATIE is situated near the city of Turrialba, 70 kilometers southeast of San Jose, Costa Rica. The valley of Turrialba was selected in 1942 as the site for the headquarters ot the Inter-American Institute of Agricultural Sciences (IICA) of the O.A.S. When the General Directorate of IICA was transferred to San Jose in 1960, it maintained at Turrialba those activities initiated in 1942; training and research in agriculture, animal husbandry, and forestry.

To carry out these functions, IICA created the Centro de Ensenanza e Investigacion (CEI) at Turrialba. From 1960 to 1969 the training of Latin American personnel in Turrialba was strengthened and that decade saw the steady growth of IICA's Postgraduate Training Program. In 1970, CEI became the Centro Tropical de Ensenanza e Investigacion (CTEI), still a part of IICA, and maintained the emphasis on postgraduate training; research continued as a back-stopping activity for training.

2. Creation of CATIE

On January 12, 1973, IICA and the Government of Costa Rica executed an agreement to create the Centro Agronomico Tropical de Investigacion y Ensenanza (CATIE). This agreement was approved by Costa Rica's Legislative Assembly in June 1973, and Turrialba was designated the headquarters of CATIE.

This non-profit autonomous organization, scientific and educational in nature, was created to promote and carry out research at different levels in the areas of agriculture, forestry and animal husbandry, with the purpose of responding to the needs of the American tropics, particularly the countries of Central America and the Caribbean.

Upon establishing CATIE, its founders gave it a clear mandate to shift emphasis from teaching to research with a sharp focus toward solving problems of the small farmer. Research was no longer to simply complement the post graduate study program but was to assume a more active role corresponding to the work carried out by national institutions in order to better respond to the perceived needs of the region's countries. Over time, as detailed in the technical annex, this changing emphasis on research occurred at the expense of the teaching program, principally the M.S. graduate program.

3. Evolution

a) Current Evolution

Beginning in the mid 1970's, CATIE's increased emphasis on research served to respond in part to the agricultural development needs of Central American countries. For example, notable progress was made in the coffee rust research, forestry research, development of farming systems research methodologies, animal and crop production systems, and cacao research. However, along with the changing focus of CATIE came an ever increasing reliance on external funding for research. Over time, this skewed both CATIE's operating budget and composition of the professional staff to where both the quality and quantity of CATIE M.S. Graduate Program deteriorated.

Equally important was the incipient budgetary crisis which occurred in 1980 due in large part to CATIE's overextension of existing facilities and staff in support of research activities. For example, not until 1983 did CATIE begin to charge reasonable overhead costs for the externally financed research activities. The crisis accumulated in 1981 with CATIE having an operational deficit of $375,000 and few professionals financed out of core budget resources.

With severe austerity measures, CATIE managed to eliminate the deficit in 1982. In 1984, the CATIE Board of Directors appointed Dr. Rodrigo Tarte as its new Director, tasked with placing CATIE on a sound footing by continuing the financial recuperation process and re-examining CATIE's longer-term role in Central American agriculture. Under Dr. Tarte's leadership CATIE has begun to implement new financial policies and practices, some of which were determined by A.I.D. financed technical assistance (Price Waterhouse accounting recommendations) and evaluations (Coopers & Lybrand). Equally important has been the ten-year institutional and department plans which are now under development (see b below). CATIE's new administration is seeking to reestablish CATIE's leadership role as a regional center of excellence in training, research and outreach by reorienting CATIE to place equal importance on training, lessen the heavy reliance on project specific external funding and seek greater operational autonomy for the institution. It is anticipated that the first two will occur in part with the assistance being provided under this project (i.e. training emphasis). The latter, based on Tarte's continued dialogue with Ministers of Agriculture and Planning, should result in a new contract with the University of Costa Rica in late 1985.

b) Ten-Year Plan

The present Director of CATIE began his term of office in March 1984. One of the priority actions he identified from the outset was the development of a ten-year program plan. The lack of such a plan was identified in the ROCAP-funded "CATIE Institutional Analysis", carried out by Coopers & Lybrand in late 1983. In the absence of a long-term plan, CATIE had tended to overextend its capabilities in

numerous research areas, deviated resources away from the top priority M.S. program, and basically lost the ability to capture donor resources in a way which was consistent with planned program priorities rather than in an ad-hoc, donor preference driven procedure.

The development of the "CATIE Ten-year Plan" is proceeding, according to the following schedule:

- Technical reviews, by outside consultants, of the Crops Production, Animal Production and Renewable Natural Resources Departments.....June-Dec. 1984 (completed)
- Departmental task forces formed to provide input to the Director on the specific priorities for each department.....Aug.84-March 85 (ongoing)
- In-country consultation by CATIE Director with officials of CATIE member countries of Central America, Panama & Dominican Republic.....June-Dec. 1984 (ongoing)
- Consultation with officials of major donor and international organizations (AID, ODA, GTZ, IDRC, IDB, IBRD, OAS, etc.).....June-Oct. 1984 (ongoing)
- Presentation of findings of Department Technical reviews to the CATIE Board of Directors, with two related proposals -- (a) proposal to proceed with the development of a ten-year plan, and (b) proposal to strengthen the CATIE M.S. program ..August 1984 (completed, with both proposals firmly endosed by the Board)
- Preparation of draft document "CATIE, basic needs for next five years, focusing on infrastructural improvements of the CATIE, Turrialba campus.....Sept. 1984 (completed)
- Workshop at CATIE for representatives of agriculture sector policy, research, and extension national institutions from the region, to discuss the relationship between sector policies and agriculture research priorities, and CATIE's role in the process.....Sept. 1984 (completed, proceedings published)
- Draft Ten-Year Plan prepared and circulated for comment to CATIE member countries and donors....March 1985

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- Regional Meeting to present comments on draft CATIE Ten-Year Plan.....April/May 85

- Completion and presentation of CATIE Ten-Year Plan.....May/June 85

The completion of the Ten-Year Plan will be a benchmark in CATIE's institutional development. It will provide a planning document useful to CATIE administration and staff, national institutions in the region, collaborating scientists, prospective students, donors, and international organizations. In addition, the process through which this document has been developed, and through which it will be regularly reviewed and modified, will result in a much needed increase in two-way consultation between CATIE and the major national level users of CATIE's services.

4) Objectives and Programs

a) Objectives

CATIE has as its main objectives the following:

- To conduct research for generating technology that will solve the agricultural problems of the tropical areas of Central America and the Caribbean, to benefit mainly the small-scale farmers.
- To train professionals from Latin America and the Caribbean at different academic levels, in order to provide specialists required by the countries to strengthen their national institutions and their agricultural development programs.
- To provide technical cooperation services to the countries, especially those of Central America and the Caribbean, working with them to strengthen their national institutions and to assist them in executing their agricultural research, training and development programs.

b) Programs

(1) Training

CATIE offers a Master's degree program through the technical departments, under terms of an agreement with the University of Costa Rica. The Center receives an average of thirty new students per year.

At another academic level, the Center offers short courses, seminars, and in-service training in special fields. By 1984, 4,800 professionals from Latin America and the Caribbean received specialized training in different fields.

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(2) Research

CATIE conducts research on a wide range of topics. Problem oriented research is focused in four major areas: annual crops, perennial plants, animal production, and renewable natural resources. In addition, CATIE sponsors disciplinary support research in several areas. Important supporting resources are the different laboratories, such as the Tissue Culture Laboratory, where economically valuable species are propagated vegetatively, permitting the exchange of plant material with other regional and international research centers. The Soils and Plant Tissue Laboratory conducts chemical analyses of soil samples, making it possible to evaluate crop behaviour in the field. The Plant Genetic Resources Unit has gathered a wealth of genetic material of important traditional and exotic crops in the tropics, including the Seed Bank with refrigerated chambers for seed storage. A tree-species germplasm collection and distribution center has also been established.

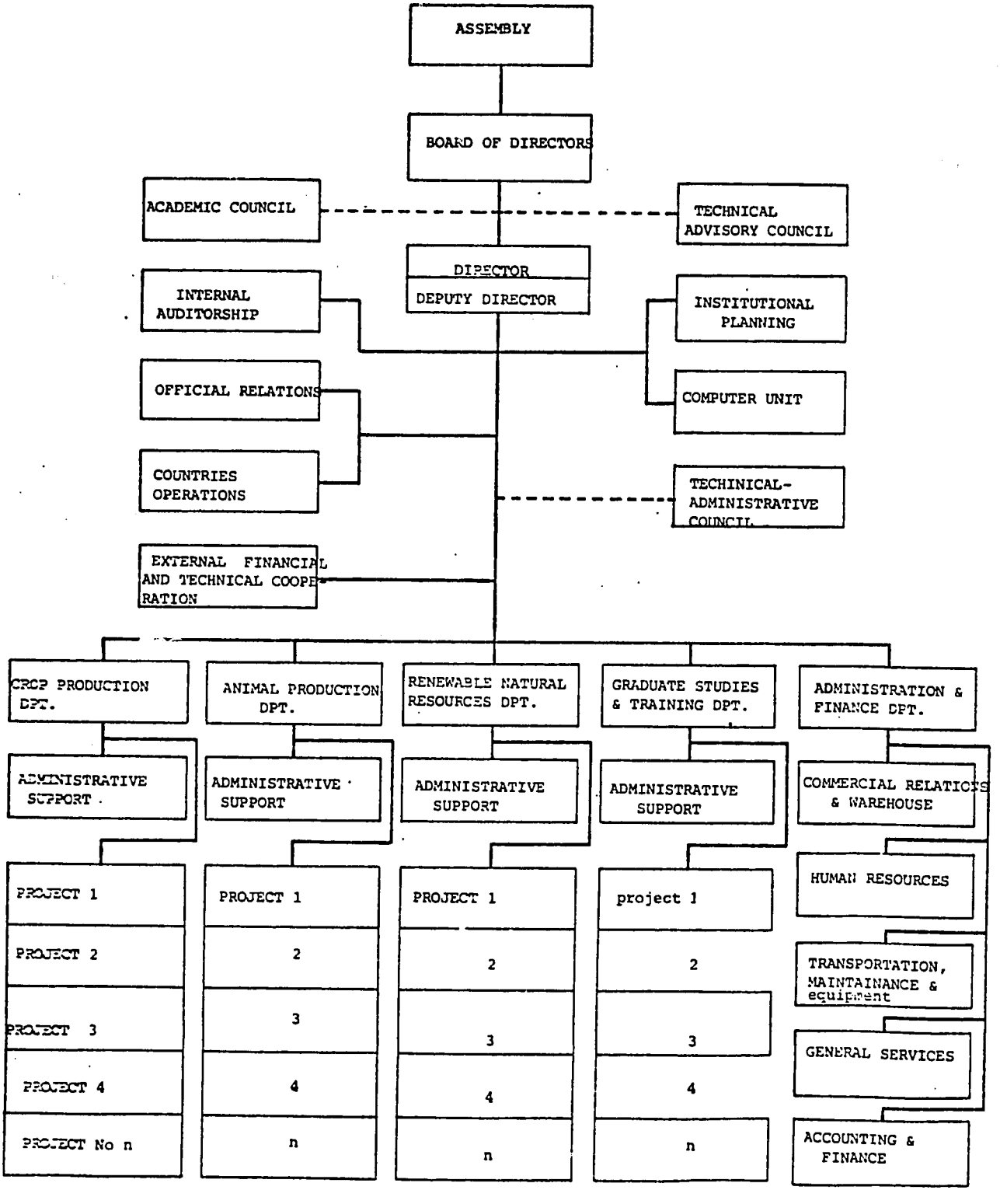
CATIE's small farm production systems research program has been widely accepted and has significantly influenced the orientation of agricultural research in the region. The systems approach of the research considers the farm production unit as a whole: the various interacting subsystems are developed in a defined ecological environment and influenced by particular socioeconomic conditions. The research is directed toward identifying and attacking the critical limiting factors and to finding better systems that permit an increase in productivity.

(3) Library

The Orton Memorial Library of the Inter-American Center for Agricultural Documentation and Information (CIDIA) is located in a new building constructed with funds donated by the Overseas Development Administration of the United Kingdom. Since it is one of the most complete in Latin America in the field of tropical agriculture, it provides ample support to the Center's diverse research and training programs.

Current Organization Structure

In late 1984, CATIE reorganized its organizational structure to more effectively coordinate and implement research and training activities (see Table I). The center has its own Board of Directors, comprised of six members, who function as its highest executive body. The board is counseled by the Technical Advisory Council which advises the Board on policies and strategies in the field of research, training and technology transfer and by the Academic Council which advises on curriculum and relevant policies affecting the educational programs. The Director is responsible for the Center's operation, and is elected by the Board members for a four-year term which is elegible once for renewal.


ASSEMBLY
BOARD OF DIRECTORS
ACADEMIC COUNCIL
TECHNICAL ADVISORY COUNCIL
DIRECTOR
DEPUTY DIRECTOR
INTERNAL AUDITORSHIP
INSTITUTIONAL PLANNING
OFFICIAL RELATIONS
COMPUTER UNIT
COUNTRIES OPERATIONS
TECHINICAL-ADMINISTRATIVE COUNCIL
EXTERNAL FINANCIAL AND TECHNICAL COOPERATION
CROP PRODUCTION DPT.
ANIMAL PRODUCTION DPT.
RENEWABLE NATURAL RESOURCES DPT.
GRADUATE STUDIES & TRAINING DPT.
ADMINISTRATION & FINANCE DPT.
ADMINISTRATIVE SUPPORT
ADMINISTRATIVE SUPPORT
ADMINISTRATIVE SUPPORT
ADMINISTRATIVE SUPPORT
COMMERCIAL RELATIONS & WAREHOUSE
PROJECT 1
PROJECT 2
PROJECT 3
PROJECT 4
PROJECT No n
PROJECT 1
2
3
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PROJECT 1
2
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project 1
2
3
4
n
HUMAN RESOURCES
TRANSPORTATION, MAINTAINANCE & equipment
GENERAL SERVICES
ACCOUNTING & FINANCE

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Assisting the Director and Deputy Director in centralized operations are a variety of units. The Office of Institutional Planning has an important role in providing longer-term planning in strengthening CATIE'S responsiveness to member countries. This office in conjunction with the Technical-Administrative Council also serves to coordinate inter-department programming. The office of internal audit provides accounting services and has linkage as well to the Office of External Financial and Technical Cooperation which serves to coordinate the wide range of donor financed projects. Finally, the Offices of Official Relations and the Computer Center provide support in public relations and computer services, respectively.

There are five parallel departments which will impact on this project. These are Department of Administration and Finance, Department of Crop Production, Department of Renewable Natural Resources, Department of Animal Production, and, finally, Department of Graduate Studies and Training.

a) Department of Administration and Finance

The Department of Administration and Finance has been reorganized and has been staffed with adequate human resources to provide the various donor financed research and training projects with the necessary support services. This allows the technical departments to concentrate their efforts in the execution of their programs, although they keep some administrative personnel for the direct conduct of the projects, including the followup and control of the programs. Comprised of five operating units, the department has to provide the administration and technical departments with the necessary services, goods and financial/accounting information needed to meet the basic objectives of CATIE.

b) Department of Crop Production

The Department emphasizes the improvement of agricultural technology for crop production systems in small farms. Physical, biological and socioeconomic factors and their interrelationship with annual and perennial crops systems in the farm are studied. The department works in the development of mixed production systems that consider the sequential use of annual and perennial crops. For example, in perennial crops, CATIE is doing research on developing high yielding and good quality cacao hybrids. It is also working on the improvement of coffee and banana production and productivy, and on the control of diseases that threaten these crops.

Typical activities of the department can be summarized as follows:

-- Design, develop and carry out the methods and systems of investigation in annual and perennial crops at CATIE and in member countries;
-- Diagnose the typical crop production systems in the countries and design production models for their improvement;
-- Test and disseminate the improved production systems and design new evolutionary production systems; and
-- Concentrate on the development of the agricultural component of the farm, taking into account its interrelationship with other factors of production to support the rational and economic use of land, labor and capital.

Experimental Station "La Montana". This experimental station is located at CATIE as a reinforcement of the activities on the farms. Here support research is contributing to the solution of actual production problems in the medium and long-term. Due to its ecological characteristics, this research will help to support mainly the activities of development of technology for the wet-humid tropics.

Experimental Station "La Lola". This cacao experimental station is located in the Atlantic lowlands in the Province of Limon, on the farm called La Lola. It has 100 ha, 86 of which are planted with cacao. Research for the development of adequate technology is carried out at this station, together with work on cacao hybrids and sale of improved plants and seeds to interested countries.

c) Department of Renewable Natural Resources

The Department works on the development of natural renewable resources, particularly the forests, waters, marginal agricultural areas, fauna and flora, by means of planning, rational use and favorable interrelationship with other land uses, in order to meet the needs of the rural areas of the member countries in the short and long term.

Methodologies are being designed for the planning, management and conservation of wildlands and watershed areas in coordination with organizations in Central America. For example, the silvicultural emphasis lies in tree cropping with fast growing/short rotation tree species; including the introduction, improvement and planting and management technologies of selected tree species with high value for fuelwood and other local and commercial uses. The department also works on developing agroforestry systems that permit the integral exploitation of forested areas in combination with agricultural crops and grazing livestock and the use of biomass for forage, soil cover and soil improvement.

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Typical activities of the department are:

- Design and operate forest production systems to meet the local needs or to guarantee a larger income to farmers, and at the same time, guarantee the best land use and the continuous and sustained rentability of natural renewable resources;
- Study and develop agroforestry systems that best combine the forestry component with the agricultural and livestock components, as an alternative for the best land use in the humid tropics;
- Establish cooperative agreements with national and international institutions to investigate production models which permit simultaneous development of methodologies for technology transfer;
- Program, execute and evaluate the training of professionals from Latin America and the Caribbean in the methods and techniques of production systems (woods or services) related to natural renewable resources, etc.;
- Document, publish and disseminate systematically the results and findings of the research and operations of the department.

d) Department of Animal Production

The department is actively involved in the research and genetic improvement of milk and meat producing animals adapted to the conditions of the tropics. It is also evaluating the germplasm of grasses adapted to the Central American region and introduces improved species and the participation of minor species in the animal production systems whth forage resources available in the farm.

The main activities of the Department are:

- Determine systems suitable for cattle and minor species production in Central America and the Caribbean;
- Design production models that ensure a productivity that is advantageous for the farmer and compatible with other factors of the farming system;
- Test and disseminate the systems technology and the alternatives for improved production;
- Program, execute and evaluate the training of professionals from Central America and the Caribbean in the methods and techniques of economically important animal production; and
- Concentrate on the livestock component of the farm, interrelated with crops and forestry resources, to ensure more profit and less risk to the farmer.

Livestock Experimental Station. The administration of this station is the responsibility of the Department of Animal Production. The station contains the intensive dairy prototypes which are based on pastures receiving chemical fertilization. A further prototype is

investigating the economic status of dual purpose systems which require less investment. In addition, the farm contains a herd of dairy cattle adapted to the tropic conditions which is a genetic improvement program with the idea of providing superior germplasm to the dairy programs in the American Tropics.

The beef herd is based on Romosinuano cattle which has been selected for its productive capability on the conditions of pastures based exclusively on tropical grasses. This herd is a source of germplasm to be used in creating other pure herds or to increase the beef production by crossing with Brahman cattle. The experimental farm pasteurizes all of the milk for sale, together with milk derivaties, to both residents of CATIE and the city of Turrialba.

e) Department of Graduate Studies and Training

This new department is being organized and structured with the objective of centralizing the Center's educational function. Even though it has a parallel relationship with the rest of the technical departments, its specific goal and functions allow it to be conceived in terms of overall coordination. This is true because the teaching activity of CATIE must be a completely inderdepartmental function based on the processes and products of the scientific research carried out in each department. The present department structure at CATIE is probably not the most adequate to plan the organization of the educational functions of the institutions. Therefore, the Department of Graduate Studies and Training represents a necessary step towards a more adequate configuration based on long-term training policies and joint planning. The basic purpose of the department is to plan, execute, support, supervise and evaluate all the Center actions directed to the development of human resources, according to the educational objectives of the institution.

Its general functions are:

- Coordinate, supervise and provide technical support to all the activities of development of human resources in the center;
- Develop approaches, systems, methods, procedures of educational resources linked to the disciplinary and work areas of CATIE;
- Implement the technical aspects of the cooperative relations with national and international institutions, whose activities in the field of human resources are of concern to CATIE; and
- To advise the CATIE Director in the development of human resources.

B. INFRASTRUCTURE

1. Lands

CATIE's central facility covers 1,069 hectares of the Turrialba Valley, bordering the western side of the City of Turrialba. Most of this land is relatively flat. The soil lends itself to such crops as coffee, sugar cane, cacao, improved pasture, citrus and other fruit trees, vegetables, and forest trees as well as livestock. There are seven major soil series found at CATIE: Reventazon, Turay, Institute Clay, La Margot, Cervantes, Colorado, and Birrisito (as well as other miscellaneous soils). Of the total land areas some 266 hectares are devoted to crop research programs, 287 to animal research production, and 100 to the natural renewable resources program (including forests). 396 hectares are used for residential areas, buildings, and land-scaped areas (the remainder is in commercial production or a reserve).

Some 60 kilometers from Turrialba, between Siquirres and Port Limon on the Atlantic slope of Costa Rica, CATIE has another farm, "La Lola", 100 hectares in size. The climate there is warm and humid with an annual average rainfall of 3500 milimeters. The original vegetation of the area was wet tropical forest. Presently, it is dedicated principally to production research development and multiplication of cacao hybrid seed and the commercial production of cacao. Some combined agriculture and forestry studies also are being undertaken at this facility.

2. Buildings and Facilities

CATIE's main facilities include four office buildings, a conference hall and other meeting rooms, classrooms, and teaching laboratories. There are also laboratories and facilities for soils, plant pathology, computer technology, entomology, plant physiology, animal nutrition and physiology, and languages. The Center has numerous greenhouses, a herbarium, two cold chambers for genetic materials, an arboretum, nurseries, and a meteorological station. In addition there are a 24-room dormitory, a warehouse/workshop and two tissue culture laboratories and a pilot processing plant.

Added since the creation of CATIE have been a building for the Cattle and Small Animals Program and one for the Soils Laboratory, a cold chamber for genetic resources, an apartment building to house visiting scientists, an enlarged potable water supply with an internal purification system, and facilities for drying and processing cacao seeds. Most of these facilities have been built with funds derived from the sale of lands.

The Orton Memorial Library was retained by IICA upon the creation of CATIE but is still located in Turrialba, serving the region's countries as well as technicians and students at CATIE. This library, reputedly the finest agricultural library in Latin America, houses over 80,000 volumes, 2300 titles of periodicals, and 110 titles of bibliographical and abstracts. A new library facility was built in 1983.

Other CATIE facilities include three dormitories for single students, 11 apartments for married students, one guest house, one apartment building for visiting scientists, 48 residences for technicians, a cafeteria, a recreation center with swimming pool and sports areas, and two school buildings, one for an elementary school and the other for a kindergarten.

3. Equipment

All laboratories are equipped for requisite research and teaching (e.g. the modern soil laboratory has a capacity for analyzing 200 samples daily). CATIE maintains a motor pool of some 60 vehicles (buses, utility vehicles, carryalls, microbuses, sedans, trucks) and fueling station. It also is equipped with agricultural machinery including tractors, bulldozers, loader, and spray equipment for the commercial farm operation (coffee and sugar cane). The dairy farm has a mechanical milking facility and operates a creamery. Center equipment also includes Hewlett-Packard and IBM computers for processing experimental data. The conference room is equipped with slide film projectors as well as an opaque projector.

C. INTITUTIONAL LINKAGES

1. National and International Organizations

CATIE's activities aimed at benefiting the agricultural development in the American tropics have been considerably strengthened by the cooperation of the governments of several countries and of an appreciable number of international, regional, and national organizations.

As detailed below, several countries contribute financial assistance and numerous countries collaborate on specific projects. CATIE receives support from 54 institutions in Latin America and in other parts of the world through cooperative agreements which facilitate the exchange of technical personnel, genetic materials, and scientific information and technology.

By 1983, CATIE was relating in various sundry forms with some 60 national and international organizatons. These included international agricultural research centers, universities, and governmental and private sector research institutions. These linkages allow CATIE to stay abreast of current research developments, coordinate development activities and upgrade technical skills. In turn, CATIE has been able to build upon good operative relationships as well as elicit support for its own research and training activities.

2. AID and Other Donors

CATIE currently has thirty-nine active agreements with AID and other donor organizations, for a total of approximately $9.3 million in 1985, or 76% of the funds available to the institution.

With respect to AID, CATIE has had extensive involvement in implementing AID financed research training and outreach activities. Principle among these are Small Farm Production System (596-0083), Regional Tropical Watershed Management (596-0106), Integrated Pest Management (596-0110), and Fuelwood & Alternative Energy Sources (596-0089). CATIE's knowledge of AID is substantial and as a result of these and other projects its financial and other types of management functions are suitable to a project of the magnitude of the proposed Regional Agricultural Higher Education Project.

Equally important are other donor financed activities. These range from the financing of short-term training by the Kellogg Foundation to full scholarships for the M.S. graduate program by the Government of Holland, CIDA and national governments of the region. Example of donor financing also include the German Technical Fund (GTZ) which is financing agroforestry systems research, the United Nations University sponsored research on land colonization, and national level and private sector support for Sigatoka negra, cacao and coffee research.

TECHNICAL ANALYSIS - CATIE

1. Introduction

The Ministers of Agriculture of the region, the Presidential Mission on Agricultural Development in Central America and the Caribbean, and many knowledgeable Central American agriculturalists have indicated the need to upgrade and strengthen the graduate and professional training programs at CATIE. Currently CATIE provides the only viable graduate training opportunity in the region where students can be provided with a training/research experience on the crop, livestock, natural resources problems and agroclimatic conditions of the region. In the past CATIE has served the needs of students, particularly mid-career professionals, and others who because of language difficulties and costs have not been able to pursue graduate studies in the U.S. The graduate studies program at CATIE has also been used along with the research projects as the base for numerous short and specialization courses to upgrade the skills of agriculturalists in the region.

Demand for graduate training either at U.S. universities or CATIE continues unabated as indicated by the applications at CATIE and the Caribbean and Latin American Scholarship program (see Background section). When compared to the 5,000 agricultural scientists that the International Service for National Agricultural Research (ISNAR) has estimated will be needed by the year 1990, these figures indicate that there will still be unsatisfied demand. More important than the mere quantity accoording to most professional agriculturalists, is that the quality of the graduates be improved and maintained. Unfortunately, the quality of CATIE's graduate program has declined in recent years as the institution had to devote more of its facilities and staff to attend to the needs of research projects. If CATIE is to continue to provide the region with quality professional agricultural degree and non-degree training, it will have to provide greater support to its education program. The CATIE Administration is cognizant of this need and has stated on its intention to restore the reputation of its educational program. It is within this context of the background cited above that ROCAP proposes to assist with the upgrading and strengthening of CATIE's graduate and non-degree professional training program.

The essential questions regarding the technical components of the project fall into two major areas: 1) educational considerations regarding overall and individual departmental objectives and areas of specialization of the M.S. and non-degree professional training programs, faculty required, curriculum, teaching-research relationships, and 2) related physical facilities (laboratories, classrooms, field experiment stations, housing, etc) and equipment required to upgrade the training program.

During the PP preparation, was contracted Dr. Kenneth L. Turk, Professor Emeritus at Cornell University, to undertake a thorough technical analysis of the existing graduate studies program covering the points outlined above. The analysis and discussions with CATIE's Administration Department formed the basis for the project components and activities.

2. Overall Findings

One of the main objectives of CATIE is to train specialists required by countries in the tropical areas of the Caribbean and Latin America to strengthen their national institutions and their agricultural development programs. Trained human resources are key ingredients to food and agricultural development in all regions of the world. With its graduate studies programs, CATIE is in a unique position to continue its contributions to agricultural progress in the Central American Region.

Graduate studies have not received the financial support and status equal to that given to research and other functions in CATIE's programs. The quality of the teaching programs has been declining in recent years. The new CATIE administration is cognizant of this decline and intends to reverse this trend by giving greater support and higher priority to graduate studies at CATIE, thereby improving the training of people who will assume positions of leadership in agriculture throughout the region.

Major improvements in CATIE's teaching (and graduate related research) program are needed if this objective is to be achieved. These improvements, which cut across the departments, are as follows:

Staff

Continuity and stability of teaching staff are essential for a successful and quality graduate program at CATIE. A larger proportion of staff is needed on core budget funds with specific responsibilities for teaching, along with some research. Excessive reliance on donor-financed research staff or professors not located at CATIE to teach core courses and electives has affected course content, thesis research, areas of specialization and interaction between professor and student. Contract research project personnel is a valuable complement to the graduate program but is not a substitute for core teaching staff. More core teaching staff will also improve the quality of instruction in the graduate program.

Curriculum

CATIE should continue its effort to improve the curriculum with a series of basic courses applicable to all departments and taught by permanent core faculty. These courses should include soils, genetics, statistics/experimental design, farm economics/budgeting and technology transfer. Elective courses taught by core teaching staff should be provided in the areas of specialization offered by the departments.

Facilities and Equipment

Considerable variation exists in the teaching and research facilities among the three academic departments. Most of the existing classrooms are adequate, but additional and specialized classrooms and laboratories are necessary for upgrading the quality of teaching and to handle an increased student body. For example, equipment and facilities at the animal production experimental farm and the lowland humid tropics La Lola station need to be improved. The existing computer center is

housed in a building that can not handle current or future staff/student needs. Due to the fiscal crisis, the library has not maintained or expanded subscriptions to many core scientific journals that are an essential part of any graduate program. Finally, existing student and dormitory housing is inadequate to permit any improvement/expansion of the graduate program.

Analyses were carried out relating each department's current staffing patterns, course content, infrastructure and laboratory/field facilities, as well as their plans and requirements to upgrade and reorient their respective graduate programs. A strategy was followed that first emphasized those aspects of the graduate program (staffing, curriculum facilities and equipment) that served the overall needs of the graduate program and cut across departmental lines and then focused on strengthening areas of specialization within the departments. The objective was to ensure that CATIE's graduate program could have the necessary core ingredients in place which could be expanded in the future. There was general agreement on this approach by the CATIE/Administration and Teaching Departments.

3. Analysis by Department

a. Animal Production Department

Overall Objectives of M.S. Program

The main objective of the graduate program in the Department is to train specialists (researches, teachers, and production-oriented professionals) in animal production required by countries in the tropical areas of the Caribbean and Latin America thereby strengthening their national institutions and improving livestock populations as a part of total agricultural development.

Content of the M.S. Program and Staffing Implications

Table 1 presents the list and sequencing of courses offered by the Department. All students are required to take core courses (marked L) and depending on their pastures, nutrition or genetics/reproduction option the respective elective courses also form part of their core course work.

In reality, the steady departure of project-financed research staff who taught some of the electives has eroded both the quantity of electives offered as well as the quality of instruction. The Department's current staff permits some degree of specialization in nutrition and pastures. Even this minimal strength will disappear within the next six months as nutrition and pastures staff depart when ROCAP and Canadian financed research projects are terminated.

The present teaching faculty in Animal Production (as of February 1985) are summarized in the following table which describes their specialization, source of funding, and courses now being taught, or that could be taught by them.

TABLE 1 M.S. IN ANIMAL PRODUCTION 1985-1986

Course	Type	Weekly Hours Theory	Weekly Hours Practice	Number of credits	Oferred at	Quarter Offered
Biochemistry	EN	4	4	4	PP	1
Animal Nutrition	EN	4	-	4	AP	1
Applied Animal Feeding	EN	4	-	4	AP	2
Digestive Physiology	EN	3	-	2	AP	3
Practice Nutrition	EN	-	3	1	AP	2
Directed Reading Nutrition	EN	2	-	1	AP	1
Agrosilvopastoril Systems	EP	3	-	2	NRD	5
Soil Fertility	EP	4	-	4	PP	1
Soil Microbiology	EP	3	-	3	PP	2
Pasture Use and Management I	EP	4	-	4	AP	3
Pasture Use and Management II	EP	4	-	4	AP	4
Pasture Ecology	EP	3	-	2	AP	4
Practical Pastures	EP	-	3	1	AP	2
Directed Reading Pastures	EP	2	-	1	AP	1
Mendelian Genetics	EG	4	-	4	AP	2
Quantitatives Genetics	EG	4	-	4	AP	3
Reproductive Physiology	EG	3	-	2	AP	1
Lactative Physiology	EG	2	-	2	AP	4
Practical Reproduction	EG	-	3	1	AP	2
Directed Reading Reproduction	EG	2	-	1	AP	1
Statistics	L	4	-	4	UCR	1
Experimental Design	L	4	2	4	UCR	2
Animal Health and Management	L	2	4	2	AP	1
General Physiology	L	4	-	4	AP	1
Agricultural Economics	L	3	-	3	AP	4
Farming Management/Systems	L	3	-	3	AP	3
Oriented Research Pastures	Thesis	-	-	1-10	AP	5-8
Oriented Research Nutrition	Thesis	-	-	1-10	AP	5-8
Oriented Research Genetics	Thesis	-	-	1-10	AP	5-8

L = Levelling Compulsory for all students
PP = Plant Production
NR = Natural Resources
AP = Animal Production

UCR = Universidad de Costa Rica
EP = Option in Pastures
EN = Option in Nutrition
EG = Option in Genetics/Reproduction

Teaching Staff in Animal Production

Name	Specialization	Source of funding	Course now teaching or can teach
O'Callaghan, M.	Laboratory/Soils	Basic	Laboratory practice** Soils**
de Alba,J.	Reproduction/Genetics	Basic	Physiology of Reproduction (Animal Management) Animal Breeding
Gomez, G.	Nutrition	Basic	Nutrition
Mares, V.*	Pastures	CIID	Pastures
Mellado, M.	Animal Husbandry	Basic	Animal Management (Practical)
Perez, E.*	Animal Husbandry	CIID	Animal Management

* Not expected to be here after the end of the next quarter or July 1, 1985.
** Course that could be taught.

It should be noted that of those listed, only four are expected to be on the staff after July, 1985 and that the professor teaching the Physiology of Reproduction, Genetics, Animal Management, and Animal Breeding courses will depart in November 1985. The effect on the teaching program is severe. CATIE soon will not have a viable M.S. program in Animal Production without core teaching staff.

In terms of curriculum and professional staff, the Department is now at a low point and will have to be rebuilt as rapidly as possible. Additional teaching/research faculty will be required so that, together with the four remaining core faculty, the Department can gradually develop a critical mass of staff in the three specialty areas of animal nutrition, pastures and forages, genetics and animal breeding and a fourth area of animal management and production which combines aspects of all three specialties. In all areas cooperative realtionships will be maintained in teaching and research with other departments to insure the interdependence of soils, crops and livestock. Animal feeding is the major limiting factor in animal production in the tropics and will receive a major thrust in research and training.

Table 2 indicates the existing and needed core teaching staff in the Department. In keeping with the philosophy of assigning staff who teach core courses to all CATIE students of specific departments, the agricultural economist and the geneticist will teach core courses in their disciplines in addition to specific farm budgeting and animal genetics courses within the Department. All professors will teach courses in their areas of specialization and will devote about one-half time to research, including supervision of thesis projects of students.

TABLE 2
EXISTING AND NEEDED CORE TEACHING STAFF

Animal Production Department

Teaching Staff Areas	Present*	Needed
Nutrition (Ruminants)		1
Nutrition (Monogastric)	1	
Pasture Agronomy		1
Grassland Management		1
Animal Reproduction	1	
Quantitative Genetics		1
Animal Physiology		1
Animal Health		1
Animal Husbandry	1	
Agricultural Economics		1
Laboratory	1	
	4	7

*After June only 4 of the present staff positions will remain in the Department, all funded by the basic budget.

Student-Staff Ratio

The number of graduate students will increase gradually for a total enrollment of approximately 36 students by 1990, more than three times the present number of 10. It is expected that approximately 9 students will be enrolled in each of the three specialty areas and the general animal production/management core. This will have the following impact on the graduate student-staff ratio.

Staff		Graduate Students	Staff-Student Ratio
Present*	4	10	1: 2.5
Anticipated	11	36	1: 3.3

* As of July 1, 1985

These staff-student ratios do not reflect the amount of time that professors will spend on teaching non-graduate short courses and in-service training and specialized courses. Additional increases in student numbers will depend on the construction of additional student housing after LOP.

Existing Networks and Linkages

The Department has no formal external linkages to any of the international centers at the present time, although an informal relationship exists with CIAT. Until the department is adequately staffed with a critical mass of permanent teaching/research faculty, it is unlikely that formal linkages can be developed in the Department. Nevertheless, funds will be required for the Department to develop and support some of those linkages, i.e. travel, in-country research activities, etc., with international and national agricultural institutions.

Graduate Program Related Research Activities

Research activities in animal production are concerned primarily with three problem areas in the tropics: (a) improvement of cattle adapted to tropical conditions (long-term); (b) animal feeding and nutrition; (c) design and evaluation of livestock farming systems.

The Department has been successful in integrating the graduate students into these research projects in the past. However, the lack of core staff in the Department has led to a problem of attracting research monies. This situation will resolve itself once a critical mass of faculty is in place through the development of more linkages with other institutions involved in animal production research such as ILRAD in Kenya.

Existing Facilities/Equipment and Future Requirements

The Department occupies a modern building which, given current low student and staff utilization, can easily handle the expected expansion of both students and faculty in the future. The building contains 14 professional staff offices and two secretarial offices. There are four classrooms each with a maximum capacity of 25 students as well as a conference room which can be used for smaller classes and seminars.

The Department's nutrition laboratory is used for research and teaching, as well as a service laboratory for chemical analyses required by the agroforestry section of the Renewable Natural Resouirces Department (primarily to analyze the nutritional content of leguminous trees, etc). It is only reasonably well-equipped to meet its present functions or handle additional teaching and service requirements (three requirements described in (Appendix 1). There are no teaching laboratores for animal breeding and physiology. However, the Department plans to convert one of its unused rooms into a breeding/physiology laboratory for the animal physiologist.

The animal husbandry experimental and teaching farm of 480 hectares provides facilities and animal (meat/dairy cattle and a small herd of goats) for teaching and research. The farm headquarters has the following facilities· two offices, a small machinery shed, classroom, milking parlor, milk processing laboratory, and a small laboratory for artificial insemination with much of the equipment improvised. There is a small dormitory for three students. Almost all of the farm equipment is very old and much of it non-functioning. A list of required equipment and costs are found in Exhibit A (on file in LAC/DR and ROCAP).

The Department's teaching and research program would also benefit by carrying out some of its experimental research on pastures and livestock production at CATIE's La Lola experimental station which is in a humid tropical lowland location. The location at Turrialba is excellent for much of the graduate teaching. Using a portion of the La Lola facility would provide more students with more exposure to livestock nutrition and management problems encountered in lowland conditions.

APPENDIX 1

B. ANIMAL PRODUCTION DEPARTMENT

1. Current Studies and Services

a. Teaching Course in laboratory analysis
b. Support for development of thesis project of graduate students of Animal Production Department
c. Provide analytical services for research projects

2. Current Analysis Available

Protein (non-routine), fiber fractions, ether extract, ash content, total energy, in vitro dry matter digestibility.

3. Future and Existing Projects

Animal Production

- Pasture fertilization studies
- Legumes (herbaceous grain and tree) for animal feeding
- Non-conventional resources and crop wastes (treated and untreated for animal feeding).

Natural Resources*

- Nitrogen fixing trees
- Multi-purposes trees (Firewood Project)
- CATIE-INCAP-NAS nitrogen fixing trees as a feed source in Central America (both direct feeding and processed).
- CATIE-GTZ Agroforestry Project

Technical Training

Besides being involved in the teaching and thesis development of M.S. students, the Department would hope to give short training courses in analytical techniques to laboratory assistants, etc., in Central America as well as develop analytical methods suited to their needs and resources.

*Natural resources do not have laboratory facilities, they use Animal Production facilities

Animal Production Laboratory

Current Equipment

- Kjeldahl (home made micro-Kjeldahl)
- In vitro digestibility (home-made)
- Ether-extractor• total fat analysis
- Crude fiber digestor
- Bomb colorimeter - total energy determination
- Colorimeters (2) - colorimeter analyses
- Non-refrigerated, low-speed centrifuge
- Analytical balance (1)
- Semi-analytical balances (2)
- Rough balance (4)
- Muffle furnace - ash or mineral analysis
- Laboratory drying ovens (2)• dry matter determination
- Large drying oven for sample preparation
- Old metal water still

b. Plant Production Department

Overall Objectives of M.S. Program

The main objective of graduate studies and research in the Plant Production Department is to train specialists (researchers, teachers and production-oriented professionals) in plant production and related sciences required by countries in the tropical areas of Central America, Latin America and the Caribbean to strengthen their national institutions and food and agricultural development programs.

Content of M.S. Program and Staffing Implications

Table 3 presents a list and sequence of courses offered each trimester in the Department. Based on tests and evaluations by the University of Costa Rica (UCR), individual students may be required to take remedial courses in technical English, mathematics and general chemistry. A core of basic subjects is required of all students. Other subjects are offered as electives that provide students with an opportunity for some degree of concentration in (a) soil science and plant nutrition, (b) crop protection, (c) plant physiology, or (d) crop science.

No courses are offered in crop production, except as given through systems courses. Too many courses in soils are taught by professors who reside in San Jose, permitting little interaction with students. There is a need for better integration of soils courses with a core CATIE soil specialist offering courses required of all CATIE students. UCR professors could then teach more specific soil subjects.

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TABLE 3. CURRICULUM PLANT PRODUCTION DEPARTMENT

No.	Course	Type*	Weekly Hours Theory	Weekly Hours Practice	Number of Credits	Pre-requisite	Offered At	Quarter Offered
6376	Technical English	Leveling	4		0		Graduate Level UCR	I
6372	Mathematics	Leveling	4		0		Graduate Level UCR	I
6373	General Chemistry	Leveling	4		0		Graduate Level UCR	I
6377	Scientific Literature	Basic	2	3	1		Graduate Level CATIE	I
6326	Soil fertility	Basic	4	2	3		Plant Production Dept.	I
6327	Agronomic Production Systems	Basic	3	2	3		Plant Production Dept.	II
6342	Soil Microbiology	Elective	3		2		Plant Production/UCR	II
6378	Technical Redaction	Elective	2	2	2		Natural Resources	II
6380	Statistics	Basic	4	4	4	6372	Computation Unit	II
6302	Ecological Basis	Elective	2	2	2		Natural Resources	II
6327	Agroecosystems	Basic	4	4	3	6372	Plant Production Dept.	III
6328	Ecophysiology	Basic	4	2	3		Plant Production Dept.	III
6336	Phytopathology	Elective	2	2	2		Plant Production/UCR	III
6334	Weed Control	Elective	3	2	3		Plant Production/UCR	III
6330	Soil Chemistry	Elective	4	2	4	6373	Plant Production/UCR	III
6381	Experimental Design	Basic	4	4	4	6380	Computation Unit	III
6389	Phytoclimatology	Elective	2	1	2		Natural Resources	III
6344	Management Physics of Soils	Elective	2	2	2		Plant Production Dept.	IV
6332	Plant Physiology	Elective	3		3		Plant Production/UCR	IV
6337	Soil Genesis & Classification	Elective	3	2	3		Plant Production/UCR	IV
6394	Thesis Proj. Seminar	Thesis	1		1		Plant Production Dept.	IV
6395	Oriented Research				1-10		Plant Production Dept.	IV
6333	Plant Breeding	Elective	4		3	6380	Plant Production Dept.	V
6341	Pest Control	Elective	1		1		Plant Production Dept.	V
6309	Agrosilvopastoril Systems	Elective	3		2		Natural Resources	V
6396	Oriented Research	Thesis					Plant Production Dept.	V
6397	Oriented Research				1-10		Plant Production Dept.	VI
6398	Oriented Research				1-10		Plant Production Dept.	VII
6399	Oriented Research				1-10		Plant Production Dept.	VIII

*Leveling - prerequisite for Department
Basic - requisite for the Department
Elective - according to orientation
Thesis - requisite for thesis

The Department relies heavily on other than core staff to teach its course offerings. Of the 23 courses in the curriculum, only eight are offered by Department staff of which only two are on core budget. This dependence on other departments and on project research staff has resulted in the cancellation of courses listed in the graduate catalog. Project research staff teaching courses often have to cancel classes to attend to their project responsibilities. Lack of stability and continuity of staff has resulted in a decline in the quality of teaching as well as in the guidance and supervision of thesis research.

The present teaching faculty in Plant Production (as of February 1985) are summarized in the following table which describes their specialization, source of funding, and courses now being taught.

TEACHING STAFF IN PLANT PRODUCTION

		Funding	Teaching
Fargas, E. Jose	Ecophysiology	Basic	Ecophysiology
Enriquez, Gustavo	Genetic/Plant Breeding	Basic	Plant Breeding
Arze, Jose	Soil Physiology Agroecosystems	FIDA	Agroecosystems II
Kass, Donald	Soils	FIDA	Soil Management & Physics
Schilter, Tommas	Ecology	CEE	Agroecosystems I
Galindo, Jose	Phytopathology	ACRI	Disease Control

Only two of the six professors are on core budget. The remaining four are on project funds that will terminate within the next year or two. Eight staff in the department (four of whom are on core budget) participate in the graduate program by supervising thesis research.

The Department is shifting from the past emphasis on farming systems methodologies to more emphasis on production-oriented crop production problems and on providing more disciplines. The Department and CATIE are reemphasizing its traditional areas of strength in cacao, coffee, plantains and bananas. There are important existing or potential export crops where disease problems have to be addressed and productivity maintained or increased. In the area of staple food crops such as maize, sorghum, beans and tropical root crops, such as cassava, there is increased interest in working with the international centers on varietal adaptation and crop protection methods. Finally CATIE expects to play a leadership role on tropical fruit crops such as critrus, mango and papaya and others by carrying out more research and training in soil-plant relationships and diseases. Within this context, the Department wants to develop a critical mass in three disciplinary areas to be able to conduct training and research in soils and plant nutrition, crop protection and tropical crop production. The teaching/research staff that have been identified will provide a core group, together with existing faculty, that will enable the Department to provide more relevant production-oriented curriculum. A revised curriculum is now in the process of

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development which will provide a balance of basic and applied subjects to reflect these areas of emphasis in the content of the Department's M.S. program.

Table 4 indicates the existing and needed core teaching staff in the Department. The tropical soils specialist will be responsible for teaching core soils courses for all CATIE students.

As these new positions are filled, plus an increasing number of existing core staff are assigned to teaching responsibilities, this will give a total of 12 positions on core budget funds. If all faculty on core funds teach courses, this should reduce the present teaching load in Plant Production by other CATIE departments and the University of Costa Rica. These new positions along with adjustments in the specialization areas of existing core staff positions will provide the critical mass in the three disciplinary areas indicated above.

TABLE 4 - EXISTING AND NEEDED CORE TEACHING STAFF

Plant Production Department

Teaching Staff Areas	Present	Needed
Ecophysiology	1	-
Genetics/Plant Breeding	1	-
Plant Genetics Resources	-	1
Tropical Horticulturist	-	1
Tropical Plant Pathologist	-	1
Plant Nutritionist	-	1
Tropical Soils Specialist	-	1
	2	5

Staff-Student Ratio

The number of graduate students will increase gradually for a total enrollment of approximately 45 students by 1990 from the present enrollment of 28.

Staff		Graduate Students	Staff-Student Ratio
Present*	6	28	1: 4.7
Anticipated	12	45	1: 3.8

*Does not include 13 subjects taught by other CATIE staff and professors from the University of Costa Rica

These staff-student ratios do not reflect the amount of time that professors will spend on teaching non-graduate, short sources, in-service training and specialized courses. Likewise, the student numbers do not include students from other departments who take certain departmental course offerings. Additional increases in student numbers will depend on the construction of additional student housing after LOP.

Graduate Program Related Research Activities

Research activities in Plant Production are concerned mainly with three areas·

1. Farming systems,
2. Perennial crops, such as cacao and coffee, and
3. Plant genetic resources.

Graduate students participate in seven of the Department's major research projects. Table 5 contains the list of research projects in the Department. For example, six students alone are participating in the cacao research project.

Work in plant genetic resources in providing a wealth of genetic material of important traditional and exotic crops of the tropics. These include many alternative crops such as peach palm (Pejibaye), peppers, spices, cucumbers, tropical fruits and many others. There are presently 15,000 introductions for study, out of which selections may be made. Graduate students are also involved in this research.

TABLE 5. PLANT PRODUCTION DEPARTMENT RESEARCH PROJECTS

Research Project Title	Source of Financing
1. Crop Systems	ROCAP
2. Crop Systems for Small Farms	ROCAP
3. Innovative Scientific Research	ROCAP
4. Production Systems of Food Crops	FIDA
5. Food Crop Systems	CIID
6. Production Systems Based on Tropical Tuber Crops and Plantain	CIID
7. Modules of Concentrated Action I	CEE
8. Modules of Concentrated Action II	CEE
9. Energy Flows in Rural Communities	CEE
10. Cacao and Fruit Tree Research	JICA
11. Production Systems of Perennial Crops	MIDA
12. Coffee Research (Coffee Rust)	PROMECAFE
13. Soil Fertility	ROCAP
14. Food Crops for Small Farmers	CIID
15. Farm Systems	GTZ
16. Pest Inventory of Food Crops	ROCAP
17. IPPC International Plant Protection Center	University of Oregon (AID)
18. Research Support for Cacao	ACRI
19. Tropical Soils Research	Univ. of North Carolina (AID)
20. Research Support	United Kingdom
21. Integrated Pest Management	AID

Existing Networks and Linkages

The Department has a formal relationship with CIAT and an informal one with CIMMYT. Staff members are working in 21 externally supported projects as summarized in Table 5. Several of these involve close cooperation with national institutions in the region.

After the Department is adequately staffed with a critical mass of permanent teaching/research faculty, opportunities should be explored for increased collaborative research in areas of mutual interest with CIAT, CIMMYT, and other centers of the CGIAR Network.

The Department should explore linkages with universities in other countries, especially the United States, for mutual exchanges of professors and graduate students. Such relationships would enhance capability in education and research both in CATIE and cooperating universities. Funding will be required to support the establishment and maintenance of these linkages.

Equipment and Future Requirements

The department of Plant Production is housed in five one-story buildings in a contiguous group. These buildings provide:

34 offices for staff and students
11 offices for secretaries
2 classrooms (with a capacity for approximately 20 students each)
2 conference rooms
2 documentation rooms
1 drawing room
5 laboratories for research and teaching
(soils, plant pathology, physiology and 2 for tissue culture)
4 small laboratories (3 soils and 1 enthomology)
1 seed preparation room
8 storage rooms for seeds and other materials, plus balance, instrument, preparation and drying rooms
13 greenhouses

The existing department complex does not have office space for the additional five staff members that will be financed under the Project. Likewise, additional classroom space will be required to handle the increased student numbers in the Department. The education building which will be constructed has sufficient office space for the new faculty as well as increased classroom space and seminar rooms.

While there is some variation, generally the laboratories are of good quality and fairly well-equipped for training of graduate students. The largest of the group is the plant physiology laboratory which can handle up to 40-45 students for teaching purposes. Appendices 2, 3 and 4 list the current teaching and laboratory services and equipment as well as future services in the plant pathology, soils and plant physiology laboratories. As the number of students in the Department increases, additional equipment will be needed for these laboratories. There is also a well-equipped agrometeorological unit in the Department, which provides useful data for all CATIE departments.

The Department has an experimental farm area at CATIE headquarters, La Montana, covering 23 hectares and divided into 15 research plots for basic and applied research crop production problems. The environmental characteristics of the experimental area are such that some of the research results are applicable to several ecological zones, including humid tropical lowlands.

Another area operated by the Plant Production Department is the La Lola Experimental Farm, located about 60 kilometers from CATIE in the humid lowland tropics. About 80 of the 100 hectares are in cacao. The farm is laid out in experimental plots for various research projects on disease control, genetics and hybrid seed production.

Additional land of approximately 30 hectares is needed now for work that is starting on humid lowland crops, such as plantains, pejibaye, peach palm, macadamia, etc., and some pastures research. Upon completion of the project additional land may also be required to allow for further expansion of these activities and for grazing lands for livestock production research cooperative with the Animal Production and Renewable Natural Resources Departments on problems of the humid lowland tropics.

The buildings, facilities and equipment at La Lola are in poor condition and need rehabilitation. A laboratory is essential to serve the needs of plant pathology, plant physiology and entomology. Overnight accomodations for professors, graduate students and short course participants are needed.

APPENDIX 2

Laboratory of Plant Pathology
(Prepared by Plant Production Department)

1. Current Studies & Services

a. Laboratory for the courses "General Plant Pathology (SP-6311) and "Plant Disease Control" (SP-6336). One of the courses is given per year to 3-8 students.

b. Support for the development of thesis projects of graduate students on cacao, corn, beans and tuber crops. Three to five students per year.

c. Diagnosis of plant diseases caused by fungi, bacteria, and nematodes.

d. Investigation on basic aspects of the fungi Monilia roreri, ceratocystics fimbriata, phytophthora palmivora, and other casual agents of diseases of economic importance on cacao.

e. Studies on screening systems to evaluate genetic resistance on cacao against pathogens on cacao.

f. Screening of the cacao germplasm bank for resistance against the pathogens mentioned above.

g. Studies on fungal and bacterial diseases on Araceas.

2. Current Equipment and Infrastructure for Studies and Services Indicated in "1"

a. Laboratory (144m2)

1 office
3 desks for technicians
1 room for isolations and transferences
4 desks for graduate students
4 work tables
1 room for preparation of samples (42m2)

b. Greenhouse (90m2)

c. Equipment

1 laminar flow chamber
4. incubators
2 growth chambers
1 refrigerator
2 autoclaves
1 water distiller
2 blender
1 balance
1 water bath
2 ovens
Reagents (old and deficient)
Glass (deficient)
3 microscopes (2 in bad shape)
2 stereoscopes (in bad condition)

d. Field. Areas in "La Montana" to set demonstraton plots for teaching and for the development of thesis projects. On cacao, germplams bank with 450 accessories at Turrialba for screeming at La Lola, 80 hectares planted to cacaco for research on epidemiology and control of diseases. Small lab, classroom and some dormitories.

3. Required Future Studies and Services

Because of monoculture and continuous cropping with homogeneous genetic crops to increase food production, plant diseases had become very important. Recently, plant diseases had appeared in Central America causing huge losses such as coffee rust, black sigatoka on plantain and bananas, monoliasis on cacao, sugar cane smut, sugar cane rust, mideo on corn, lethal yellowing on coconut and bacterial canker on citrus, being quite urgent to train professionals on this discipline to confront the problems caused by disease on tropical crops.

Additionally, large agricultural areas in Central America are located in the humid tropics where plant diseases are important constraints for food production. In these areas perennial crops are a good alternative to increase and stabilize the income of farmers and their families. Among these crops we have cacao, coffee, plantain, rubber, peach palm (pejibaye) and other palms[fruit trees like citrics, avocado, pineapple, cashew, mango, soursoup, carambola, macadmia, annona, and cherimoya and spices like cinnamon, vanilla, pepper, cardamom, ginger and other plant genera, several of which are in the germplasm bank at CATIE.

In the future the work on plant pathology will deal with the identification of diseases of economic importance on these crops caused by fungi, bacteria, virus, nematodes and mycoplasmas, and to study the epidemiology of these diseases in order to device economical plant disease control systems. Furthermore, studies will be performed on methods of evaluation and screening looking for disease resistance, in order to establish integrated methods for plant disease control. These areas of study will serve as theme for research for graduate students. In addition, the studies on diseases on corn, bean, sorghum and tuber crops will continue.

See Exhibit A for a list of required laboratory equipment.

APPENDIX 3
LABORATORY OF SOILS
(Prepared by Plant Production Department)

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1. Present studies and services

A. Laboratory

I. Soil Analysis

a) Chemical - pH, N, P, K, Ca, Mg, Na, S, B, Fe, Cu, Mn, Zn, Al, Extractable Acidity, organic matter, C. E. C.

b) Physical - Texture (Hydrometer method), water retention curves, gravimetric moisture, bulk density, particle density, hydraulic conductivity.

II. Plant Analysis

a) Chemical - N, P, K, Ca, Mg, Na, S, Fe, Cu, Mn, Zn, Al.

III. Water Analysis

a) Chemical - N, P, K, Ca, Mg, S, Fe, Cu, Mn, Zn, Na.

IV. Research

a) Studies on nutrient fixation in soils.

b) Comparison of different analytical methods on the extraction of soil and plant nutrients.

c) Characterization of soils for taxonomic and fertility purposes.

V. Advisory Services

a) To technical personnel and students in CATIE.

b) To technical personnel in the Central American countries.

VI. Training

a) Graduate

b) Short courses

c) In-service training

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The operation capacity of analysis at the present time is between 6000 and 7000 samples with approximately 60,000 determinations per year, with the present budget and personnel.

B. Greenhouse Research

a) Preliminary evaluation of soil fertility

b) Studies on crop tolerance to high aluminum concentrations in soil

c) Studies on the effect of different doses of sulphur and phosphorus in dry matter production in sorghum.

C. Field work

Experiments using the microplot technique to evaluate soil fertility and to study the effect of fertilzer in crop production.

Fields at the Experiment Station "La Montana".

2. Existing equipment and facilities

a. Resources available

Two laboratories for soil, plant and water analysis with an approximate area of 375 square meter, two offices for technical personnel, seven desks for technicians (in the laboratories), 10 working tables, 2 instrument rooms with air conditioners, 1 balance room, 1 soil physical analysis room, 3 small store rooms, 2 for regents and 1 for glassware, 1 area for crushing soils, 1 area for grinding plant material.

Laboratory equipment

3 centrifuges, 1 horizontal shaker, 1 shaker-heater, 3 hoods.

Plant analysis

1 semi-micro Kjeldahl equipment, 3 hot plates (Lindberg), 1 oven for drying plant material. Texture determination equipment by the hydrometer method.
Equipment for the determination of water retention curves. 2 water stills (Barnskad).
1 atomic absorption, spectrophotometer. 3 colorimeters, 1 pH meter.
Multiple equipmet for soil, plant and water analysis.
2 small ovens, 1 compressor, 1 vacuum pump, hydraulic conductivity equipment (made locally), 1 soil crusher, 2 Wiley mills for plant material, 1 muffle furnace.

3 Variable transformers
1 refrigerator, equipment for sampling soils. Glassware, reagents.
1. Greenhouse for drying and preparation of soil samples, with an approximate area of 140 square meters.
At the present time there is only one greenhouse to conduct research work and also with teaching purposes, with an approximate area of 105 square meters. It has a working area for sample and materials preparation and 10 working tables, where the pots are located during the working periods.

3. Future studies and services

General studies in soil taxonomy, oil microbiology, soil physics, soil chemistry, soil fertility and plant nutrition. Soil management and conservation. Fertilizer use. Specific studies in soil characterization, COLE determination, soil texture by the pipette method. Nitrogen mineralization in soils, studies on organic matter determination of phosphorus and sulphur isotherms.

Determination of critical levels with different soil analysis methods. Determination of critical levels in some crops and different nutrients using several methods of analysis. Studies on the efficiency in the use of new fertilizer (developed by IFDC). Studies on the effect of aluminium in soil in the dry matter production of several crops. Development of mineral deficiencies on some non-traditional crops (macadamia, achiote, fruit trees).

Experiments using the microplot technique and utilizing different crops as test crops.

Collaboration with CATIE technical personnel in specific soil studies.

Equipment requirements

See Annex Exhibit A (on file in LAC/DR and ROCAP) for a list of equipment requirements.

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APPENDIX 4
PLANT PHYSIOLOGY LABORATORY

A. Present capacity and services

1. Staff personnel — Jose Fargas PhD. Plant physiologist. Head.
   Jose Arze M.S. Crop physiologist.
   Jose J. Salazar Laboratory Assistant.

2. Other users

Students	5 (2 years permanency, with cubicles)
Staff	10 (other department included, their laboratory assistants and students)
Students from courses	
"Plant ecophysiology".	12 students (3 months)
"Research and development of technology for agricultural systems".	15 students (3 months)
"Agroecosystems".	12 students (3 months)

3. Physical plant

   Laboratory 2 staff offices, 6 students cubicles, one electronic instruments room, one balances room, one room for ovens and mills. Cabinets with organic chemicals, cabinets with glassware.

   Sheds two, for field crop sample handling before weighing, drying and grinding plant materials.

   Greenhouse one, for growing plants in partially controlled environments. Airation, electricity, rain water facilities for nutrient solutions.

   Classroom Specially equipped for courses with practices. 20 students capacity.

4. Main activities

   a) Quantitative analysis of plant growth.

      a.1 Biomass determination, by organs, in several periods of plant life.

      a.2 Leaf area development throughout the life of the plants.

   b) Determination of solar energy (PAR) available to crops when grown in monocultures and in associations.

   c) Response of crop germplasm to several stresses produced in partially controlled conditions (greenhouse).

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d) Reproduction of scarce genetic material in almost optimal growing conditions (greenhouse).

e) The practices of several courses.

f) Plant tissue analysis (N, P and S).

B. Future capacity and services

Some crop physiological aspects probably will have good future such as the ones related crop genetic tolerance to main regional stresses·

1. Crop germplasm selection for tolerance to water excess or water shortage (association problem).

2. Crop germplasm selection for tolerance to low dose of fertilizers. How this could improve by biological nitrogen fixation and mycorrhizae.

3. Crop germplasm selection for low light compensation point or good biomass production under low light intensities (association problem).

See Exhibit A (on file in LAC/DR and ROCAP) for a list of required laboratory equipment.

C. Renewable Natural Resources Department

Overall Objectives of M. S. Program

The main objectives of graduate studies and research in the Department is to train specialists (researchers, teachers and professionals) in renewable natural resources required by countries in Central America, Latin American and the Caribbean to strenghten their national institutions and to meet the needs of rural populations. Specialists are trained for work in three areas· forestry, agroforestry, and wildlands and watershed management.

Content of M. S. Program and Staffing Implications

Table 6 presents the list and sequence of courses offered by the Department. All students are required to take basic core courses. Individual students may be required to take some remedial course in technical English, mathematics, and use of scientific literature. Other subjects are offered as electives but, depending on the specialization area of the student, i.e. forestry, agroforestry or wildland and watershed management, may also be obligatory.

The Department relies heavily on other than core staff to teach its course offerings. There are 22 members on the teaching faculty out of a total staff of 61 in the Department. Only five of the 22 teaching faculty are on the core budget. The present teaching faculty are presented in Table 7 which describes their specialization and source of funding and courses they are teaching or can teach. Eight additional staff, all except one of whom are project research staff, are available to supervise graduate thesis research. While the Department has a policy that all core staff must teach and encourages the teaching by project research staff, the lack of a sufficient number of permanent faculty affects the quality of teaching. Listed courses are not always offered, or content is changed. Many of the teachers can not spend enough time on their teaching due to project research responsibilities.

The Department will continue to offer the three specialization areas mentioned previously. Increased attention will be devoted to· integration of existing knowledge to better manage forest plantations, their protection from insect, fire and effects of shifting agriculture. This will require core specialists in forest management and forest inventory. Work will be expanded on integrating forestry into existing systems, including cost effective technology. This will require greater emphasis on agricultural economics and extension in the training. A greater role is to be given to training in wildlands park management as well as watershed management.

These new positions will provide instruction in· (a) Extension/Transfer of Technology for all CATIE students, (b) Natural Forest Management, and (c) Forest Inventory and Mensuration.

TABLE 6. COURSE OF STUDY DEPARTMENT OF NATURAL RENEWABLE RESOURCES

Course	Type*	Weekly Hours Theory	Weekly Hours Practice	Number of credits	Prerequisite	Offered at	Quarted Offered
Technical English	Leveling	4		0		UCR/CATIE	I
Mathematics	Leveling	4		0		UCR/CATIE	I
Use of Scientific Literature	Leveling		2	1		UCR/CATIE	I
Forestry Science Seminar	Basic		1			UCR/CATIE	I
Nursery and Plantations Techniques	Elective	2	2	2		UCR/CATIE	I
Dasometry I Forest Mensur.I	Elective	2	2	2		UCR/CATIE	I
Concepts and Principles of Watershed Managment	Elective	3	2	3	Mathematics	UCR/CATIE	I
Technical Writing	Basic	1	4	2		UCR/CATIE	II
Statistics	Basic	4	4	4	Mathematics	UCR/CATIE	II
Elementary Hydraulics	Elective	2	2	2	Mathematics	UCR/CATIE	II
Ecological Bases for Land Use	Elective	2	2	2		UCR/CATIE	II
Dendrology	Elective			2		UCR/CATIE	II
Plant Climatology	Elective	2	2	2		UCR/CATIE	III
Natural Resources Seminar	Basic	3	2	3		UCR/CATIE	III
Experimental Design & Analysis	Elective	4	4	4	Statistics	UCR/CATIE	III
Dasometry II Forest Mensur. 2	Elective	2	2	2	Forest Mensur I	UCR/CATIE	III
Principles of Data Base Management and Applications	Electrive	1	4	2		UCR/CATIE	III
Land Use Inventory and Planning Methods	Elective	3	2	3		UCR/CATIE	III
NaturalResources Seminar	Basic		1	0		UCR/CATIE	III
Watershed Hydrology	Elective	3	2	3	Concepts Water-shed Management	UCR/CATIE	III

TABLE 6. (Continued)

Course	Type*	Weekly Hours Theory	Weekly Hours Practice	Number of credits	Prerequisite	Offered at	Quarted Offered
Special Topics	Elective			1-2		UCR/CATIE	III
Tropical Soils (Genesis, classification)	BASIC	3	2	3		UCR/CATIE	IV
Thesis Seminar	Thesis			1		UCR/CATIE	IV
Watershed Management Planning and Management	Elective	3	2	3	Concepts Water-shed Management	UCR/CATIE	IV
Planning and Managment of Wildlife	Elective	4	4	4		UCR/CATIE	IV
Natural Resources Seminar	Basic		1	0		UCR/CATIE	IV
Soil & Water Conservation Technology	Elective	4	4	4	Concepts Water-shed Management	UCR/CATIE	IV
Management of Wildlands	Elective	3	2	3		UCR/CATIE	IV
Silviculture	Elective	4	4	4	Forest mensur. I & II	UCR/CATIE	IV
Numerican Methods	Elective	3	6	4	Mathematics & Statistics	UCR/CATIE	IV
Special Topics	Elective			1-2		UCR/CATIE	IV
Agroforestry System I	Elective	3	2	3	Ecological basis	UCR/CATIE	IV
Oriented Research	Thesis			1-10		UCR/CATIE	IV
Forest Management	Elective	3	2	3	Silviculture	UCR/CATIE	IV
Forest Genetics	Elective	3	2	3	Statistics	UCR/CATIE	V
Agroforestry Systems II	Elective	3	2	3	Agroforestry	UCR/CATIE	V
Oriented Research	Thesis			1-10		UCR/CATIE	VI
Oriented Research	Thesis			1-10		UCR/CATIE	VI
Oriented Research	Thesis			1-10		UCR/CATIE	VII

*Leveling - Obligatory as a prerequisite f r the Department
Basic - Obligatory for the Department
Elective - According to orientation obligatory for those students in that field
Thesis Obligatory for thesis

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TABLE 7 TEACHING STAFF IN DEPARTMENT OF NATURAL RENEWABLE RESOURCES

Name	Specialization	Source of Funding	Courses Now Teaching or Can Teach
James Barborak	Wildland Management	WWF, Core Budget	Wildland Management
John Beer	Agroforestry	GTZ	Agroforestry Systems
Rolain Borel	Agroforestry, Forage Science	Core budget	Agroforestry Systems
David Boshier	Forest Genetics	ODA	Forest Genetics
C. Buford Briscoe	Silviculture	Core budget	Forest Mensuration, Silviculture Forest Management
Gerardo Budowski	Ecology, Land Use, Dendrology, Convervation	Core budget	Dendrology, Ecological Basis for Land Use, Agroforestry Systems
Jorge Faustino	Soil Conservation Information, Technical Writing	ROCAP/Watershed	Soil and Water Conservation
Jochen Heuveldop	Agroforestry, Silviculture	GTZ	Agroforestry Systems, Plant Climatology
Robert Komives	Land Use	ROCAP/Watershed	Land Use Planning
Oscar Lucke	Forest Hydrology	ROCAP/Watershed	Introd. to Watershed Management
Craig MacFarland	Wildland Management	Core budget	Wildland Planning and Management
Daniel Marmillod	Silviculture	DDA	Silviculture
Carlos Quesada	Watershed Management	Core budget	Watershed Management, Hydrology
Carlos Reiche	Economics	ROCAP/Fuelwood	Natural Resources Economics
Ricardo Russo	Agroforestry	IDRC	Agroforestry Economics Systems
Rodolfo Salazar	Forest Genetics	ROCAP/Fuelwood	Forest Genetics
Germán Sánchez	Agronomy, N Fixing Trees	IDRC	Agroforestry Systems
Eduardo Seminario	Watershed Management	ROCAP/Watershed	Watershed Management and Planning Principles of Hydaulics
Eduardo Somarriba	Ecology, Agroforestry	UNU	Agroforestry Systems
Thomas Stadtmüller	Forest Bioclimatology	CIM/UNU	Physics, Climatology
George Wallace	Integrated Resources Management and Planning	ROCAP/Watershed	Principles of Watershed Management Integrated Resources Mgmt. Seminar
Mario Gutiérrez	Information Technical Writing	DDA	Technical Writing

These new positions will contribute to continuity and stability of the teaching program in the areas mentioned. During the next three years the Department will have to make a concerted effort to better achieve balance in its core teaching staff by increasing its core staff and/or negotiating with other donors to finance staff with greater teaching responsibilities. Some European technicians intend to discuss this possibility with their parent donor agencies.

Student-Staff Ratio

The number of graduate students will increase for a total enrollment of approximately 40 students by 1990 from the present enrollment of 22.

Staff		Graduate Students	Staff-Student Ratio
Present*	5	22	1: 4.4
Anticipated	9	40	1: 4.4

*Does not include 17 project research staff who teach.

These staff-student ratios do not reflect the number of students in non-degree short and specialization courses nor students from other departments who take departmental course offerings. Additional increases in student numbers will depend on the construction of additional student housing after the LOP.

Graduate Program Related Research Activities

The major efforts of this Department are oriented toward developing renewable natural resources through research and training in three main areas.

1. Forestry - production of fuel wood and other alternate sources of energy introduction of breeding and plantation techniques and management practices of forest species of commercial value, designing techniques for wood production in primary and secondary natural forests.

2. Agroforestry - the most advantageous associations between trees and crops of pastures, and the use of trees where biomass could be harvested for cattle fee, utilized as ground cover, or for soil improvement practices. (Some of these projects are in cooperation with the Department of Animal Production).

3. Wildland and Watershed Management - design of methodologies for planting, managing and conservation of wildland and watershed areas, and work in collaboration with national personnel from different key areas in Central America.

The Department is quite successful in integrating its graduate students into project research activities. Graduate students are conducting thesis research on some aspects of 15 different projects in forestry· five projects in agroforestry and seven projects in wildland and watershed management..

Existing Network and Linkages

The Department has been quite successful in developing linkages with universities in other countries for mutual exchanges of professors and graduate students (e.g. Colorado State University, and University of Michigan, University of Buenos Aires, and the Agricultural University, Wageningen, Netherlands).

Another linkage exists with the Latin American Forestry Institute, connected with the School of Forstry, University of the Andes, Merida, Venezuela.

A Memorandum of Understanding is in process of development wih the School of Forestry and Environmental Studies, Yale University. Other similar likages are in various stages of development with other universities. An in-service training program, with a limited number of participants, is conducted cooperatively with the United Nations University in Tokyo. There is cooperation on some research projects with the Animal Production Department on a problem of mutual interest (eg. agroforestry) as well as with the Plant Production Department on soils, etc.

Existing Facilities/Equipment and Future Requirements

The Department is housed on the second and third floors of the CATIE administration building. Some recent improvements have provided for adequate offices for the staff, but those for graduate students are inadequate. A small room for storage of documents has table space for 6 to 8 people for conferences.

There are no classrooms for the Department, and classes have to be taught in other buildings. In some courses this is not a problem, but in others extensive use needs to be made of maps, overlays, and other materials that need to be left permanently in place for use by the teacher and student. One of the smaller classrooms in the new Education building to be constructed will be made available to the RNR Department. The additional faculty members financed under the project will also have office space in that building.

This Department does not have its own chemical laboratory for the use of the staff and students, but shares the nutrition laboratory of Animal production for necessary chemical analyses. This laboratory is reasonably well equipped for its teaching, research and service requirements (see Appendix 1, Department of Animal Production). The Department requires additional equipment, however, to augment its mensuration forest inventory teaching and research activities (see Appendix 1).

CATIE has some research plots for study on various kinds of trees, including leguminous trees with nitrogen-fixing properties, and a small forest. There are needs, however, for additional forested areas that can be used for teaching purposes. Graduate training would be strengthered if there

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were research stations in one or two different ecological zones where students could do their thesis research. Currently, some of the research projects finance test plot areas in various zones.

The Department has a documentation center, INFORAT, which compiles and distributes technical materials in forestry field and publishes the journal "Agroforestry". It also maintain the Latin America Seed Bank (BLSF) to facilitate handling of certified seed for research purposes (80 sq. meters within the germ plasm facilities).

Other facilities include a forestry greenhouse (60 sq. meters) and nursery, and an agroforestry greenhouse (200 sq. meters) and nursery.

APPENDIX 1
RENEWABLE NATURAL RESOURCES

To reinforce graduate training with a large number of students, the Department would need such minimum equipment as·

Mensuration/inventory equipment which will be used to do field practice in the courses to be given by the fores, inventory and management specialists. Some of the equipment will include altimeters, calipers, increment borers, compasses, diameter tapes, etc. (for inventory work the requested equipment will include a sketchmaster, and a digital planimeter). The satellite parabolic antenna will be used to connect the CATIE Computer Center with the NASA Earth Sciences Research Program in order to teach on the use of NASA computerized images for land use inventories and management.

The capacity of the two existing greenhouse and nurseries at the Department has to be increased for the agroforestry greenhouse and nursery ($3500 are needed for irrigation/mist equipment and minor tools and $1,500 are needed for the silvicultural greenhouse and nursery to upgrade the existing equipment. The Agroforestry greenhouse is also used by the Animal Production Department students and researchers.

The Agroforestry Program is currently engaged in the study of beneficial Nitrogen Fixing Trees (NFT) which are used in traditional farming practices. It is necessary to evaluate different NFT in the laboratory and nursery conditions as teaching aid to students and new faculty. A minimum equipment consists of dry oven, analytic balance, a growth chamber for observing plant gowth, incubators for culture of Rhizobium isolated from NFT, various microbiological isolated from NFT, various microbiological materials (culture media, indicators, chemicals, etc.) and minor equipments (sterilizer, inoculating supplies, refrigerator for consrving cultures, etc.). This equipment will be located at the Animal Production Laboratory.

All students involved in forestry graduate work receive training at an upgraded Latin American Forest Tree Seed Bank will necessitate equipment for improving tree seed processing and testing such as·

A growth chamber to standadrize conditions (for testing propagation materials from different climatic sources), and analytical balance, a refrigerator and other minor equipment for analyzing seed viability and moisture, a seed separator and the seed collection equipments.

See Detailed Cost Estimates for a listing of equipment and costs required by the Renewable Natural Resources Department.

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ATTACHMENT 1

PROJECT - FINANCED PROFESSORS SERVING ALL CATIE DEPARTMENTS

Name	Department	Level	Teaching Responsibilities
Agricultural Economist	Animal Production	M.S.	Core course in Economics for all incoming CATIE students. Specific economics/farm budgeting courses for the AP, PP, RNR departments.
Tropical Soils Specialist	Plant Production	Ph.D.	Core course in soils to all CATIE students. Would also integrate with soils courses offered by UCR professors and other CATIE professors
Biometrician	Computer Center	Ph.D.	Teach core courses in Statistics for all CATIE students and experimental design courses in AP, PPD, RNR departments (will split teaching resposibilities with CATIE M. S. Biometrician).
Extension/Transfer of Technology Specialist	Renewable Natural Resources	M.S.	Core course in concepts methodology and technology of extension. Specific courses in developing methods, techniques communication for AP, PPD and RNR departments.
Genetist	Animal Production	Ph.D.	Core course in quantitative generics for all CATIE students. Course in Animal Genetics for AP department.

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PROJECT-FINANCED PROFESSORS SERVING SPECIFIC DEPARTMENTS

ANIMAL PRODUCTION DEPARTMENT

Position	Level	Teaching Responsibilities
Pasture Agronomist	Ph.D.	Teach at least two courses per year on introduction of grasses and legumes[establishment, response to stress, pests grazing, etc. Growth curves. Seed production in dry and humid tropics. Courses for agroforestry and watershed management students in RNR department.
Glasslands Management Specialist	M.S.	Teach at least two courses per year in management and utilization of grasslands. Nutritive value as affected by environment, light, temperature, management, and fertilization. Determination of consumption. Botanical composition of ingested material. Stocking rates. Courses for agroforestry and watershed management students in RNR department.
Animal Nutritionist Specialist	Ph.D.	Teach at least two courses in ruminant nutrition. Use of non-conventional feedstuffs, harvest and industrial wastes, urea, molasses, banana, sugar cane, etc. Tree and shrub-forage. In situ and in vitro digestion, toxic or growth limitird componds. Mineral nutrition, also elementary nutrition course for agroforestry and wildlife students in RNR department.

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Position	Level	Teaching Responsibilities
Animal Physiologist	Ph.D.	Teach an introductoru course in anim,al physiology, including physiology of digestion, metabolism, growth and development for AP students and wildlife utilization students from RNR department. A second course would deal with endocrinology and reproductive physiology within the genetics/reproduction option· a further course would be applied physiology for nutrition option.
Animal Health Specialist	M.S. (perhaps with Vet. degree)	Teach a course in common diseases of farm animals, causes and prevention, management for maintenance of anumal health. Also will be responsible for health problems of experimental livestock herds.

Professors shared with Natural Resources Department·

Pasture specialist (2)
Nutritionist (basic courses)
Physiologist basic courses)

PLANT PRODUCTION DEPARTMENT

Position	Level	Course to be given
Plant Genetic Resources Specialist	Ph.D.	Photosynthesis, respiration and growth regulations. Seed physiology
Tropical Horticulturist	Ph.D.	Plant genetics production and disease course with plant pathologist.
Tropical Plant Specialist	Ph.D.	General plant pathologist disease control courses
Plant Nutritionist	M.S.	Mineral nutrition and water soil fertility and productivity

Professors shared broadly with all departments

Tropical Soils Specialist

Professors shared partly with other departments

Tropical Plant Pathologist (AP, RNR)

Plant Nutritionist (AP, RNR)

Plant Genetic Resources Specialist (AP, RNR)

RENEWABLE NATURAL RESOURCES DEPARTMENT

Position	Level	Teaching Responsibilities
Natural Forest Specialist	M.S.	Teach core course in management of primary and secondary forests and multiple use trees for all RNR department students and many AP and PP students involved in agroforestry approaches, teach two advanced courses to students specialing in these aspects (thesis students).
Forest Inventory Specialist	Ph.D.	Coordinate team-taught introductoru core course for all RNR students and some AP and PP students in all aspects of tropical forest management (2 quarter course). Teach two quarter course on ion disometry (beginning and advanced).

Professors shared broadly with all departments·

Extension/Technology Transfer Specialist

Professors shared partly woth all departments·

Natural Forest Management Specialist
Forest Inventory Specialist

CATIE COUNTERPART CONTRIBUTION

TABLE I: SUMMARY

	1985*	1986	1987	1988	1989	1990	TOTALS
I Staffing	392,869	827,093	868,448	911,871	1,111,463	1,160,338	5,272,082
II Facilities	-	128,800	433,660	567,232	649,870	728,880	2,508,442
III Curriculum/ Administration	9,714	95,830	84,633	88,920	93,318	97,814	470,229
IV Land	-	400,000	-	-	-	-	400,000
TOTALS	402,583	1,451,723	1,386,741	1,568,023	1,854,651	1,987,032	8,650,753

*Second Semester 1985

CATIE COUNTERPART CONTRIBUTION

TABLE II: STAFFING

	1985*	1986	1987	1988	1989	1990	TOTAL COST
IC 10 educational PPI technicians PB (1)	304,000	640,000	672,000	705,600	894,880	932,924	4,149,404
ID 10 PPN educational assistance (2)	58,900	124,000	130,200	136,710	143,545	150,723	744,078
IE Cost of 15 secretaries	29,969	63,093	66,248	69,561	73,038	76,691	378,600
TOTALS	392,869	827,093	868,448	911,871	1,111,463	1,160,338	5,272,082

(1) International Professional Personnel
(2) National Professional Personnel

*Second semester 1985

CATIE COUNTERPART CONTRIBUTION

TABLE III: FACILITIES

		1985	1986	1987	1988	1989	1990	TOTALS
A	Class/off $416,000[1]	-	-	54,080	56,784	59,623	62,604	233,091
B	Staff Housing $2,470.000	-	-	-	-	-	-	-
C	Student Housing $2,346,000[1]	-	-	139,230	201,442	256,692	311,942	909,306
D	Computer CTR $179,000[1]	-	-	23,270	24,423	25,655	26,937	100,295
E	La Lola Rehab. $346,000[1]	-	-	21,840	46,072	48,375	50,795	167,082
F	Labs/equip, $713,000[4]	-	74,600	138,330	147,246	154,608	166,439	681,223
G	Water/Elect. $315,000[2]	-	-	-	31,500	33,075	34,728	99,303
H	Vehicles $110,000[4]	-	22,000	23,100	24,255	25,467	26,741	121,563
I	Audiovisual $65,000[3]	-	13,000	13,650	14,332	15,049	15,801	71,832
J	Technical Assistance	-	19,200	20,160	21,168	22,226	23,338	106,092
K	Primary School $70,000[1]	-	-	-	-	9,100	9,555	18,655
			128,800	433,660	567,232	649,870	728,880	2,508,442

1 CATIE will contribute 13% of the value of the construction and maintenance, with an increase of 5% each year thereafter.
2 CATIE will contribute 10% of the value of the new and actual constructions, an increase of 5% each year thereafter.
3 CATIE will contribute 20% of the value of the equipment, with an increase of 5% each year thereafter.
4 CATIE will contribute 20% for the maintenance and operation of this equipment, with an increase of 5% each year thereafter.

* To obtain the applied percentages, cost incurred during the last three years approximately.

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CATIE COUNTERPART CONTRIBUTION

TABLE IV: CURRICULUM/ADMINISTRATION

	1985*	1986	1987	1988	1989	1990	TOTALS
III-A							
1 Bilingual Secretary	2,104	4,416	4,638	4,870	5,114	5,370	26,512
Office Equipment (One office: typewriter, telephone, curtaines, desk, library, chairs and others	2,200	-	-	-	-	-	2,200
Office Supplies	400	800	900	1,000	1,100	1,200	5,400
Telecomunications	2,500	5,500	5,800	6,100	6,400	6,700	33,000
Regional Trips(1-1985/2-86-90)	2,000	4,000	4,200	4,400	4,600	4,800	24,000
Office maintenance	510	1,071	1,125	1,180	1,240	1,302	6,428
TOTAL US$	9,714	15,787	16,663	17,550	18,454	19,372	97,540
III B-C-D-E							
2 Bilingual Secretaries	-	8,832	9,274	9,738	10,225	10,736	48,805
Office Equipment(2 Secretaries)	-	8,800	-	-	-	-	8,800
Office Supplies (2 Secretaries)	-	1,800	1,900	2,000	2,100	2,200	10,000
Telecommunications	-	3,500	3,700	3,900	4,100	4,300	19,500
Regional Trips (4 per year)	-	8,000	8,200	8,400	8,600	8,800	42,000
Office maintenance (2 Offices)	-	7,150	7,507	7,882	8,277	8,690	39,506
TOTAL US$	-	38,082	30,581	31,920	33,302	34,726	168,611
IV A-B-C							
1 Bilingual Secretary	-	13,248	13,914	14,610	15,342	16,110	73,224
Office Equipment		6,600	-	-	-	-	6,600
Office Supplies	-	2,400	2,700	3,000	3,300	3,600	15,000
Telecomunications	-	16,500	17,400	18,300	19,200	20,100	91,500
Office maintenance	-	3,213	3,375	3,540	3,720	3,906	17,754
TOTAL US$	-	41,961	37,389	39,450	41,562	43,716	204,078
GRAND TOTAL US$	9,714	95,830	84,633	88,920	93,318	97,814	470,229

* Second semester 1985

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ANNEX II.B
Exhibit 1

INSTITUTIONAL ANALYSIS AGRICULTURAL SCHOOL

A. Location

Given that the primary objective of School is to train agronomists skilled in the production methods applicable to the tropical humid lowlands, the School needs to be located either in or in close proximity to such an area. Costa Rica is a logical choice because a large portion of its land mass fits this criteria and because of the presence of CATIE which will have a complementary role vis-a-vis the School. Also, Costa Rica has an enviable record of political stability which will contribute to the institutional stability of the School. Furthermore, legislation is now making its way through the Costa Rican Legislative Assembly which will authorize the establishment of the School as a private institution with international status.

Within Costa Rica, a location near the city of Guapiles, 70 kilometers Northeast of San Jose in the Atlantic zone will be selected. One of the reasons the location in Guapiles is preferred is because of the infrastructure available, e.g. the close proximity to San Jose, the better environment, an airport, a hospital and schools, and more amenable living conditions adequate for support staff and faculty. The ASBANA and the MAG humid tropics agricultural experimental stations are also located in the Guapiles area. ASBANA also has its crop diversification program located at this station due to the overall representation of the area that Guapiles offers relative to the humid tropics. Upon completion of the new highway in late 1985, Guapiles will be only 45 minutes by car from San Jose. Even though faculty will be housed at the School, this will improve the living conditions because good high schools, shopping, cultural activities, etc. will be easily accessible. Close proximity to San Jose will also improve the ability for professors from the University of Costa Rica to teach basic science and support courses.

It is planned to purchase approximately 3,000 hectares of land for the School. This will be adequate for the campus site, areas for training activities, for research, and to operate a commercial farm. In addition, some land will be left untouched in its natural state to provide students the opportunity study environmental concerns.

The size of the land holdings was determined from reviewing the model used by the Pan American Agricultural School (EAP) in Zamorano, Honduras, and adapting it to the conditions of the humid tropics. EAP estimates approximately 10 hectares are required per student, which suggests 4,000 hectares for the proposed School. However, the task force assisting in the design of the project suggested that for the humid tropics less land is needed, perhaps on the order of 7-8 hectares per student. This amount is sufficient to meet all the teaching, research and commercial requirements of the School, while at the same time, minimizing management demands.

B. Administrative Structure

1. Board of Trustees and Board of Directors

It has been concluded that the governance of the Agricultural School will be by two bodies. One, a Board of Trustees composed of three to five persons whose basic function will be control and surveillance of the economic resources of the College. Second, a Board of Directors of approximately 12 members, of which the members of the Board of Trustees, ex officio, will be a part. The basic function of this group will be to select and appoint the Director and to formulate the broad academic and administrative policies under which the Director will develop and manage the institution. the Director will appoint faculty members and major administrators with the consent of the Board of Directors. Other staff will be appointed by the Director.

Assistance in identifying and screening candidates for membership on the Board of Trustees and Board of Directors will be provided by Cal Poly. In the selection of final candidates, review and assessment will be made by AID, W.K. Kellogg Foundation, and the Government of Costa Rica.

The initial appointments to the Board will be made for terms of a different length, in order to establish a pattern of staggered terms of office. In other words, one third of the members for the initial Boards will be appointed for two years, one third for four years and one third for six years. The normal terms will be for six years with the provision that members may be reappointed for additional terms of office.

The Board of Trustees will meet at least one a year and the Board of Directors four times a year.

After this initial appointment to the Boards, all subsequent appointments will be made by election of members of the Boards themselves.

The search for members of the Boards will give consideration, in the location of candidates, to various tropical areas of Latin America and to relationship with various institutions, such as:

a) Dominican Republic
b) Costa Rica
c) Coastal Region of Ecuador and Colombia
d) Panama and other Central American countries
e) The Amazonian region
f) The English-speaking Caribbean
g) A member of the Board of Directors of the school at Zamorano
h) Cal Poly
i) AID
j) The international agricultural research centers in Latin America
k) The W.K. Kellogg Foundation
l) A graduate at Zamorano who is involved in agricultural production and/or processing, and marketing.

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In addition to the above, there is also a matrix of substantive consideration to be taken into account in the selection process. Persons with at least the following characteristics will be represented on the Board:

a. Banking and investment capabilities
b. Knowledge of management and organizational matters
c. Agro-industrial background
d. Educational administration
e. Production farming experience
f. Agricultural extension
g. Applied agricultural research
h. Vocational education
i. Natural resources (such as forestry - ecology) training and experience

2. The Director

The privilege and challenge of serving as the founding Director of this unique School will make the Director's position highly desirable.

The Director will have the ability and drive:

a. To manage the planning and development processes of this new institution consistent with the policies established by the Board of Directors.

b. To serve as an articulate advocate of the School's mission and philosophy internally and externally. This should include a strong commitment to the "learning-by-doing" approach to education.

c. To give leadership for the creation of an environment of excellence for teaching and learning.

d. To recruit, select, orient, and supervise and evaluate faculty and staff.

e. To communicate in both Spanish and English.

f. To build cooperative relationships with the immediate community, Costa Rica and the agricultural and higher education communities in the Americas.

g. To give leadership in developing appropriate linkages with other institutions of higher education government agencies, international institutions, and private organizations.

h. To employ and develop a quality administrative team and to delegate responsibility so that they can effectively plan and implement programs in their areas of concern.

i. To actively seek funds for the improvement and suppor of the School.

j. To give leadership to curricular development.

k. With the Chairman of the Board of Directors, plan board meetings, prepare agendas and communicate regularly with the Board.

In addition to the above, it is desirable that the Director:

a. Have an earned doctorate in agriculture or related field.
b. Have practical work experience in agriculture or agribusiness.
c. Have experience in a developing country.
d. Have a minimum of 5 years' experience in educational administration.
e. Have demonstrated ability to manage complex systems.

3. Assistant Director for Academic and Student Affairs

An early appointment following that of the Director will be an Assistant, who, with the Director, can set in motion the planning and development of the curriculum and student programs. For the curriculum development, the Assistant Director will establish a working group knowledgeable about programs where "learning-by-doing is practiced to assist in formulating the basic elements of the curriculum.

Since the School will be developed in a relatively isolated situation with students of differing cultures at a highly formative age, the management and development of student programs will be complex, yet must fit into and complement the learning-by-doing academic program. Thus the Assistant Director will participate in all aspects of planning the institution, ranging from student housing and recreational facilities, to the use of the farm land for learning, to planning academic buildings and equipment, to planning the curriculum, and finally system of management and overall development of the students.

The person recruited for this position should have:

a. Training in a subject matter field in agriculture, preferably with a Ph.D.

b. A commitment to the educational method of learning-by-doing.

c. Experience in curricular development and management.

d. Experience in administering an academic unit at the departmental and/or college level.

e. Work experience in agriculture or agribusiness.

f. Experience at a higher educational institution in a student counseling and services role is imperative.

g. Fluencey in Spanish and English.

h. Experience in and knowledge of several Latin American cultures.

4. Assistant Director for Business and Finance

It is important that the business and financial matters of the School be developed effectively and systematically from its inception.

The investment in land, buildings, equipment, services, salaries, etc., will be sizeable and complex. The land will be utilized both as an educational and business enterprise and must be dealt with as such.

This will require the services of someone who has the ability to conceive, plan and manage resources in an efficient and effective manner, so as to maximize their impact on the educational program The individual selected should have:

a. Experience in higher education related to its business and finance programs.

b. Experience in the tropics in a less developed country in Latin America, with an awareness of their business practices and cultural values.

c. Experience in some agricultural enterprise.

d. Fluency in Spanish and English.

e. A high sense of integrity and honesty.

5. Controller

From the beginning of the development of the School, there is a need for someone working under the Assistant Director of Business and Finance knowledgeable about accounting and auditing, who can develop the accounting system of the School with its appropriate controls.

This person should be:

a. A well-trained accountant

b. Someone with experience in an office of a comptroller in an institution of higher education,

c. Bilingual in Spanish and English.

d. An individual with high integrity and honesty.

6. Resident Engineer - Development and Maintenance

In the planning, construction, and operational phases of the School, there will be a need for someone who has engineering ability to help develop and to assess plans for construction, watch construction for adherance to plans and regulations, and once operation begins, to develop a system of maintenance that will be effective and efficient.

This person should:

a. Be a qualified civil engineer.

b. Have a broad experience in practicing engineering, particularly in the building industry.

c. Be bilingual in Spanish and English.

d. Have experience in Latin American countries with an awareness of their practices and cultural values.

e. Have knowledge of humid tropical environment.

7. Security Officer

Another position that will be of vital imporance from the time of purchase of the land on through to the completion of the buildings and the initiation of the classes will be security or campus police.

a. This person should have the ability to train, organize and develop a security force consonant with the development of the institution.

b. Once land is acquired, provide security from squatters and other such intruders.

c. Although the main task in the early stages of development will be securing property, still this person should be developing a staff and program capable of dealing with a community of students, faculty, staff and workers.

C. Faculty

No set of decisions will have a greater impact on the quality of this institution and its graduates than the decisions on hiring faculty. Therefore, it is essential that high standards be set for recruitment and selection of the international faculty.

An aggressive recruitment effort will be essential to acquire outstanding faculty. In addition to traditional announcements being sent to agricultural colleges, technical colleges and international employment services, special effort should be made with former Peace-Corps volunteers and Extension Services.

The following area seen as requirements for all core faculty:

- Masters degree in subject matter of teaching assignment
- Fluent in Spanish and English
- Work experience in agriculture or agribusiness
- Excellent oral and written communication skills
- Willingness to work on institutional farm projects with students.

The following, while not required, are preferred for all core faculty:

- At least 2 years work experience in agriculture or agribusiness in a developing country.
- At least 2 years teaching experience.
- Experience in inter-disciplinary and team efforts.
- Knowledge of the humid tropics agriculture.

In addition to a core faculty (those employed full-time with the intent of being long-term) it is recommended that these additional types of faculty be actively sought:

- Peace Corps volunteers.
- Adjunct faculty from agribusiness farming and government agencies.
- Shared appointments with CATIE and the University of Costa Rica

The following identifies each of the key faculty positions that the School must fill to initiate operations by January, 1987, Preliminary scopes of work and areas of responsibility are described, but will be carefully reviewed and, as appropriate, adjusted once the Board of Directors is in place and functioning.

1. Farm Planning and Development

The technician in charge of Farm Planning & Development will have as his principal responsibility the "planning and development" of farm activities to insure that these further the School's educational purposes. He will work closely with the faculty in charge of developing the various agricultural projects and will endeavor to produce a unified and harmonious farm plan. In other words, he will encourage some faculty to be more aggressive in their projects, while he may be suggesting to others that they should limit their farming activities to those required for efficient teaching and research during the period. He will work cooperatively with the Agricultural Economics and Management Marketing Specialist.

a. The Farm Planning & Development Specialist will:

i. advise the School's administration on the purchase of materials (seed, fertilizers, chemicals, farm equipment, etc.) for the farm, and on the sale of farm produce;

ii. provide budgets to be submitted to the administration, for land clearing, drainage, soil conservation, and other farm development projects;

iii advise the school's administration on the prices for hiring farm labor or for contracting farm jobs;

b. He should be well trained in agriculture; with emphasis on planning and development.

c. He should have a commitment to the learning-by-doing educational method.

d. He should be fluent in Spanish and English.

e. He should have work experience in planning farm development.

f. A masters or a PhD in his field is desirable.

g. Awareness of the humid tropical environment is desirable.

2. Agricultural Economics and Management - Marketing

a. This technician should:

i. Determine the cost/price relation for all farm production activities.

ii. Support the concept that the school's main objective is education, but that determination of a profit or loss for each farm production project is important and should be accomplished.

iii. Work cooperatively with the Farm Planning & Development Specialist, and with the School's Administration and Faculty.

b. This person should be well trained in Agricultural Economics, a PhD degree is very desirable;

c. He should be fluent in English and Spanish;

d. He should be familiar with agricultural economics in Central America;

e. He must be competent to deal with both micro and macro economic issues and problems;

f. It is desirable that he have work experience in agriculture or agribusiness.

3. Nutrition and Home Economics

The reason for recommending early recruitment for this position is two fold: (1) to have this specialist's ideas and inputs on the planning and development of faculty and staff housing, student dormitories, dinning halls, kitchen, laundry, etc.; and (2) to assure that from the very beginning adequate attention is given to food and other "home management" aspects of the School; later, as the continuing education activities are implemented, the Home Economist will have responsibility for developing home making educational materials and courses.

The Nutrition and Home Economics faculty member should have:

a. A degree in Home Economics; a graduate degree is desirable;

b. A commitment to the educational method of "learning by doing";

c. Teaching experience in an educational institution or in an extension type program;

d. Fluency in Spanish and English;

e. Desirable that he/she have work experience in Latin America.

4. Soils-Water-Plant-Animal Interactions

Adequate development of agriculture in the humid tropics is largely dependant on in-depth knowledge of the soil-water-plant-animal interactions. Many of the plants growing in the humid tropics would perish if the fragile soil-water-plant relationship is broken. It is theorized that some areas of the humid tropics could become "wet desserts" if the covering plants are removed and not adequately substituted by others. A soils specialist, who is knowledgeable of humid tropical soils should be on the faculty at a very early stage of the School's development.

This specialist should have:

a. A masters or PhD degree in soils;

b. Work experience in tropical soil conditions;

c. Excellent oral and written communication skills;

d. Willingness to work on institutional farm projects with other faculty members and students.

5. Crops Broadly Defined

Forestry and livestock will be important areas of training in the School; however, crop production will be the principal teaching and working activities.

An early decision will be made on which crops to plant, so the students can begin acquainting themselves with these crops during their first year of studies.

A Crop Specialist will work in close cooperation with the Farm Planning and Development Specialist and with Agricultural Economist.

As with other core faculty members, he should:

a. Be dedicated to the learning-by-doing method of education.

b. Have a Masters degree in Agronomy;

c. Be fluent in Spanish and Englihs;

d. Have 2 or more years experience in agriculture or agribusiness in a developing country;

e. Have teaching experience;

f. Have work experience in the humid tropics (desirable).

6. Livestock

Even though livestock production will not be a major activity at the School, some animal husbandry courses will be taught. A livestock specialist will be hired during the initial phase to determine which areas of animal husbandry the School will develop, and to assist in the planning and implementation of these projects.

This specialist should:

a. Have a Masters or PhD in the subject matter of his teaching assignment;

b. Be familiar, in a broad sense, with livestock production in the humid tropics;

c. Be dedicated to the learning-by-doing method of education;

d. Fluent in Spanish and English;

e. Have at least 2 years work experience with livestock.

7. Forestry - Management - Exploitation

In some humid tropical regions most of the land is still covered by tropical rain forests. Research data on the humid tropics indicate that a relatively large percentage of the land should be left in forests or reforested. Those responsible for developing agricultural projects in the humid tropics should give special consideration to the importance of forests - or tree farming - as protection against soil erosion, and as a natural resource to be managed and exploited; not destroyed by buzz saws and fire. This concept should be understood and supported by the faculty and graduates of the School. Therefore, early selection of a Forestry-Management-Exploitation Specialist is imperative.

This Forestry Specialist should:

a. Have a Masters or PhD degree in Forestry;

b. Have knowledge of tropical rain forest ecosystems;

c. Work experience in forest management/exploitation is highly desirable;

d. Have the ability to communicate well in verbal and written form;

e. Have a commitment to the learning-by-doing method of education.

8. Fisheries

In the Far East the production of fish in farm ponds and coastal waters has become an efficient means for producing high quality (animal) protein.

It is anticipated that with proper technology, fisheries will become one of the humid tropics principal sources of food. Therefore, an Acquaculture Specialist will be hired to develop this potential at the School, for teaching, research, and production purposes.

This specialist should:

a. Have at least 2 years work experience in acquaculture;

b. Have a degree in biology or related subject;

c. Be committed to the learning-by-doing method of teaching;

d. Be fluent in Spanish and English.

D. Curriculum Development

1. General Objectives and Guidelines

Certain objectives and guidelines that stem from the main educational principles of the School will be the basis for organizing its educational programs.

a. Academic Level of Instruction

Every effort will be made from the beginning to assure that the educational program of the School combines: 1) high levels of excellence in teaching and learning, 2) the build-up of responsible professional leadership and self-reliance among its graduates, and 3) disposition and capacity for productive, practical work in any aspect of agricuture as a permanent habit of its graduates. Academic excellence and leadership will not impair practical efficiency, and viceversa.

b) Beneficiaries

The products of the School (graduates and research finding) will be directed to improve productivity and well-being of both the small farmer and the efficient, productive enterpises.

c) Scope of Training

The School will concentrate on crop production and supporting disciplines (basic sciences, agricutural economics, and agricultural engineering) as the main core of its training program. Animal

production will be offered as a minor component, subject to optional emphasis at advanced levels. However, surveys on current employment of comparable agronomists, and to some extent potential empoyer's opinion, will be considered before final definition.

d) Role of Entrepreneurship

The main purpose of the School is to place agronomists in the productive private sectors, so provisions will be taken to develop managerial capabilities in the students through a combination of coursework and production experiences inside and ourside the School.

e) Nature of Practical Field Work Component

The students will be responsible for a variety of farm chores as part of their learning process. Its time ratio, in relation to class-work, is to be determined, but should not be less than one-third nor more than one-half of the weekly schedule. Students will start performing routing work for the School farm in their first year to produce their own food and progress toward field management responsibilities of experimental material toward the end of their program of study.

f. Role of Research Component

Since a research mentality is necessary to have up-to-date and creative professionals, research must be a part of the School instructional program. Students and faculty will contribute, through pertinent applied research, to the improvement of humid tropic agricultural technology; also, information for use in the instructional programs will be constantly validated an updated through research projects. This, in turn, will constitute an incentive to keep qualified faculty.

2. Curriculum Design

The design of the core curriculum of the School will be the task of a specialized team comprising agronomists of different branches, as well as educators, both from the School and from experienced institutions, led by the Assistant Director for Academic Affairs. The following guidelines will be used.

a. Profile Criteria

The occupational profile (what the graduates should do) has been tentatively defined on the basis of the general principles of the Schoool, but will be adjusted as necessary on the basis of such criteria as the demand analysis for graduates. Then the final professional profile (what the graduates should know) will be established, and the definite starting curriculum designed.

b. Preparatory Cycle

Provisions for catch-up courses in a few basic sciences will be made for those students with intellectual potential who were insuffiiently prepared at the secondary school level. These courses will be taught before regular classes start each year.

c. Main Curricular Components

The fundamental task of the Curriculum Design Team will be to determine the relative balance of the following components of the instructional program:

1) Cultural foundations. A motivating encounter with the humanities and social sciences will be integrated into a single, two-semester course.

2) Scientific groundwork. Basis sciences and plant sciences, solid enough as a support for applied disciplines and for continued learning aftter graduation.

3) Soil sciences. This area is crucial for adequate management of the humid tropics.

4) Crop production. This is the main area of instruction and will include diverse courses on annual and perennial crops, combining coursework with ample practical experience in the field.

5) Crop protection. An essential component, in view of the limiting effects of weekds, diseases, and pests in the tropics.

6) Plant breeding and propagation. Important both for production and research purposes.

7) Animal production. Only one or two courses will be required, but practical experience, as well as options for major emphasis in the last year, will be provided.

8) Research-orienting components. Courses in all disciplines required for planning, executing, and analyzing research will be included.

9) Agricultural economics. This will be a strong support for the production courses and will include courses and practices that enable graduates to plan and manage farms as well as enterprise operations.

10) Communication skills. Needed for social as well as business reasons, will include English language and diverse verbal and written skills.

11) Agricultural engineering. A crucial support area for production, particularly in mechanization, land drainage, and postharvest management, it will include course work, shop and field practice.

d) Curricular organization

A preliminary curriculum for a four-year degree is attached. The following considerations guided the preparation of this model:

1) Traditional course sequence is maintained only when essential for the learning, process (as in chains basic sciences). In other instances it is better to take an applied course before taking theoretical course (e.g. taking fruit and vegetable crops before plant physiology, protection, and soil fertility).

2) The use of library and computers will be stressed from the start, and will be learning tools for the whole program. However, computer science, as a formal discipline, will be taught later as a tool for advanced economics and statistics courses.

3) English will be required througout, however, in the last two years it will be more useful to teach certain technical courses in English, rather than having regular language courses.

4) Field practice in the first two years will emphasize food production on the School farm. Crop production will also be studied in class.

5) Field practice in the last two years will emphasize experimental work as well as an optional emphasis in animal production, agricultural engineering, or specific groups of crops.

6) Field practice in the second, third and fourth years will include a minimum of one trimerster of instructorship, e.g. responsibility for supervising the field work of groups of less advanced students.

7) The courses in social sciences will be integrated and collegiate (several oustanding visiting professors), and offered in third year, so as to benefit from the greater maturity and motivation of the students.

8) Students will serve an intership outside the School during one trimester of the fourth year either working and/or living in a small farmer community or in a large production company to test their technical knowledge in different production environments.

3. Scheduling

Yearly, weekly and daily programming of the School will be decided by the Curriculum Design Team. The following organization is suggested:

a) Timing of the school year: start in mide January, and finish in mid December, with a 5-week vacation for Christmas and New Year. (The limitation is that some annual crops (corn, beans) may have to be planted in this period.)

b) Academic cycles: the "long trimester" organization is planned, i.e., three cycles a year, each with 14 weeks of classes and 1 week for final exams, plus 1-week breaks (no classes, but field work full time) after the first and second trimesters.

c) Organization of practical field work: daily time ratio in relation to class work (and possibly research) will be decided. Field work cycles: groups of 6 - 12 students assigned to production units for 3-week periods, led by advanced students (instructors).

d) Daily scheduling: class work will be most productive in the morning, but exceptions may be necessary, particularly if full-day field work is required on farms distant from the main campus.

4. Course Programming

For each course within a given disciplinary group, an inter-institutional team of specialists will set standards for the following: curriculum sequence, weekly hours (class, lab and/or field), course content, credits, reference literature, and nature of practice. Minimal criteria required by prestigious U.S. and Latin American institutions will be followed, so that courses can be transferred and accredited. A summary of components of the curriculum follows.

	Disciplinary groups	Number of Courses	
		Minimum	Maximum
A.	Humanities	1	4
B.	Basic Sciences	8	10
C.	Plant Sciences	2	3
D.	Soils	4	5
E.	Crop Production	8	10
F.	Crop Protection	3	5
G.	Plant Breeding and Propagation	2	3
H.	Research Orientation	4	5
I.	Social Sciences	4	8
J.	Communication Skills	6	8
K.	Agr. Engineering	3	6
L.	Animal Production	3	6
	TOTAL	48	73

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Other credit-earning activities

M.	Field Practice	11	11
N.	Instructorship	1	3
O.	In-farm intership	1	1

F. Student Selection

No shortage of applicants for the School will exist and an effort will be made to attract the best one and to select them on he basis of fair, objective, efficient, and uniform criteria and procedures.

1. Numbers and Priorities

The School will admit some 100 freshmen a year when operating at full capacity, but will start with 75 in its early, formative years.

There will be far more applicants from the host country, but the student body will not have a local majority. Selection will employ a rough country-by-country assignment, in combination with academic and personal considerations. Countries in Central America and Panama where humid tropics are important will have priority.

2. Academic Considerations

Students desirous of practical experience and willing to work with their hands are required, but not at the expense of academic excellence. This balance implies:

a) Secondary school completion. Adjustments will be made to compensate for wide differences in secondary school quality which could provide unfair to some applicants.

b) Both general intellectual aptitude and specific subject matter knowledge will be assessed and credited by means of the admission procedure.

c) Vocational inclination, i.e., a minimum knowledge of, and motivation toward, agriculture and rural life, will be sought.

3. Personal Considerations

a) Age: limits will be set to avoid immanture or overmature students.

b) Sex: discrimination will be ruled out. Women and men will be made aware of the hardships and limitations that an agronomic career implies.

c) Motivation for learning: the dynamic and scientific nature of agriculture will be recognized by applicants.

d) Rural vs. urban origin: this will not be a prime criterion but, other things being equal, rural youth will be preferred.

e) Health requirements: minimum standards to allow for required field work will be set.

f) Economic need: deserving applicants will be encouraged and accepted, regardless of their ability to pay.

g) Self-assurance: applicants will be made aware of the conditions and hardships of student life.

4. Guidelines for Selection Procedures

A uniform and efficient selection procedure will be implemented by the Student Selection Committee, including:

a) Appropriate, attractive and informative announcements.

b) Applications forms designed to provide pertinent information and insights about applicants.

c) A preliminary screening (pre-selection process).

d) An admission examination carefully designed, so as to measure: (1) general intellectual aptitude; (2) specific scientific knowledge; (3) vocational inclination.

e) Post-exam interviews to clarify doubts that the institution or the applicant may have before decisions are made.

f) Appropriate parental information and approval.

g) Medical examination (physical and psychological).

h) Prompt pre-entrance information and assistance for admitted students.

i) Remedial (levelling) courses for deserving candidates with secondary school deficiencies.

j) Post-entrance screening before the end of the first year so as to remove students who were mistakenly admitted, using criteria that are clearly defined and well understood.

TECHNICAL ANALYSIS

The analysis presented in this section first reviews the demand for the type of training to be provided by the Agricultural School and, based on the conclusion that demand exists and will continue in the future, then considers the alternatives for providing the training. The alternative selected, creation of a new institution, raises other technicl factors which are addressed by an analysis of engineering and construction considerations.

A number of recent studies have stressed the need for increased numbers of better qualified agricultural professionals in Central America. Most of these studies however, have not quantified the numbers needed, discussed the type of training needed, or assessed the effective demand for such professionals. The design team which assisted in developing the project, therefore, analyzed the needs in greater depth, developed information relative to determining the likelihood of there being an effective demand for the students of the proposed School, looked at the alternatives to establishing a new institution, and developed a realistic plan for the development of the proposed new School.

The Need and Demand for Additional Agricultural Professionals

A number of high level groups have studied the quality and quantity of agricultural programs in Central American and recommended an expansion of agricultural programs and a substantial increase in the training of agricultural professionals. Concurrently, and at first glance in apparent contradiction, other studies have indicated that some graduates are having difficulty finding jobs. In Costa Rica, the supply and demand for agricultural economist is about equal, but enrollment is being reduced in the schools of plant sciences and animal sciences of the university because of weak demand (coupled with budgetary restraints). At the same time, the demand for the more production-oriented graduates from the Escuela Agropecuaria Panamericana (EAP) in Zamorano, Honduras remains high, often exceeding the availability of graduates. This suggests that the quality of education affects the demand. A survey of private sector employers in Costa Rica by the design team shows a strong preference for EAP graduates by the private sector. The apparent over-supply of some types of agricultural graduates, i.e., those from national universities, also reflects the cutback in government hiring due to budgetary problems brought on by the world recession in recent years.

The international economic conditions coupled with the tense political situation in Central America, and in some cases inappropriate governmental economic and agricultural policies, have been a deterrent to increased investment in agricultural activities by the private sector. This has also slowed the hiring of agriculturalists. There are a number of factors, however, which suggest that the foregoing situation will be changing significantly before the proposed new regional school will be providing graduates.

Central American countries are becoming increasingly aware that they must expand agricultural productivity, both as a means of increasing crucially needed exports and to meet food needs which have been rising sharply because

of the high rate of population increase. A number of infrastructure and market development programs and projects are being initiated in the region which will require trained agriculturalists to plan and implement. These programs and projects will also foster conditions which will be conducive to increased private investment in agricultural production and agri-business activities, which will also increase the demand for trained agriculturalists. While there are programs to increase productivity in exisitng agricultural areas, there is also increased migration into the humid lowland tropics accompanied by the use of inappropriate agricultural production technologies. Much of this movement is having deleterious effects on the nature resource base of these fragile lands.

Thus, there is a need for an increasing number of trained agricultural professionals to carry out research in and to teach about the lowland humid tropics, and to carry out production activities in these areas.

SIECA, the planning unit of the Central American Common Market, issued a report in 1983 on the possibilities for the production of non-traditional crops for export from the low humid tropics of Central America and Panam (Cultivos No Tradicionales para Exportacion de las Zonas Humedas Bajas Tropicales de Centroamerica Panama, SIECA/ECID/MOCA Div. Inf. 024-83, Guatemal, March 1983). Of the 14 commodities studied, 9 have the potential for considerable expansion, both in area in production and employment generated. Information on these mone products are provided in the table below.

DEVELOPMENT POTENTIAL OF THE LOW HUMID TROPICS
IN CENTRAL AMERICAN AND PANAMA

Crops	Area in Prod.	Potential (1,000 Ha.)	Pot. Employ. generation 100 Days/yr)
Cacao	42	38	4,499
Cashew	10	20	893
Pineapple	11	22	4,964
African Palm	28	39	1,672
Soybeans	3	80	2,116
Peanuts	10	66	3,970
Sesame	63	115	4,565
Yucca	11	49	3,419
Tobacco	25	10	2,319
Total of Above	203	440	28,417
Total of 14 Crops	230	460	28,920
Of which: Guatemala	80	174	10,691
El Salvador	23	56	3,715
Honduras	43	40	3,185
Nicaragua	23	79	3,293
Costa Rica	53	95	6,961
Panama	8	16	1,075

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These production figures generally refer to 1980 or 1981. No doubt some expansion is alredy underway. However, it is clear from a review of the projects approved for Costa Rica that at least half of the potential for increased production suggested by this study will be developed after the Agricultural School begins graduating students.

In its Increased Agricultural Productivity Program project in Costa Rica, IDB indicates a need for 26 Ingenieros Agronomos to improve the output on 30,000 hectares of lowland humid tropics. This suggests an increment of nearly 400 professional agriculturalists to carry out the expansion proposed by SIECA in the low humid tropics of Central America and Panama. This calculation does not take in to consideration the increased demand of some larger private enterprises that may be established or expand their operations in the low humid tropics. Nor does it allow for the possibility that an increasing number of university graduates will initiate farming activities in these areas.

The foregoing information indicates that there will be an increasing need for agricultural graduates, including specifically those with an orientation to the low humid tropics. To guarantee that there will be a continuing high level of effective demand for the graduates is not possible, however, there are a number of factors which suggest that demand will be rising and that employment of graduates from the Agricultural School will not be a problem. By the time there are graduates from the School, the economic situation in Central America should have improved considerably so that some level of government hiring will have resumed. Furthermore, donors are increasingly funding operating costs as well as investment costs for the development activities they are supporting. The previously cited IDB project is an example. Thus, higher levels of government hiring can be expected by the time graduates of the School enter the labor market.

Because of civil service rules, graduates, even with a Bachelor of Science Degree, will be at a disadvantage in government hiring in competing with graduates from the national universities with an Ingeniero Agronomo degree. Therefore, the bulk of the graduates of the School, like EAP graduates, are expected to work in the private sector or go into business themselves. (The following Table compares the employment of Zamorano and University of Costa Rica graduates.) While increased government hiring may not add significantly to the demand for graduates of the School, it will mean that there will be fewer Ingeniero Agronomo graduates competing for private sector slots.

Comparison of Current Employement of Graduates of the University of Costa Rica College of Agriculture (UCR) and the Panamerican Agricultural School in Zamorano, Honduras (EAP)

Percent employed in:	UCR	EAP
Public Sector	79	35
Private Sector	12	31
Self-Employed	7	31
Retired	2	.4

Government attitudes toward the private sector are likely to have a greater influence on the demand for graduates of the School than government hiring policies. Fortunately, there appears to be an increasing awareness among Cental American Governments that they need to modify policies and practices to encourage increased production by the private sector. Thus, it is anticipated that private sector demand for trained agriculturalists, particularly graduates of the Agricultural School and EAP, will arise. The design team attempted to get some indication of this demand by doing a survey of a number of potential employers in Costa Rica. Emphasis was on known employers of Zamorano graduates and firms producing for export, particularly of products from the low humid tropics. Although the sample was relatively small, it does give some indication of recent hiring trends and anticipation for the future. It is assumed that graduates of the School would be competitive for the Ingeniero Agronomo positions because the quality of training would be more important in the private sector that the title of the degree. Consistently, private sector employers spoke highly of the training provided to EAP graduates; a number spoke disparagingly of that provided Ingeniero Agronomo graduates.

Based on the information available there appears to be ample demand within Central America for the planned graduates of the Agricultural School. Both national universities and EAP are taking only a small percentage of eligible qualified candidates. For example, EAP admitted only 18 Costa Ricans from more than 100 qualified applicants and 66 out of 300 qualified Hondurans. In addition, significant demand exists in South America and the Caribbean for this training. For example, Ecuador has requested considerably more slots at EAP than can be provided — 100 slots a year. In recent years over one-fiuth of the EAP graduates were from outside of Central America (including Panama and Belize).

In summary, there is a clear need for additional trained agriculturalists in Central America, particularly those oriented toward the production of crops in the lowland humid tropics. There will be plenty of qualified candidates unless the increase in the number of scholarships to the U. S. (per Kissinger report recommendations) is too dramatic. The demand for graduates of the School will come primarily from the private sector, and this demand is expected to continue to rise significantly.

Alternatives to a New Institution

As part of the design process, four alternatives to the establishment of a new institution were reviewed:

a) expand Zamorano (EAP);
b) expand CATIE at Turrialba;
c) expand and modify the output of the national universities;
d) expand undergraduate training in the U.S.

The results of the design team's review are presented below.

Expand EAP

At first glance, this appears to be an attractive alternative because EAP is already an established institution with a good reputation throughout Latin America and the Caribbean, it is free from domestic political pressures, and its philosophy of instruction is the model for that proposed for the School. The Board of Directos of EAP is in the process of considering an expansion of enrollment, including the possibility of adding a fourth year of instruction for a small percentage of the students. This has been under consideration for a number of years, and EAP has recently begun to work with USAID/Honduras in analyzing its options for expansion. A final determination is not expected for another year.

Of more importance is the location of EAP. There is a need for a campus in the lowland humid tropics which would be complementary to the location of EAP. EAP itself thought of establishing a second campus in the lowland tropics of Costa Rica. If the desirability of locating a campus in the lowlands of Costa Rica is accepted, then the costs of establishing the new school would be about the same whether it was established as a new independent school or as a second campus of Zamorano. While there could be some costs savings in overhead, this would be completely offset by the additional costs that would be entailed in coordinating the two campuses. Furthermore, it is not clear that there would be any savings in the salaries of faculty or management, unless the school in Costa Rica only took students for the last two years of their enrollment. Both the Task Force and the Kellogg Foundation team felt that this arrangement was impractical, primarily because of the negative impact it would have on the esprit de corps of the students, one of the positive factors in the EAP arrangement. It would also require a complete reworking of the EAP curriculum which currently does not offer all the courses required for a B.S. degree, but it is based on teaching a specific discipline each year.

There have been some expressions of concern that the establishment of Agricultural School could have a negative impact on EAP, but the design team and the Task Force do not feel that there is justification for this concern. There appear to be no shortage of qualified candidates for both schools, unless there is a drastic expansion beyond the level presently planned of scholarships in agriculture for study in the U.S. in response to the Kissinger Report recommendations. The demand for graduates from both EAP and the Agricultural School should continue to expand, particularly in the private sector. While there would be some advantage to the Agricultural School to have on its faculty one or two people with experience at EAP, such people could likely be recruited from those who have previously served at EAP. Thus, there should be no need to hire away EAP faculty, and refusal to do so will be policy from the outset. In this context, salary levels at the new School will be compatible with those at EAP so that a more attractive offer will not be possible. Similarly, funding for scholarships will be consistent between the two institutions.

A high degree of cooperation between the two institutions, including possible exchanges of faculty for short courses or seminars, is in the interest of both institutions and will be pursued on an active basis.

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B. Expand CATIE

CATIE also has the advantage of being a long-established institution of international standing. As an international institution; as such, it is largely free from national politics, but subject to some external pressures from other affiliations.

CATIE's principal program in recent years has been research and short-term training . With the help of this project, its graduate program will be strengthened. It could well endanger the success of CATIE's ongoing programs if it were to try to lauch a new undergraduate program concurrent with an expansion of its graduate program.

CATIE is not located in the lowland humid tropics, although it is close to such areas and has an experimental station located in the lowland, humid tropics. If the new undergraduate facility is to be located in the lowland humid tropics, it would cost virtually the same whether administered by CATIE or a new school administration. Theoretically, the undergraduate facilities could be built at Turrialba and students could be bussed to production and experiment stations in the lowland humid tropics for their practical work. However, since this would entail travel of approximately an hour each way, this would be disruptive to the educational program, and would not be preparing the students to live and work under humid, tropical conditions.

The proposed site for the of the Agricultural School campus, after completion of the New San Jose-Limon, highway, will be fewer minutes from San Jose than CATIE. This will have a number of advantages, one of the most important of which will be in the recruiting of faculty. CATIE has at times had difficulty in recruitment due to its relative isolation. EAP also has had such difficulties particularly before the road to Tegucigalpa was improved.

C. Expand and Modify the Output of the National Universities

The Kissinger Report recommends the strengthening of Central American universities. Strengthening the agricultural education programs of these intitutions would indeed be salutary. The question is whether it is feasible to bring about the types of changes needed, through such a regional project.

Two options were considered try to have an impact in all of the universities concurrently or try to attach the "hands-on" type program to one particular university, e.g. one in Costa Rica. Trying to work with five or six universities concurrently is out of the question. In addition, there would be controversy in some countries over which university would be the chosen one. Most of the Central American universities are highly politicized, thereby making it difficult to introduce any new ideas, even in a relatively technical (and theoretically non-controversial) area. Even if a university could be found in which the political problems did not seem insurmountable, it probably would be necessary to construct an essentially new campus so the costs would end up being about the same as presently proposed for the Agricultural School. Whether it would be feasible to establish an endowment fund solely for the Agricultural School of a national university seems highly unlikely and raises the question of long-term financed viability and independence.

D. Expand undergraduate Training in the United States

The Kissinger Report has recommended a very large expansion of the granting of scholarships for study in the U.S. It is assumed that a significant expansion will take place, and conceivably could encompass the number of personnel that would be trained under this proposed project -- at least in the project's early phases.

There are other factors, however, that argue against the U.S. training option. There is only one U.S. university that stands out for it "hands-on" pedagology, and it is not located in a lowland humid tropical area. There are institutions in the South that have some characteristics of the lowland tropics, but the technology in use is often too specialized for Central American conditions — or not appropriate for other reasons. Furthermore, achievement of the improvements in agricultural education programs that are sought in national universities in Central America are much more likely to be obtained if there is a visible example of the program in a Central American institution and that institution is building links with the national universities.

In summary, there does not seem to be a reasonable alternative to creating a new institution in the lowland humid tropics if a relevant, well-designed transfer of technology program is to be carried out in a relatively short period of time. The magnitude of the development needs and problems in the area, particularly in the lowland humid tropics, begs for immediate and effective action. Thus, the establishment of a private, independent Agricultural School in the lowland humid tropics with a site as close as feasible to San Jose and CATIE is the best alternative available.

Engineering and Construction Review

General

The site on which the new campus is to be located has yet to be identified other than the general low-land area in the vicinity of the town of Guapiles, about 70 kms northeast of San Jose, along the new World Bank - financed road to Limon. The road is in the final stages of construction and is scheduled for completion in December 1985.

Figure 1 shows a preliminary master plan of a suggested 80-hectare urbanized campus layout identifying the respective buildings and related components. These will comprises the school, together with an indication of the proposed phasing, Phases I, II, III and IV, for accomplishing the construction within the respective calendar years, 1985, 1986, 1987, 1988 and 1989 of the planned project implementation schedule. When the site selection has been made, a final master plan will be approved adapting the respective buildings and related components into the selected site topography and terrain, a factor which can result in some revision and modification to the proposed layout of Figure 1.

The implementation schedule envisions that the registration of the first class will take place in January, 1987. To be ready by this date, all Phase I construction components, furnishings and equipment need to be in place no later than December, 1986, tested and ready for operation in order to accomodate the incoming student body, faculty and operations/maintenance staff.

Construction will be implemented in two locations, the city of San Jose and the Guapiles area. The San Jose construction will be developed to provide a total of ten transient apartments of 2 and 3 bedrooms, a central meeting room and a central liason office. A 1000 square-meter site will be needed to accomodate the 3-story combined apartment, meeting, office building and to include an area for limited parking. The site for this building has yet to be identified, but this building would be located within an urbanized zone with available municipal water, sewerage, and electric utility services.

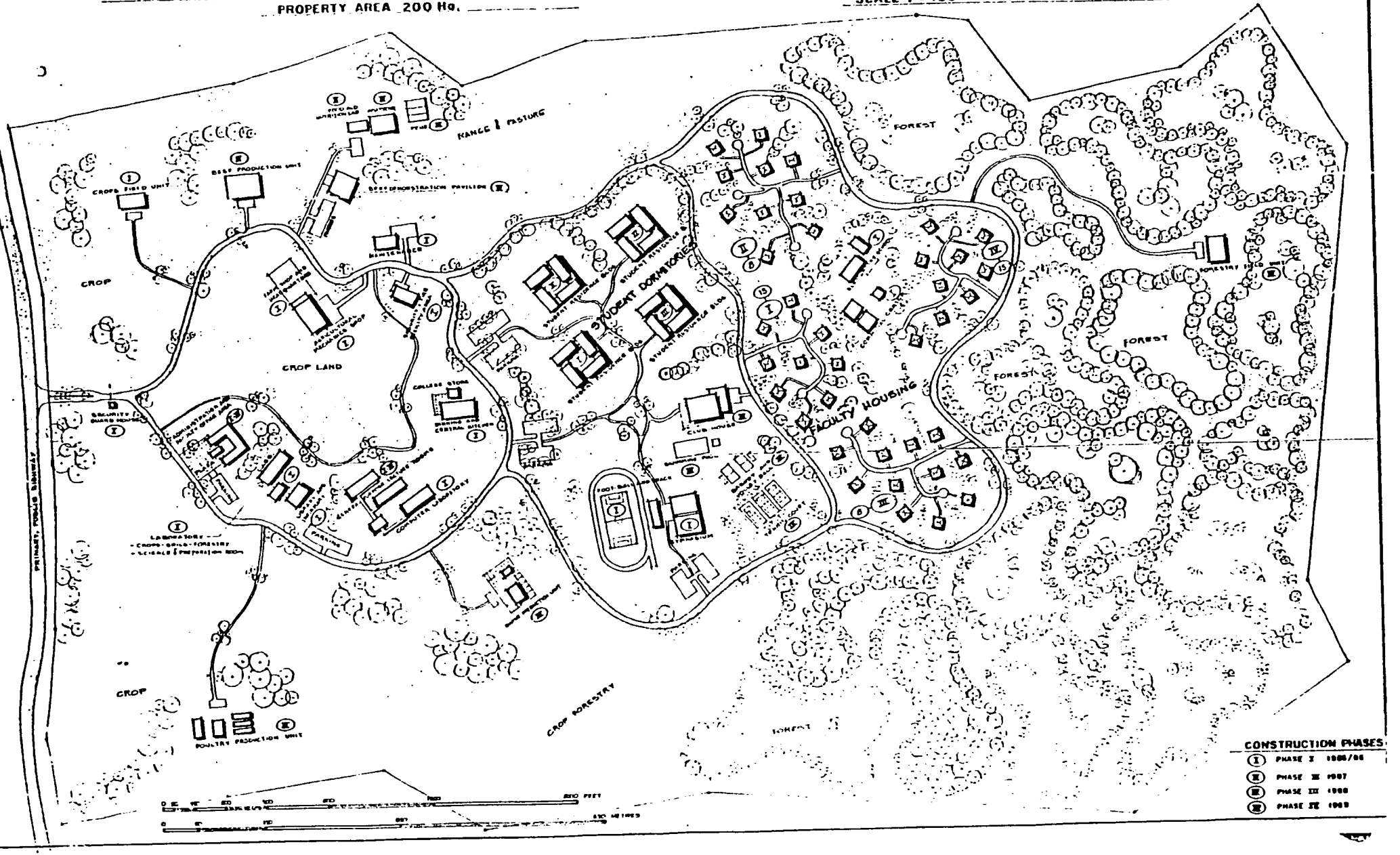
The Guapiles campus will be developed to provide the facilities for practical, hands-on, eduational experiences. The components of construction will basically comprise a series of interrelated school buildings, together with respective infrastructure elements, the accomplishment of which will include clearing and grubbing, earth movement and grading, streets and drainage, utilities (water/sewerage/lights), and final site preparations. Relatively standard and simple (one or two-story) building construction is proposed to consist of reinforced-concrete and/or tiled floors, reinforced-concrete structural building frams, concrete-block filler walls, steel roof trusses and roof joists, and asbestos-cement corrugated roofs. The highly-humid low-land tropical climatic conditions indicate a need for air conditioning for selected buildings, primarily the central library/infirmary building, college bookstore, computer and other laboratories, and administration and student records/central computer areas.

GUAPILES, COSTA RICA

PROPERTY AREA 200 Ha.

SAMPLE CAMPUS MASTER PLAN

SCALE 1" = 400' ESC. 1:5000 12 FEB. 1985



The simple nature of the proposed school and related buildings (one or two stories), with no particular concentration of floor and resultant earth loadings, will not present unusual foundation problems during planning and design. During a field visit, the surface soils of the area in the vicinity of Guapiles were observed to be basically granular and loose earth with some clay filler, together with large clusters of medium to large boulders overlying many of the surface areas adjacent to the side of the road. Stone and boulder deposits were noted along the sides of the new road west of Guapiles resulting from the earth work and grading operations of the road construction. At one cut section of the road, the side slope showed a conglomeration of stone and boulders below the earth surface.

Development of utilities (water, electricity, sewerage) also would not appear to present any unusual problem. Water appears to be available from both surface and ground-water sources, development of which will depend on the final site selection. Drilling for ground-water development, however, might present some difficulties at sites of granular subsoil conditions of gravel, stones and boulders. A central sewage collection and disposal-after-treatment (oxidation lagoon) is envisioned for the campus area and septic tank detention with subsoil leaching for the outlying areas too distant for practicable connection to the central sewerage system. Distant and isolated outlying areas may be provided with individual water service by means of small indivisual wells and pressure systems should final design review determine that this will be more practicable than a connection to the central campus water system. Electricity would be provided from the national grid now supplying Guapiles by means of a connection with the final selected site.

Construction Cost Estimates

The construction cost estimates have been based on recent labor/material cost experiences in the San Jose area, together with projected allowances for application, as considered appropriate to the isolated low-land/humid Guapiles area. In making these allowances, principal considerations were given to inflationary influences and to the relative isolation of the area with its limited skilled labor complement (carpenters, masons, electricians, plumbers) in relation to the relatively lrge requirements of the construction program. Other considerations were given to the humid climatic conditions and the unusually heavy and extensive periods of intense tropical rains. Daily rainfall records at Los Diamantes (Guapiles Airport) weather station show an annual rainfall variation of 165 inches to 221 inches during the five-year period 1979 through 1983 over which the records were reviewed. Daily records show that the months of January, February and March reflect the least number of days of measurable rainfall, and in some years, this low rainfall period also extends to include either or both December and April. During the remaining months (May through November), measurable amounts of rain fall almost every day.

The cost estimates reflect and identify the foreign exchange component of the construction cost. Costa Rica is generally self-sufficient in meeting the material needs for the type of building construction proposed. Mechanical/electrical needs, such as imported air conditioning, door/window hardware, water/sewerage materials/equipment, and selected electrical pumps/motors/equipment will resquire payment from foreign exchange. Current experience indicates that this will approximate 15 percent of the construction cost.

Inflation

Discussions and reviews with construction and engineering principals indicates a need for an inflationary allowance in developing projected construction costs. A review of most rescent date shows inflationary incluences of 16.5% and 14% respectively for the years 1983 and 1984. For the current year 1985, a potential inflationary increase of 15% is being projected. The costs presented herein reflect this probable inflationary influence for the construction beginning in late 1985 and early 1986 and proceeding through 1986--Phase I of the construction program. For 1987, Phase II, 7.5% added allowance is projected, the average between a January to December 15% annual inflationary cost increase. Similarly, construction costs for work programmed in 1988 and 1989 reflect 15% annual cost increases resulting in compounded inflationary allowances of 24% and 42% over the costs estimated for the works to be initiated during Phase I in 1985/86.

Phasing of Construction:

The construction of the school facilities will be phased in accordance with a four-phase implementation plan Phase I will embrace the period 85/86 with construction programmed to begin in late 85 and to be completed in late 86 for an initial 75-student enrollment for classes in January 1987. Phases II, III, and IV will be implemented in the ensuing calendar years of 87, 88 and 89 to attain a capacity for receiving the projected full 400-student enrollment early in 1990.

Table 1 lists thesse various components together with the proposed scheduling, by phases, for the respective calendar years.

Construction Cost

As previously stated, construction costs have been based on conferences and discussions with members of the San Jose consultant and construction community, including the AID-financed consultant and contractor who accomplisheds the recently completed INCAE construction project. These costs were also evaluated against current IDB cost analyses developed for its agricultural productivity project and the cost date being used for the proposed AID/CATIE renovations. In addition, the 15% foreign exchange component assigned to the construction cost has resulted from the results of evaluations and reviews of recent building constrution work, including that of the new INCAE campus buildings. Similarly, the inflation allowances have been evaluated and developed from reviews and discussions with the consultant and construction community and from an examination of the recently constructed INCAE campus cost data. These cost estimates further reflect a site location beside the new World Bank road in the Guapiles area and as presented can be considered reasonable firm, realistic, and indicative of current practice in Costa Rica.

The total cost for construction has been estimated at $18.42 million. Table II, with a breakdown of this cost in conformance with the projected phasing of the construction work, provides an indication of annual construction budget needs. The cost estimates for the San Jose and Guapiles campus buildings and related facilities reflect the projected inflationary

TABLE 1

PHASING OF CONSTRUCTION COMPONENTS

PHASE I (1985/86)	PHASE II (1987)	PHASE III (1988)	PHASE IV (1989)
1. Transient Housing	1. Classroom Buildings (2 units)	1. Campus Infrastructure	1. Classroom Buildings (2 units)
2. Campus infrastructure	2. Student Dormitory	2. Classroom Building (2 units)	2. Student Dormitory
3. Classroom Buildings (2 units)	3. Faculty (8)/Secretarial (3) Office Extension	3. Student Dormitory	3. Faculty (15)/Secretarial (6) Office Extension
4. Student Dormitory	4. Faculty Housing (8 units)	4. Faculty (8)/Secretarial (3) Office Extension	4. Faculty Housing (15 units)
5. Student Dining Hall/ Storage		5. Faculty Housing (8 units) Unit	5. Beef Production/Demonstration unit
6. Administration/Faculty (9) Secretarial (3) Offices		6. Food/Nutrition Lab.	6. Forestry Field Unit
7. Faculty Housing (15 units)		7. Abattoir Facility	
8. Security/Fire Station		8. Swine Production Unit	
9. Building/Grounds Maintenance Facility		9. Poultry Production Unit	
10. Library/Infirmary		10. Swimming/Tennis Recreation Facilities	
11. Computer Laboratory			
12. Crops/Soils/Forestry/ Science Laboratories and Preparation Rooms			
13. Agricultural Mechanical Shop/Farm Shop Center and Headquarters			
14. Crops Field Unit			
15. Elementary School and Community Center			
16. Gymnasium and Football Facilities			

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TABLE II
CONSTRUCTION COST ESTIMATE
(UNIT US $1,000,000)

	PHASE I		PHASE II	PHASE III	PHASE IV	
	1985	1986	1987	1988	1989	TOTAL
1. San Jose Transient Housing	0.25	0.15				0.40
2. Guapiles Campus						
Infrastructure	0.46	0.46		0.39		1.31
Buildings	0.85	4.00	1.82	3.27	3.58	13.52
3. Consultant Engineering Services (10%)	0.16	0.45	0.18	0.37	0.36	1.52
Total Construction Cost	1.72	5.06	2.00	4.03	3.94	16.75
Contingencies (10%)	0.17	0.51	0.20	0.40	0.39	1.67
Total Construction Budget	1.89	5.57	2.20	4.43	4.33	18.42
Foreign Exchange Budget (15%)	0.28	0.84	0.33	0.66	0.65	2.76

influences as discussed earlier under Inflation, to which engineering and contingency allowances have been added as shown. These estimated costs do not include any allowances for rights of way and/or land purchases.

The foreign exchange needs are also shown, and these estimates reflect an overall allowance of 15% of the construction cost. This allowance, however, can vary among projects. The infrastructure construction and a larger use of heavy imported equipment and materials may reflect a 15% to 25% foreign exchange cost component. Imported heavy equipment and related materials needs reflect the use of trucks, vehicles, bull dozers, rock crushers, road graders, power shovels, pipe, pumps, slectric transmission/distribution and other electric materials, air conditioning, mechanical/plumbing and door/hardware equipment and materials. In the case of buildings with a larger use of local materials, the foreign exchange can approximate 10% and less of the construction cost. Also for building construction, which is continually in progress throughout the country, many needed imported materials can be purchased off the shelf with local currency since a stock of these items is maintained to meet the continuing local building construction needs. Depending on AID policy, such purchases might be considered a local cost component; in which case, a reduction of the foreign exchange needs may fall to something less than the projected overall 15% allowance. This alternative could be examined and reviewed during the planning and design.

Planning and Design

Planning and design will be performed by an architectural and engineering firm to be retained by the school administration. When the campus and transient housing sites have been identified, field surveys will be performed to develop the topographic information needed to site adapt the proposed facilities, and to develop and submit a final master plan for review and approval. This will require the assistance and guidance of a school planner and campus development specialist to guide the consultant. When the master plan has been approved, schematic building drawings will be prepared, again with guidance and assistance from a school planning specialist, and submitted for approval. These schematics will show the type and limits of building construction for Phase I, together with the related infrastructure development and improvements. With the approval of the schematics, final plans and specifications will be prepared and submitted for approval, whereupon the construction contractor can prepare and submit cost proposal for the construction.

To expedite and implement fast-track procedures, the consultant and construction contractor will continually and jointly review the work as it progresses by means of pre-bid type conferences. The construction contractor, thus fully informed upon receipt of the final plans and specifications, can prepare and submit a cost proposal in the soonest practicable time frame. Upon review by the consultant, a construction contract will be negotiated with the school administration. During contract negotiations, any differences in cost perspectives between the consultant and the contractor can be clarified and final contract prices established for any questionable items of work.

An engineer who will be the liason between the school administration and the consultant and contractor will be retained by the school authorities.

Upon completion of the construction, this engineer will administer and be responsible for the operation and maintenance of the school facility. He will collaborate closely with all participants, the school administration, the consultant and the contractor. He will continually follow and monitor progress to assure adherence to the implementation schedule and will recomend preventive measures, as circumstances may indicate, for overcoming potential influences.

Construction

The proposed area for the site development is isolated and lacking in skilled and common labor in the number indicated for the magnitude of the proposed work. The contractor will be required to recruit staff and labor from San Jose; an on-site field camp in indicated.

The general area is one of extremely high and torrential/tropical rainfall with annual measured rainfall in excess of 200 inches. The more direct World-Bank financed road routing (75 kms) is scheduled for completion at the end of 1985, and projects to be initiated earlier can be influenced by the round about currently available routing through Turrialba and Cartago to San Jose, some 120 kms. over a winding and generally narrow roadway.

Figures 2, 3 and 4 show schematic layouts for the proposed classroom building and faculty housing indicating the somewhat simple and uncomplicated pattern for the construction proposed. Because of the fact that the site has yet to be identified, provisions for the infrastructure items, site access road, source and distribution of electricity, and perimeter fencing of facilities, water supply and distribution, and sewage collection and disposal and streets and drainage reflect only nominal allowances consistent with the experience/record in the development of infrastructure for this type of school facility. Also, current planning reflects 6-meter, concrete campus roadways with 1 1/2-meter shoulders, and intallation of the more economical alternative for overhead service in electrical distribution.

The cost estimates are based on accomplishment with conventional construction procedures. Final site selection that may result in an unforeseen need for excessive and unusually costly infrastructure development can also result in a need for additional funding from that projected herein.

Another construction implication worthy of further examination is the review of phasing of the construction. Phase I comprises $7.46 million of construction for which the contractor will mobilize. Phase II to follow involves $2.20 million of construction, indicating reduced staffing and equipment needs. In Phase III, $4.43 million of construction, the pace picks up again indicating further increased staffing needs for the contractor. In order to balance the construction which may result in more favorable construction bidding responses, a division of the construction work into two approximately equal contracts by combining Phases I and II and Phases III and IV would appear practicable. This would result in two contracts, each of $9.66 million and $8.76 million. This can permit the contractor to maintain his Guapiles operation throughout the work and to avoid disruptive staff/materials/equipment reductions and resultant demobilization costs to be followed one year later with comparable mobilization cost increases.

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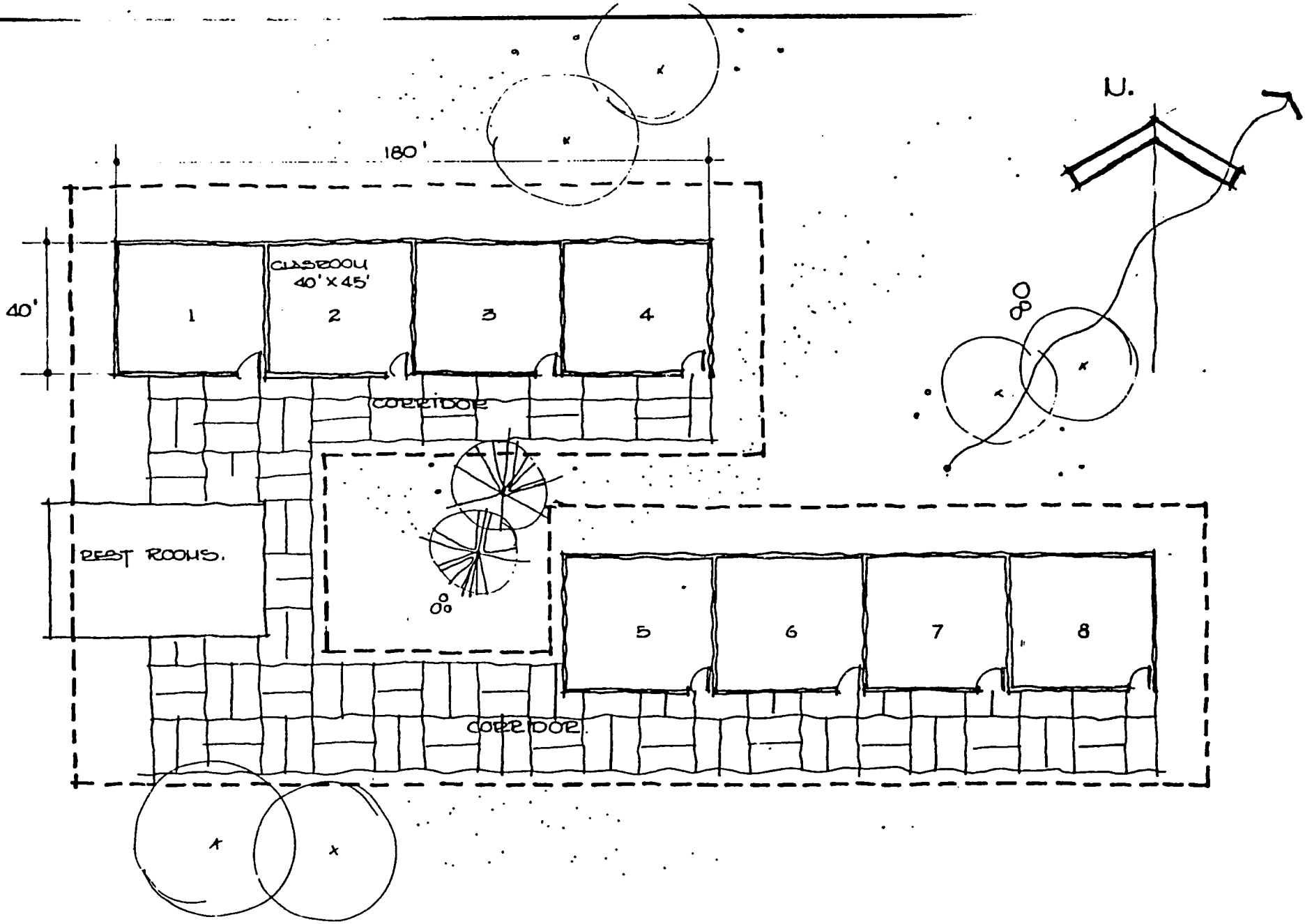


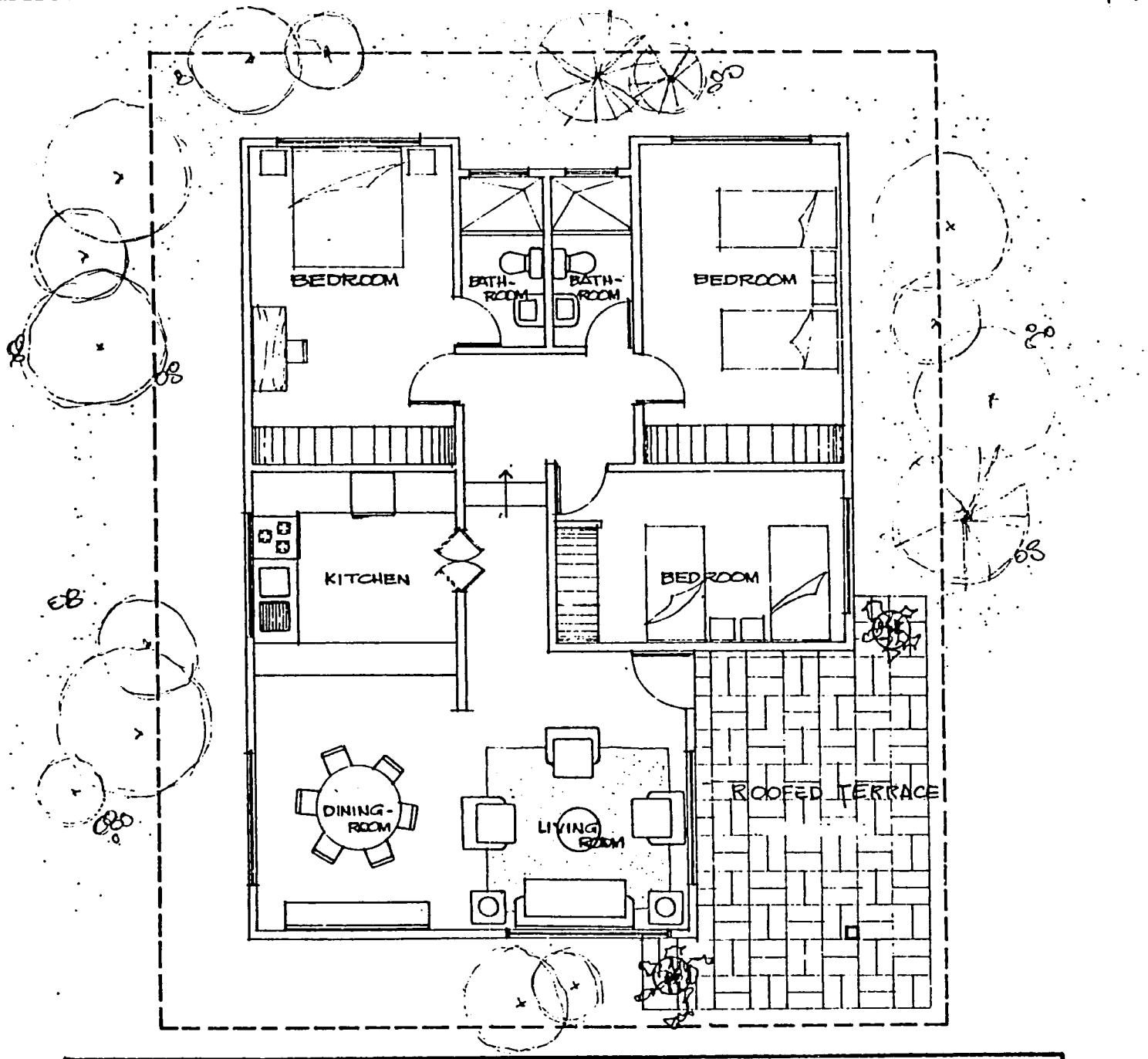
GENERAL PURPOSE LECTURE ROOMS

EARTH... GUAPILES, COSTA RICA.

II - 12 - 85.

SCALE 1" = 40'

FIGURE 3



- ENCLOSED LIVING AREA 1420 s.f.
- ROOF TERRACE 160 s.f.

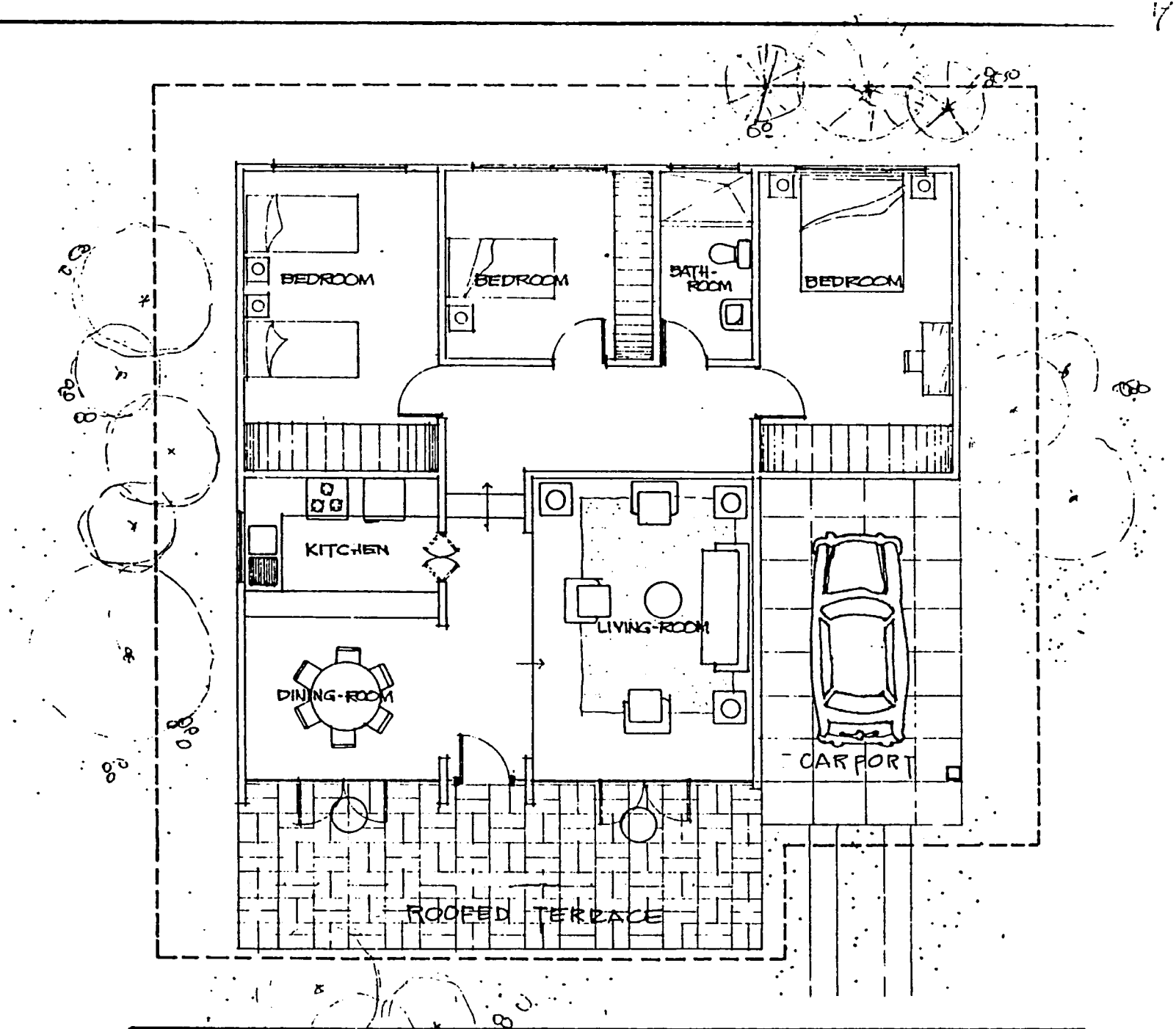
TOTAL 1580 s.f.

FACULTY HOUSING

EARTH...GUAPILES, COSTA RICA

II-12-85
SCALE 1" = 8'

FIGURE 4



- ENCLOSED LIVING AREA 1380 s.f.
- ROOFED TERRACE AND CARPORT 500 s.f.
TOTAL 1880 s.f.

FACULTY HOUSING

EARTH...GUAPILES, COSTA RICA

II-12-85
SCALE 1" = 8'

Potential Implementation Problems

The isolation of the proposed site development, the indicated unfavorable soils conditions, and the heavy and intense tropical rainfall would appear to present the more critical implementation problems. The initial limited access via Cartago and Turrialba will tend to increase costs and time for the transfer of equipment, materials and manpower to the site. When the new more direct World Bank road to Limon is opened in December 1985, this potential problem may be minimized and eliminated.

During a February site visit into the mountain area to the front where the road contractor is currently working, heavy and intense rains with resultant sloppy and muddy soils conditions were encountered. Potential slide zones were apparent in many sections as a result of the steep and deeply-cut side slopes. In some areas, it was noted that slides has already occurred, and the work progress during the short time it was observed did not appear to reflect a potential December 1985 completion. Thus, Phase I of the school construction may experience possible delaying effects of the round about routing from San Jose. With appropriate foresight and advanced planning, however, this potential implementation problem may be minimized. However, the problem of slides and resultant blockages on the new road can continue toi persist during the first few year following its completion.

The unfavorable soils conditions of surface and underground gravel, stones, and boulders can be overcome through appropriate alternatives for site selection. However, within the Guapiles area, in order to assure a site adaptable and acceptable to the proposed agricultural development planning, and without the unfavorable surface and subsurface stone and boulder deposits, limitations in site availability can be envisioned forcing unforeseen implementation delays.

In the construction work, particularly that of the earth movement for the infrastructure elements, excessive rainfall can create implementation delays. In the Guapiles area, with its excessive rainfall and humid climatic conditions, such potential delays can result and construction work will require close planning and coordination with the potential unfavorable climatic elements. As mentioned, annual rainfalls in excess of 200 inches occur and during the months of May through December, measurable amounts of rain are experienced almost every day. Prolonged dry periods occur mostly during the months of January, February, and March, except in some years these dry periods can also include the months of December and April. In the building construction, however, potential problems from extensive rains can be experienced principally during site grading and foundation preparation. Once the roof has been placed, remaining construction can proceed to completion with few if any interruptions from intense and daily rainfall, indicating that the first steps of building construction will be most affected by the rains.

Operation and Maintenance

The budget, facilities and personnel for the operation and maintenance of the educational buildings and related structures have been developed elsewhere. In this section, a budget has been developed for the maintenance and operation only of the infrastructure (streets, drainage, outside and

inside lighting, water supply, sewerage, electricity), faculty housing including rubbish collection and recreational areas and facilities (gymnasium, swimming pool, football/track field, volley ball/basketball/tennis courts).

A staff of fifteen is projected to include one foreman, one sub-foreman, one clerk, one electrician, one mason, one plumber, two carpenters/painters, and 6 laborers. Maintenance responsibilities will include the care of 8 to 10 kms. of streets, 5 to 8 kms, each of water distribution, collection, sewage and related appurtenances, water supply, at minimum with chlorination treatment, sewage disposal by means of oxidation lagoon and/or septic tank systems, cleaning/maintaining/ painting recreational and housing facilities. Operation costs will generally be limited to the cost of electricity to provide power for street and other outside lighting, for housing and recreation facilities lighting and equipment, and for water/sewer and other pump operations. No allowance has been made for telephone service presuming this will be a matter to be resolved between the individual resident faculty and the telephone utility.

Two vehicles are projected, a medium-size, 5-ton truck and a small pick-up. These are included as part of the overall vehicle complement developed for the School. Thus, only vehicle operation/maintenance costs are estimated herewith no allowances for purchase.

A preliminary annual budget to meet the limited maintenance and maintenance/operation requirements has been estimated as follows:

1.	Personnel	$ 78,000
2.	Vehicle/Equipment/Tools	20,000
3.	Materials (wood, glass, paint, chlorine, pipe cement, etc.)	48,000
4.	Electricity	64,000
	Estimated Annual Cost	210,000
	Contingencies (15%)	31,500
	Estimated Annual Budget	$ 241,500

The school and education complex includes a mechanical/maintenance shop which will also serve as the facility to provide the maintenance/servicing of the respective equipment, pumps and vehicles.

SOCIAL SOUNDNESS ANALYSIS

1. Role of Agriculture

Agriculture has long been a major source of wealth and employment in Central America and Panama. Although the service and manufacturing sectors of the respective economies of the several nations have expanded, reducing the relative importance of the agricultural sector, it remains a major consideration for the development of the region and a critical source of foreign exchange earnings, since a majority of exports from the CA/P region consists of agricultural products. The importance of agricultural production for economic and social stability can hardly be overemphasized.

Being a major source of wealth, land ownership is also a major source of economic inequality. The concentration of land ownership and control in the region is great; a small fraction of landowners control a large share of the land. Increases in the agricultural efficiency of small producers, in concert with land reform and the prospect of the opening up of new lands in the lowland tropics, offer hope for the amelioration of some of the economic inequalities.

2. Sociocultural Context

The sociocultural context which the project would impact include several areas. These are: (a) regional population trends, (b) education, (c) rural agrarian sector, and (d) key growth rates. Each of these are briefly discussed below.

a) Regional Population Trends

Additional food supplies will need to be made available to the CA/P population, which is projected to increase from 24.5 million in 1984 to 35.8 million in 2020, an increase of 146.1 percent (Table 1). El Salvador, Nicaragua, and Honduras are projected to exceed this rate of increase while the projected increase for Costa Rica and Panama is substantially smaller, although by no means negligible (88.0 and 81.0%, respectively).

TABLE 1

PROJECTED POPULATION GROWTH 1984-2020

COUNTRY	MID 1984 POPULATION (MILLIONS)	PERCENT OF REGION	PROJECTED POPULATION IN 2020	PERCENT OF REGION	INCREASE 1984 - 2020 NUMBERT	PERCENT
Costa Rica	2.5	10.2	4.7	7.8	2.2	88.0
El Salvador	4.8	19.6	12.3	20.4	7.5	156.3
Guatemala	8.0	32.7	19.3	32.0	11.3	141.3
Honduras	4.2	17.1	12.0	19.9	7.8	185.7
Nicaragua	2.9	11.8	8.2	13.6	5.3	182.8
Panama	2.1	8.6	3.8	6.3	1.7	81.0
Region	24.5	100.0	60.3	100.0	35.8	146.1

Source: Population Reference Bureau, World Population Data Sheet, 1984.

Vital rates are good indicators of socio-economic well-being. Although there have been substantial decreases in the birth rate, notably in Costa Rica and Panama, the area's of crude birth rates remains high, (double or triple those of industrial market economies). Although infant and child mortality rates, which are particularly sensitive to social and economic conditions, are two to eight times greater than in industrial market economies, overall death rates in the region are equal to or lower than those of industrialized market economies. This, in concert with high birth rates, means high rates of natural increase and of population growth, producing a population in which fifty percent or more of its members are under the age of twenty. The next result of the population growth will be expansion into non-traditional areas, including the lowland tropics.

Annual rates of CA/P population growth are substantially higher Central America by a factor of 3 or more than in industrial market economies. Annual growth rates of agricultural production in the region were higher during the 1970's in than in the industrial countries (Table 2), reflecting the much lower base in Central America and Panama. On the other hand, annual growth rates of gross national product per capita (with the exception of Panama) have been substantially lower than in industrial market economies (Table 2), reflecting a slowdown in industrial development, coupled with a rapid increase of population.

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TABLE 2

AVERAGE ANNUAL PERCENT GROWTH RATE OF POPULATION
AGRICULTURAL PRODUCTION AND GNP PER CAPITA, CENTRAL AMERICA

COUNTRY	POPULATION a/	AGRICULTURAL PRODUCTION b/	GNP PER CAPITA c/
Costa Rica	2.5	2.3	2.8
El Salvador	3.0	2.0	0.9
Guatemala	3.1	3.9	2.4
Honduras	3.4	2.4	1.0
Nicaragua	3.9	2.5	0.2
Panama	2.3	2.0	3.4
Ind. Mkt. Econ.	0.7	1.8	3.3

a/ 1970-1982
b/ 1970-1982
c/ 1960-1982

Source: World Bank, World Development Report 1984, Tables 1, 2 and 19.

b) Education

In all but El Salvador and Guatemala, close to 100 percent of children of primary school age are enrolled in primary school. The proportion of males and of females enrolled in primary school are approximately equal. The percent of age group enrolled in secondary schools is considerably lower, ranging from 20 percent in El Salvador to 65 percent in Panama. Comparable figures for higher education range from 4 percent in El Salvador to 27 percent in Panama and 26 percent in Costa Rica. Females account for well under 50 percent of enrollments in higher education and under 10 percent in agricultural higher education. While proportions of total enrollment in primary schools in industrial market economies are the same as in the CA/P region, the proportion enrolled in secondary and higher education in industrial market economies (90 percent and 37 percent) are substantially higher.

(c) Rural Agrarian Section

The CA/P countries societies are among the most rural in the world, with 45 to 63 percent of their populations living in rural areas as compared to 22 percent of the population of industrial market economies (Table 3). The contrast with regard to the proportion of the labor force employed in agriculture is even greater: 6 percent for the industrialized market economies and from 29 to 63 percent in CA/P nations. Concurrently, agriculture comprises a far larger proportion of the CA/P gross domestic product (from 21 to 27 percent) than in industrial market economies (3 percent) (Table 3). Food production per capita in 1980-82 was substantially below 1969-71 levels in Honduras and Nicaragua. Only in Guatemala did per capita food production rise as rapidly as in the industrial countries. Honduras, El Salvador and Nicaragua all had per capita gross national products of less than $1000. While starvation is rare, malnutrition is endemic, particularly in rural areas. Increased agricultural productivity can contribute towards the reduction of this problem.

TABLE 3
SELECTED ECONOMIC AND AGRICULTURAL INDICATORS
CENTRAL AMERICA, CIRCA 1982

COUNTRY	GNP PER CAPITA a/	PERCENT OF POPULATION THAT IS RURAL b/	PERCENT OF LABOR FORCE IN AGRICULTURE	INDEX OF FOOD PRODUCTION b/	AGRICULTURE AS A PERCENT OF GDP e/
Costa Rica	1,430	57	29	100	25
El Salvador	700	58	50	97	22
Honduras	660	63	63	79	27
Guatemala	1,130	60	55	114	—
Nicaragua	920	45	39	77	21
Panama	2,120	47	33	103	—
Industrtial Market Economies	11,070	22	6	114	3

a/ Dollars, 1982. Gross National Product.
b/ Based on each country's definition of rural, 1982.
c/ 1982
d/ 1980-1982. 1969-1971 = 100
e/ 1981 Gross Domestic Product

Source: World Bank, World Development Report, 1984, Tables 1, 3, 6, 21 and 22.

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e/ 1981 Gross Domestic Product

Source: World Bank, World Development Report, 1984, Tables 1, 3, 6, 21 and 22.

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3. Beneficiaries

Agricultural Educational programs have many beneficiaries, including, students, direct and indirect employees of the agriculture sector and the general population at large.

The prime beneficiaries are students whose level of skill and earning capacity will be enhanced by virtue of the project. Students are to be selected without regard for sex or the ability to pay. Consequently, social class background as a factor influencing admission will be reduced. Students will come from every country of the region. It will be the policy of the institutions to give preference, other factors being equal, to rural youth.

The Central highlands of Central America and Panama are experiencing considerable population pressure in agricultural zones. As the population has expanded, production has tended to expand into ever more marginal highland soils.

The tropical lowlands have already begun to be occupied and will, increasingly, be the destination of a significant number of internal migrants in search of land to farm or in search of farm employment. If these lands are to be used efficiently, with adequate safeguards against soil degradation and erosion, training will need to be given in the appropriate agricultural practices and the appropriate technologies diffused.

The learning-by-doing approach of the curriculum of the agriculture college and the advanced degree training at CATIE will emphasize instruction in technology relevant to farming in the tropical lowlands and will produce graduates able to cope in this environment. Successful transference of appropriate agricultural practices from the classroom to the field will contribute significantly to agricultural production and to the creation of new opportunities for the agricultural rural population.

Other sectors will also be favorably affected by the infusion into the societies of the region of an expanded supply of trained agricultural technicians. Data from a recent survey of graduates of the University of Costa Rica and of the EAP School are illustrative. Graduates of these institutions are employed in a great variety of public agencies and private sector enterprises and, in addition, a significant fraction is self-employed. A majority have experience in the tropical lowlands and believe in the potential of this area. It is clear that manpower trained in agriculture has a broad impact on the society and on the economy. The strengthening of the human resource base in agriculture in the region will have a positive impact on the social and economic well-being of the region as a whole.

The local economy will also benefit from the presence of a relatively large labor force with steady employment. Salaries paid to employees of the schools will be a significant impact on the local economy. Farmers who participate in the projected short courses and seminars will also benefit. Employers of graduates will benefit from increased production and earnings. Finally, the population at large will benefit from increased agricultural

productivity, increased food supplies, and lower prices. The national economy will benefit from increased foreign exchange earnings from new exports and the reduction in food imports (or at least a reduction in the rate of increase of food imports).

The agricultural labor force will derive both direct and indirect benefits from the project. Farm owners and farm managers will stand to experience increased efficiency in agricultural production and farm laborers a more secure source of employment. It is estimated that these groups number about 776,000 persons in the region as a whole (Table 4).

TABLE 4
ESTIMATED SIZE OF AGRICULTURAL LABOR FORCE AND NUMBER LOCATED IN HUMID TROPICAL LOWLANDS
CENTRAL AMERICA, 1984

COUNTRY	ESTIMATED SIZE OF AGRICULTURAL LABOR FORCE[a]	ESTIMATED NUMBER IN HUMID TROPICAL LOWLANDS[b]
Costa Rica	261,000	52,300
El Salvador	750,000	150,000
Guatemala	1,575,000	315,000
Honduras	715,000	143,000
Nicaragua	351,000	70,200
Panama	231,000	46,200
Total	3,883,000	776,700

a/ Source: Based on data in Population Reference Bureau, World Population Data Sheet, 1984 and World Bank, World Development Report, 1984, Table 19.

b/ Assumes that 20 percent of agricultural labor force is in humid tropical lowlands.

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The Agricultural School and CATIE will be a prime resource for the spread of agricultural innovations which will enhance production and increase incomes. Care must be taken, however, to make these innovations available on an equal basis to owners of small as well as of large farms lest social inequalities be increased through the selective diffusion of technologies to the well-to-do. Mechanisms need to be developed for transmitting knowledge gained by students and produced through experimental plots. Such information needs to be diffused to extension services and other purveyors of agricultural technology such as a salesman of agricultural chemicals and equipment.

CATIE and the Agricultural School will not discriminate in their admissions on the basis of sex. Thus, the opportunity to enroll will be equally available to women. Indicative of the female enrollment which may occur is the fact that the student body at the EAP is ten percent female. Female graduates of the institutions will be qualified to occupy possitions of leadership in the agricultural and agribusiness sectors of the economy and to make significant contributions to the development of the region. Further, they will serve as role models for other women who may be considering careers in agriculture and related professions.

4. Socio-cultural Feasibility

Higher education in agriculture is not new to Central American culture. There is no question but that this is not only an acceptable but a valued component of the social structure. There is also little question that there is a need for additional personnel trained in agriculture at the undergraduate and graduate level.

Interviews with agricultural graduates of the Costa Rican institutions of higher education revealed a unanimity of concern that their programs of study needed more opportunities for practical or field related experience. The respondents also expressed a desire to have had training in administration and management methods and techniques. Graduates of the EAP, for example, where practical experience is stressed, have expressed a desire to have had training relevant to entrepreneurial activity in preparation for the possibility of becoming self-employed. Almost all EAP graduates who work in Costa Rica are employees of some kind, primarily in the private sector.

The curriculum of the institution should provide opportunity to study the requisite subjects and basic sciences with emphasis on:
(a) Relevant theoritical and practical applications of agricultural training, (b) practical field experience and exposure, (c) market mechanisms and workable farm management technicques and (d) the ecological niche in which training will be applied.

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ECONOMIC ANALYSIS

The CA/P region in recent years has been characterized by a series of disruptive socio-political, economic and ecological issues. These issues have led to a reversal of economic growth rates throughout the region, with attendant increases in unemployment, underemployment and poverty. For example, real GDP growth rates of 6-7% in Honduras, during the 1970's was followed by negative growth rates since 1981. A recent report on Honduras indicates 77% of the rural residents and 34% of the urban residents are below a poverty line of $230/year/capita.

Political instability has led to declining domestic and foreign investments which have been partially responsible for increasing rates of inflation and increasing food imports. These negative conditions have been compounded by continued low prices for traditional exports. A further confounding issue relates to continuing high population rates. An average rate of 2.8% per year is one of the highest regional rates in the world.

These forces have triggered an array of actions that have and will continue to impact the lowland, and especially humid lowland, tropics. Among these are increasing rates of migration, increasing numbers of landless families, an increased search for subsistence conditions, pressure for more land reform and, among others, poorly conceived and implemented colonization activities.

Migration is an old and generally successful economic development strategy. The high rates of rural to rural migration to the humid tropics of Central America is likely prompted by high expectations. A reliable data set on such migration does not seem to exist, but some evidence is available. In Costa Rica, the Northern Zone Infrastructure Development PP suggests that during the early 1970's, population in the Atlantic region increased by 18% per year. In Guatemala, the ecological profile reports population increases of 13 to 16% per year in the Atlantic lowland departments[1]. Other ecological profiles[2] on Central American countries report continued migration but give no quantitative estimates. However, these profiles lead to the conclusion that migration rates are high and will likely continue.

The forms of ecological degradation associated with migration can be grouped into four major types. These are erosion, declining soil fertility, deforestation and a changing mix of species[3]. All four types of degradation are occuring in the humid tropics and many technologies are location specific. A failure to address these issues will result in continual declines in real incomes associated with increased costs for subsistence or commercial agriculture in the humid tropics.

1/ Environmental Profile of Guatemala, Institute of Ecology, University of Georgia, October, 1980.
2/ See Country Environmental Profiles for Honduras, by JRB Associates, 1982 and for Panama, by Int. Science and Technology Institute, 1980.
3/ See J. Bremer and others, Fragilelands, Dev. Alternatives Inc. June 1984.

There is a clear need to develop human resources to generate necessary technologies, to develop a system to deliver the technologies, and enhance human capital to increase the rates at which such knowledge is adopted. There are many areas where research can generate technologies to reduce ecological degradation and increase unit productivity. These areas relate to alternatives on land clearing, rotation and crop mixes, crop varieties selection, agro-forestry, forestry, livestock management, no-till cultural systems, etc.

A very limited amount of research is underway on these issues which are usually very locational specific. Investments in such research efforts, as discussed below, will likely yield rates of return well above the opportunity costs of capital.

In summary, the reduction in ecological degradation resulting from continuing migration to the humid tropics depends in large part on building a science-based agriculture. The proposed investments in human capital and research are indispensable to the resolution of this problem.

A science dependent agriculture designed to serve domestic and international markets requires investments in a science base for the sector and modern, industrialized, high-payoff inputs. There are five necessary elements for such a science-based agriculture: (1) a research system integrated into the international network of agricultural science capable of producing flows of new technical knowledge; (2) a link into the industrial complex of a region with capacity to provide requisite modern inputs for use in the food production, processing, and marketing systems; (3) a rational set of policies (including price policy, exchange rate policy, trade policy, and fiscal policy) which allow market forces to provide incentives for capital formation, for guiding resource and product allocation, and for consumer choices; (4) extension and market information systems for transferring technical and economic information to the various entrepreneurs in the food system, and provide the appropriate feedback; and (5) an educational system which develops appropriate human capital at all levels to work in the public and private firms and institutions serving agriculture.

A modern, highly productive, science-based agriculture can be conceived of as having two major components. One is an efficient public sector with the capacity to develop and implement rational policies; to develop and transfer on a sustained basis new technical knowledge; to train a majority of the required human capital; and to develop and implement requisite regulatory functions. These activities are usually and generally undertaken by the public sector since the outputs from these efforts are either rules and regulations to meet social objectives, or public goods. Private investments in research and extension will not be undertaken by the private sector, unless returns from such investment clearly can be internalized to the one making such an investment.

The second component of a modern agriculture in such a conceptualization is the private sector. This sector comprises all of the private firms in the sector including farmers, input supply firms, processors, wholesalers, retailers, and transporters. It also comprises the various institutions and

organizations of these entrepreneurs such as producers associations, cooperatives, irrigation associations, and chambers of industry. Movement from a traditional, low-productivity agriculture, to a high-productivity, science-based agriculture clearly requires private investments for the set of activities discussed above. Since the payoff from such investments usually lag by 10 or 15 years, there is often a problem of sustaining the level of social investment necessary to move to a science-based agriculture. The eventual emergence of a strong science-based agriculture does generate the funding base for sustaining investments in the private and public network serving agriculture.

This educational project is designed to provide the human capital and technological components of the science-dependent system. It will also produce the human capital to serve to develop the private sector. More specifically on the ecological issue, the project is designed to produce human capital and technologies that can have an enormous impact.

Efforts to create a science-oriented agriculture in the humid tropics can serve to increase real rates of economic development. Investments proposed in this project focus on education, new knowledge and the transfer of such knowledge. Educational investments result in direct and indirect benefits that accrue to the individual, to the indigenous location and to external investors. Similarly, investments in research yield net benefits that impact a region's foreign exchange balances, its competitive position and the indirect benefits relating to social and political stability as real food prices show long term declines.

The section below will qualitatively, and with some quantitative evidence, attempt to reveal expected benefits. As in the migration case, no data set and analyses are available for the proposed investments in the humid tropics. Secondary data sources reviewed capture streams of benefits from increased skill levels, foreign exchange savings, increased productivity, and cost-reducing productivity systems. The net benefits are estimated by calculating the present value of benefit and cost streams which are converted into estimates of internal rates of return.

A 1973 report by G. Psacharopoulos shows that social annual rates of return to higher educational investments vary from 12 to 23% per year in five Latin American countries[1]. His estimates show that investments in higher education generally exceed rates of return for investments in secondary education but are less than half the rates for investments in primary education. Another study on investments in higher education in Jamaica suggests annual net social returns of 6.5 to 20% depending on the conditions postulated[2]. These estimates suggest sensitivity to foreign exchange savings but are insensitive to project life expectancy and conditions that change the demand for graduates.

1/ USAID, Economic Analysis of an expansion of the Jamaican College of Agriculture.

2/ G. Psacharoupoulos, Returns to Education: An International Comparison, 1973.

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Another way of testing this relationship between real growth rates and educational/research investments is to evaluate returns to agricultural research. These estimates incorporate net returns to education, extension and research. As seen in Table 1, the internal rates of return range from 24 to 96% per year for crops likely to be important in the humid tropics. These estimates include those that measure average rates of return per dollar invested with benefits assumed to continue indefinitely and methods that estimate incremental returns. The latter estimates on marginal returns capture the change in total productivity which can be tested statistically. The methodology also captures returns to research variables and the lag between investment and benefit. Correcting for measurement and analytic errors, the expected rates clearly suggest that investments in education/research/extension far exceed other investment options.

Another set of estimates on returns to Brasilian research, using varying methodologies, reveal annual internal rates of return ranging from 31.5% to 69%. These estimates refer to a 10-year lag and incorporate changes in crop yield, changes in factor inputs, and changes in aggregate output (land increases and increases in output per unit of input).[1]

There are errors in extrapolating these estimates to conditions in the humid tropics, but the estimates are supportive of decisions to invest in human capital, knowledge and its transfer. These estimates suggest the significant role that new technologies can have on the real growth rates of the agricultural sector.

There are two other sources of information supportive of this supposition. In medium and high per capita income countries, with advanced agricultural systems, expenditures on agricultural education/research range from 1.2 to 2.6 percent per year of the value of agricultural output. In low per capita income countries, usually faced with food supply problems, similar expenditure to total value estimates range from .6 to 1% per year.[2] The implication, accepting high rates of return, is that increased expenditures on agricultural educational/research is a high priority investment option.

The evidence also suggests that annual expenditures to total value proportions are extremely low for many crops of the humid tropics. Crops such as cassava, coconuts, chick peas, cacao, pastures, tropical oil crops, etc. fall in this category.

Another indicator, but again limited by scarce information, is the results of some agricultural research going on in humid tropics. Data from the annual reports of CIMMYT report on-going work in tropical lowlands on corn. Their corn work on issues of early maturity, varietal selection and breeding for disease resistance suggests potential yields per hectare 2 to 3 times actual yields.

1/ L. Yeganiantz(ed), Brasilian Agriculture and Agricultural Research, EMBRAPA, 1984.

2/ R. E. Evenson, Benefits and Obstacles in Developing Appropriate Agricultural Technology in Agricultural Development in the 3rd World, edited by C. Eicher and J. M. Startz, Michigan State University Press, 1984.

TABLE 1

SELECTED ESTIMATES OF RESEARCH-EXTENSION-EDUCATIONAL INVESTMENTS IN THE AGRICULTURAL SECTOR[1)]

ESTIMATOR	ANNUAL AVERAGE RATES OF RETURN	INCREMENTAL RATES OF RETURN PER YEAR	CROP	LOCATION
R. Evenson	40	—	Sugar Cane	S. Africa
Hertford & Ardila	60 - 82	—	Rice	Colombia
Scobic & Posada	79 - 96	—	Rice	Bolivia
Pee	24	—	Rubber	Malaysia
Hayami	—	46 - 71	Rice	Tropics
Evenson	—	47	Aggregate	U. S. A.
Flores, Evenson & Hayami	—	46 - 71	Rice	Tropics

1/ V. W. Ruttan, The Economic Benefits from Agricultural Research. Chp. 24 in Agricultural Research Policy, Univ. of Minn. Press, 1982.

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Collaborative work with CIMMYT and Peruvian scientists in the high jungles of Peru have produced new varieties that yield 4 to 5 times actual yields on farm trials and experiment station plots.

Similar collaborative work with CIAT and Peruvian scientists reveal paddy rice yields on farmers' fields that average 6 metric tons per hectare with two crops per year. Rice yields on most farms in Central American countries range from 1 to 1.5 metric tons per year.

Another collaborative effort reported by CIAT with Central American researchers on bean productivity in tropical areas is equally convincing. On-farm results show bean yields moving from 425 Kg./ha. in 1970 to 1200 Kg./ha. in 1980.

A recent study in Costa Rica relating to a new program on increasing agricultural productivity reports comparative yields per hectare in the humid tropics for farmer fields and experiment stations plots[1]. These data are shown in Table 2. The three regions (North, Pacific and Atlantic) account for some 65% of the area of Costa Rica and represent the humid tropic regions.

Changes in real economic development can be further tested by applications of existing economic tools. These include consumer-producer surplus analyses, the estimation of employment and income multipliers by growth areas, and by more aggregate techniques for projecting the impact of changing technologies, prices, policies and skills. The application of these procedures requires an heroic set of assumptions on a time frame, adoption rates, land expansion by productivity classes, long term relative prices, predictions of government policies, etc.

For this assessment, the analysis can be further tested by reporting the results of selected secondary sources. A 1983 study on the potential for non-traditional exports from the humid tropics of Central America and Panama reports a cultivated land area expansion of 460,000 hectares as compared with the present area of 231,000 hectares[2]. This report on land expansion, involving some 14 commodities, doesn't factor in per hectare productivity changes, adoption rates, or additional analyses on the sensitivity to price, policy, and rates of migration. A set of sensitivity tests of the highly variable rates of return above selected costs could assist in identifying priority crops and potential areas of regional specialization.

1/ SEPSA, Programa de Incremento de la Productividad Agricola, Anexos 5 y 38, 1984.

2/ SIECA, Estudio Sobre Cultivos no Tradicionales para Exportacion de las Zonas Humedas Bajas Tropicales de Centroamerica y Panama, SIECA/ECID/MOCA DN/, Inf. 024-83, Guatemala, 1983.

TABLE 2
COMPARATIVE YIELDS PER HECTARE FOR SELECTED CROPS
IN THE HUMID TROPICS OF COSTA RICA

LOCATION AND CROP	ACTUAL	EXPERIMENTAL
	(metric tons/ha)	
Atlantic		
Chocolate	.2	.5
Corn	1.5	1.6
Pacific		
Chocolate	.2	.5
Corn	1.5	2.6
Rice	1.6	2.4
Beans	.5	1.0
Sugar	60.0	82.0
Coffee	6.3	10.0
North		
Chocolate	.2	.8
Corn	1.5	2.6
Fruits	19.0	24.5

Source: SEPSA, 1984

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Another study was completed in 1984 for the humid tropics of Costa Rica[1]. This study incorporated productivity changes per hectare over a 4-year period associated with a land expansion of 31,000 hectares. Changes in productivity per hectare explained more than 60% of the change in total output. As in other studies, the returns above selected costs ranged from 15 to 700% and averaged over 100% per hectare but were extremely variable. The report also suggests an increase in potential employment of more than 160% or the 29,000 versus 18,600 (1000 man days per year).

The USAID/Honduras Agricultural Research Foundation PP completed in 1984 applied a consumer/producer surplus methodology. This assessment confirmed again high rates of return to research breakthroughs and management - internal rates of return ranged from 22% per year on bananas to 82% per year on basic grains. The net present values of economic grains discounted over a 20-year adoption period at 12% were $8.3 million for citrus and $24.[illegible], $8.4, and $10.9 millions for bananas, corn and basic grans, respectively. As one would expect, the consumers were expected to benefit most from research on corn and basic grains. The shares accruing to consumers were 17, 33, 36, and 72 percent for citrus, bananas, corn, and basic grains, respectively.

In summary, sharply focused investments in agricultural science for the humid tropics will likely yield returns above market rates. These research and educational investments will trigger productivity changes per hectare on projected land expansions. In turn, these changes will trigger an income and employment multiplier effect on real rates of economic development in the area.

CONCLUSIONS

As many have paraphrased, science and its application separates the developed from the undeveloped world. Economic development with a predominant agricultural component is also heavily dependent on science. Quality human capital, new knowledge and its transfer are necessary but insufficient conditions. A science-based agriculture for the humid tropics also requires a rational set of policies, adequate infrastructure, and an operational set of factor and product markets.

Many of these sufficient conditions are and will be developed in the humid tropics. The necessary conditions including human capital knowledge and its transfer should also be forthcoming.

The first question of ecological degradation results from socio-polotical-economic difficulties with a consequence of increasing migration into the humid tropics. By far the major resolution of this serious issue will occur only if human capital is trained, relevant knowledge is developed and its application occurs. The agriculture research issues are very location specific and focus on options relating to conservation, agroforestry, crop fillage systems, inter and multiple cropping options, varietal adaptations, etc.

1/ SEPSA, Programa de Incremento de la Productividad Agricola (PIPA), 1984.

The argument is made that the major resolution of a serious ecological degradation problem is science dependent. A science-dependent agriculture requires five necessary elements: a research system, an industrial linkage for modern inputs, a rational set of policies, a viable knowledge transfer system and an educational system developing appropriate human capital. Such a network, linked with infrastructure, markets, and incentives prices, has and will continue to produce improved rates of economic development.

The proposed agricultural education investments, even though long term in nature, are expected to yield net returns above the opportunity cost of capital. The investment will alter the development process from just cultivated land expansion to a combination of increases in output per unit of input and income and employment multiplier effects from expanding factor and product markets. The essence of the argument is that migration and cultivated land expansion will occur, but higher rates of economic development arise when these lands and human resources also become technically and economically more efficient.

The documentation on net returns to research and educational investments, ranging from 20 to 100%, will apply to the humid tropics. The implications on productivity increases with attendant employment increases are clear. What is not clear from the wide variability associated with such estimates are questions of priority crops and likely forms of regional specialization. These latter questions can be addressed with sensitivity analysis of published data and the application of other economic methodologies that address price, yield, inflation, and other forms of risk.

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