PD-AAS-411
ISN 40928

UNCLASSIFIED

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

ROCAP

PROJECT PAPER

REGIONAL AGRICULTURAL HIGHER EDUCATION

AID/LAC/P-264

Project Number: 596-0129

UNCLASSIFIED

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: LAC/DR — 05

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

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 09 DD 30 YY 95

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)
A. Initial FY 85 B. Quarter 4 C. Final FY 92

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

A. FUNDING SOURCE	FIRST FY 85 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	6,200		6,200	33,400		33,400
(Grant)	(6,200)	( )	(6,200)	(33,400)	( )	(33,400)
(Loan)	( )	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.						
Host Country					89,582	89,582
Other Donor(s) CATIE					15,134	15,134
TOTALS	6,200		6,200	33,400	104,716	138,116

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						32,400	
(2) ARDN	620	620						1,000	
(3)									
(4)									
TOTALS								33,400	

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

11. SECONDARY PURPOSE CODE: 120

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

A. Code	TNG	TECH	BR	BF			
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 11 YY 86 — MM 01 YY 91 — Final MM 11 YY 94

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: A. [signature] B. [signature]
Title: A) J. Eyre, ADIR/ROCAP
B) D. Chaij, DIR/Costa Rica
Date Signed: MM 08 DD 13 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)

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

PROJECT AUTHORIZATION

Name of Country:	Costa Rica
Name of Entity:	Regional Agricultural College
Name of Project:	Regional Higher Agricultural Education
Number of Project:	596-0129B

1. Pursuant to Sections 103, 105 and 531 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Regional Higher Agricultural Education project with the Government of Costa Rica (GOCR) (the "Grantee"), involving planned obligations of not to exceed Twenty-six Million Four Hundred Thousand United States Dollars (US $26,400,000) in grant funds ("Grant") over a ten-year period from the date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The planned life of the project is ten (10) years from the date of initial obligation.

2. The project ("Project") consists of the creation of a regional agricultural college to produce a professional resource base with the practical and educational experience needed to address the agricultural production problems of the Central America and Panama region.

3. The Project Agreement, which may be negotiated and executed by the officers to whom such authority is delegated in accordance with A.I.D. 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 A.I.D. may deem appropriate.

a. Source and Origin of Commodities, Nationality of Services

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

b. Conditions Precedent to Disbursement

(1) Except as A.I.D. may otherwise agree in writing, prior to any disbursement or the issuance of any commitment documents under the Project Agreement, other than for the hiring of the Rector of the Regional Agricultural College, evidence shall be furnished to A.I.D., in form and substance satisfactory to A.I.D., that: (I) the Costa Rican Legislative Assembly has passed a special law creating the Regional Agricultural College with all rights and privileges accorded to other international missions in Costa Rica; (II) a Board of Trustees for the Regional Agricultural College has been duly constituted and empowered; (III) an agreement for funding and implementation of the Project has been signed with the College; and (IV) the Board of Directors of the College has submitted a detailed time-phased plan and budget setting forth all activities to be completed during the first year of the Project.

(2) Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement to finance costs for the construction of the Regional Agricultural College campus in Costa Rica, the Board of Directors of the Regional Agricultural College shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that (I) the title to the campus site has been vested in the Regional Agricultural College in fee simple, and (II) no debt has been assumed in connection with the acquisition of this title.

c. Covenants

(1) Prior to undertaking Project activities for each year after the first year of the Project, the Regional Agricultural College will furnish to A.I.D., in form and substance satisfactory to A.I.D., a consolidated workplan and budget for activities for that year.

(2) The Regional Agricultural College agrees to use its best efforts to ensure that its student body is characterized by a predominance of individuals from the Central America and Panama region.

Administrator

September 27, 1985
Date

Clearances:
GC:HMFry _____ Date 9/26
PPC:RADerham _____ Date 9/21
AAA/LAC:MButler _____ Date _____

Drafted:GC/LAC:PJohnson/tim/9/10/85:632-9182:Id. 0156B

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D C 20523

ASSISTANT
ADMINISTRATOR

PROJECT AUTHORIZATION

Name of Entity: Tropical Agricultural Research and Training Center (CATIE)

Name of Project: Regional Agricultural Higher Education

Number of Project: 596-0129-A

1. Pursuant to Sections 103 and 531 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) (the "Grantee"), involving planned obligations of not to exceed Seven Million United States Dollars (US $7,000,000) in grant funds ("Grant") over a three-year period from the date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The planned life of project is six years from the date of initial obligation.

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

3. The Project Agreement which may be negotiated and executed by the officer to whom such authority is delegated in accordance with A.I.D. 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 A.I.D. may deem appropriate.

a. Source and Origin of Commodities, Nationality of Services

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

b. Condition Precedent to Disbursement

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 architectural and engineering services, master plan development, and the hiring of a Coordinator for the graduate program, CATIE shall, except as A.I.D. may otherwise agree in writing, furnish, in form and substance satisfactory to A.I.D., a detailed time-phased plan setting forth all activities to be completed during the first year of the Project.

c. Covenants

CATIE covenants and agrees that:

(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 A.I.D., a consolidated work plan and budget for activities for that year.

(2) CATIE will use its best efforts to ensure that its student body is characterized by a predominance of individuals from the Central America and Panama region.

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

(4) CATIE will 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.

Acting Assistant Administrator
Bureau for Latin America and
the Caribbean

AUG - 9 1985

Date

Clearances:
GC/LAC:RBMeighan Date 7/31/85
LAC/DR:DJohnson Date 8/05/85
LAC/DR:ILevy Date
LAC/CEN:OLustig Date 7/30/85

Drafter:GC/LAC:PGJohnson:paj7/31/85:0891A

4

REGIONAL AGRIULTURAL HIGHER EDUCATION

596-0129

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I. RECOMMENDATIONS AND SUMMARY

A. Recommendations

ROCAP recommends that a $33.4 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 $26.4 million with the Government of Costa Rica (GOCR) to obligate funds for the Regional Agricultural College component of the project. CATIE will implement its component over a six-year period, and the Agricultural College 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 Regional Agricultural College;
- -- expanded and upgraded graduate studies and non-degree programs at CATIE;
- -- approximately 400 undergraduates in training at any given time;
- -- approximately 100 B.S. graduates per year;
- -- approximately 60 M.S. graduates completing training annually;
- -- approximately 4,500 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 (2.8% 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 problems with technology generation, transfer and adaptation, inappropriate 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. One alternative has been training from 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 a Regional Agricultural College; and (2) the strengthening and reorientation of the graduate and professional programs of the Centro Agronomico Tropical de Investigacion y Ensenanza (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 Panamerican 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 College and CATIE, four activities will be undertaken. These are: (a) staff development; (b) facilities and equipment; (c) curriculum and administrative development; and (d) networking.

The project will provide the resources needed to create a new undergraduate college and permit it to achieve financial viability. The creation of the new college 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 College 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. They will be a specialized cadre of individuals trained to enter into all levels of vertical integration in the agricultural industry. The principal elements of this component will be the development of the professional staff (faculty and administration) required by the College and the physical creation

of a campus. In order to develop graduates who can enter into the private sector, the development and installation of 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 College. (See Annex II.E, Demand Analysis).

CATIE needs to be transformed from a post-graduate institution with a fledgling 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 planned.

C. Summary Financial Plan ($000)

AID TOTAL EXPENDITURES

		AGRICULTURAL COLLEGE	CATIE	TOTAL
I.	Staff Development	15,957	3,221	19,178
II.	Facilities & Equipment	6,938	1,061	7,999
III.	Curriculum and Admin. Dev.		1,932	1,932
IV.	Networking	1,942	300	2,242
V.	Evaluation	200	60	260
VI.	Miscellaneous/Contingency	1,363	426	1,789
	TOTAL	26,400	7,000	33,400

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

Regional Agricultural College

USAID/CR	Mr. Daniel Chaij, Director Mr. Richard Archi, DDIR Mr. Kevin Kelly, PDDE Mr. Rafael Rosario, RDD Dr. Paul Kretchmer, RDD Mr. Michael Foster, PDD Mr. Richard Layton, CONT
AID/W	Dr. Albert Brown, Former Chief, LAC/DR/RD Dr. Chris Hermann, PPC/CDIE Ms. Sandra Amendola, PPC/CDIE Dr. Ben Severn, LAC/DR
W. K. Kellogg Foundation	Dr. Norman Brown, Program Director Dr. Glen Taggart, Former President, Utah State University Dr. Eduardo King Carr, Agricultural Educator
University of Costa Rica	Dr. Luis Carlos Gonzalez, Dean of Agriculture Dr. Jorge Moya, Agricultural Economist Dr. Edgar Arias, Agricultural Economist
Costa Rican Coalition of Development Initiatives (CINDE)	Mr. Rodolfo Cortes, Director Ms. Clara Zomer, Director of Training
Law Firm of Jimenez, Vargas & Peralta	Mr. Manuel Peralta, Partner
Experience Incorporated	Mr. Jim Roush, Team Leader Mr. Charles Stevens, Engineer Dr. John Saunder, Rural Sociologist Dr. Larry Rathbun, Agricultural Educator Dr. Art Coutu, Agricultural Economist

CATIE

ROCAP	Mr. David Joslyn, RADO Mr. Michael Deal, PDO Mr. Julian Heriot, Economist Mr. Thomas Totino, Controller

AID/W	Mr. Erhardt Rupprecht, LAC/DR/RD Dr. Harlan Davis, S&T/AG
CATIE	Dr. Rodrigo Tarte, Director Dr. Carlos Saenz, Deputy Director Dr. Jose Luis Parisi, Director, Department of Graduate Studies and Training Dr. Gerardo Budowski, Director, Department of Renewable Natural Resources Dr. Romeo Martinez, Director, Department of Plant Production Dr. Mathew O'Callaghan, Department of Animal Production Dr. Vladimir Hermosilla, Consultar Lic. Roberto Perez, Architect Lic. Cristina Rojas Rodriguez, Attorney
CONSULTANTS	Mr. Arthur Warman, Team Leader Dr. Kenneth L. Turk, Professor Emeritus, Cornell University Mr. James A. Fleming, Assistant t the President for College Advancement, Kennesaw College

II. PROJECT BACKGROUND AND RATIONALE

A. Background

1. The Problem: CA/P Agricultural Productivity

a. Overview

Agriculture has historically been the backbone of the economy of Central America 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 as increases in population (2.8% annually) and 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 pepper 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, 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 (2.8 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 deforested. Many of these lands have been placed in annual crops, for which they are unsuited, or 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 forested 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 the failure:

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

5) to establish a professional human resource base needed in the generation, adaptation 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. 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, adaptation 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.

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 emerge "...as the least well equipped in number of agricultural scientists". In addition, ISNAR noted that

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.

there are weaknesses in the growth of research investments and the number of scientists 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.

d. 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. Therefore, the Mission requested an analysis of Central American employment patterns and current agricultural training institutions from PPC/CDIE with support from the University of Costa Rica (Annex II.E). 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.

AID's employer demand study supports the ISNAR conclusions and resultant assumptions. Most importantly private sector employers clearly indicated their intention to hire more agriculturalists with B.S. level educations than those with vocational, technical, or graduate level training (see Annex II.E, Table 5) and are offering significantly higher salaries and more frequent promotions than for non-degree recruits (see Tables 6 and 7 of Annex II.E). The analysis emphasizes that "the effects of higher agricultural education have a dynamic effect on the graduates' long term earnings and, at the macro level, on the regional economy."

Nevertheless the surveyed employers indicated two fundamental problems with recently hired agricultural graduates: a lack of technical/practical skills, i.e. "hands-on" training or experience, and a lack of administrative/business related skills (see Annex II.E, Table 10). Over the past three years approximately 27% of agricultural graduates hired by Central American private sector employers were for jobs in the area of extension/technical assistance. During that same period agriculture colleges produced no students who had specialized training in this area.

Since a majority of employers surveyed derive a significant proportion of their earnings from operations in the tropical lowlands, demand for specialists in this area is critical, especially considering the dearth of currently available relevant training. This demand will become more accute as businesses expand their operations in this region (Annex II.E, Table 12 shows that 71% of those employers surveyed plan such expansion).

Other indicators of the demand for agricultural training in the region are also 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, 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, the IDB Increased Agricultural Productivity project estimates the need to train at least 18 professionals.

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 for 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 food crops such as corn and beans, but may eventually be better advised to shift to the production of non-traditional crops such as fruits.

There is an additional demand for short-course and specialization training of mid-career professional agriculturalists which should also be considered (see Annex II.E, Tables 8 and 9). These professionals need to keep abreast of improvements in technology, agronomic practices and the detection and solution of critical pest and disease problems.

2. Current Efforts to Address the Problem

a. Higher Agricultural Education Institutions in the Region

It has become clear to both U.S. and Latin America agriculturalists and to regional employers 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 level[1].

As detailed below, the problem is particularly acute at the undergraduate level in providing students with the necessary practical as well as theoretical skills on the cropping, livestock and agroclimatic conditions of the lowland tropics. (Annex II.E, gives a detailed analysis of relevant educational institutions in the region).

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. 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.

Annex II.E provides an analysis conducted by PPC/CDIE and the University of Costa Rica of agricultural training currently available in the Central American region. Nineteen institutions were analyzed - 6 vocational, 5 technical, and 8 agricultural colleges. Of these, the most employable graduates are from the technical schools where students receive a broader education than the vocational schools and the practical training not available at the universities, with a far more supportive student/teacher ratio of 6/1 and opposed to 35/1 for vocational schools and 13/1 at the universities.

However, the main difference between these groups of schools are their intended outputs: vocational schools provide a low level of hands-on agricultural training at a minimum cost - they are not intended to produce experts in the agriculture-related fields; the undergraduate universities produce theoretically versed agricultural generalists better suited to government entry-level desk jobs than private sector oriented jobs such as agricultural production or practical research; the technical schools provide a very limited number of students with a higher level of technical hands-on general agricultural training, however these students lack the non-technical agricultural education necessary to prepare them for upper level positions in the public and private sectors (i.e. administration, management, finance, marketing, etc.). Furthermore, there is no technical school specializing in humid tropical agriculture - the zone identified in this paper as a major area of expansion for future agricultural production.

Another characteristic of most of these institutions is the high level of politicization and nationalism making it difficult to introduce new ideas, even in a relatively technical and non-controversial area. As state schools they are also subject to political controls on their budgets making financial independence impossible.

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 "ingenieros agronomos" (agronomists) cannot find employment in Panama, Costa Rica and Honduras. The problem according to Latin American and other professional agriculturalists is one of <u>quality</u>. 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. However, a recently completed task force study of the expansion proposal, while recommending an expanded curriculum leading to an advanced degree, recommended against EAP, due to administrative and logistical problems, specializing the curriculum for specific ecological zones or establishing a branch campus(es).

Yet the demand for agronomists is changing. Studies indicate that employers will increasingly demand agriculturalists with agricultural and/or regional specializations. More specifically, as employers expand their operations in the humid tropics, additional demand for agriculturalists with the appropriate specialized training is expected (see Annex II.E).

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). Therefore any reasonable adjustment in any of the existing schools, short of a completely new campus with - in many cases - a radical change in educational philosophy, will lead to a graduate not much different from that being produced by existing institutions. Only a new school developed on the basis of projected agricultural development needs will be able to produce a graduate with the new basket of skills identified above as essential to the goal of this project.

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. There are 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).

a) University of Panama

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 meet their graduate level training requirements.

b) CATIE

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 by IICA and OAS 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 on the development of high-yielding and pest-resistant coffee varieties, monilia resistant cocoa varieties, crossbred criollo and imported meat/dairy cattle, and 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. National and Donor Efforts to Address Constraints

In recent years CA/P countries, with AID and othe donor support, have been focusing on addressing the first four constraints t increased agricultural production and productivity listed above. For example included among the technology generation adaptation and transfer efforts ar the AID-financed Agricultural Research Foundation in Honduras, th Agricultural Technology Development and Transfer Project in Panama, the Smal Farmer Diversification Project in Guatemala, and the IDB-financed Increase Agricultural Productivity Project in Costa Rica. CATIE's own technolog generation and adaptation research activities in cacao, coffee plantain/bananas, basic food crops, natural resources and forestry as well a tropical plant genetic resources are directly linked to these projects Emphasis is also being placed on developing alternative (i.e. non-publi sector) institutional mechanisms to carry out technology generation/adaptatio and dissemination functions through private research foundations an commodity-specific producer associations.

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

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

B. Project Rationale

1. Alternatives to the Project Design

Prior to and during the PP preparation, ROCAP and USAID/C 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 vigoro practical/theoretical background of humid lowland production systems, technologies and constraints. At the graduate level, the focus was on how t 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 Level

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 undergraduate 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. This experience is supported by the Economic Analysis (see Annex II.D).

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. The just completed task force report on the proposed expansion (sponsored by USAID/Honduras) has recommended an expansion of the current curriculum to offer an advanced degree; however, it has recommended against an expansion into other ecological zones - including the lowland humid tropics - or building additional campuses. It has also warned of the ecological threat of expanding enrollment at the present campus. While the expanded curriculum will help meet the manpower constraints discussed above, it will not be able to meet the projected increased demand for trained agriculturalists, nor will EAP address the primary area of concern discussed in this paper - the humid tropics.

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 strengthen 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 NBCCA 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. Finally, the Economic Analysis demonstrates that U.S. training is not more cost-effective than creating a new specialized institution. 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 Region's 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.

It should also be noted that U.S. graduate training is not more cost effective than expanded training at CATIE (see Table 1, Annex II.D, Economic Analysis).

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.

C. Project Strategy

In order to best address the constraints to manpower development in the CA/P region USAID/Costa Rica, ROCAP, and an interdisciplinary task force have developed a project with two components: (1) establish a Regional Agricultural College for the Lowland Humid Tropics and (2) up-grade the graduate training at CATIE.

1. Regional Agriculture College

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 in the private and public sectors at all levels of agriculture, from the production of seed, food production, marketing, storage processing, export and credit, 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 agricultural college 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.

2. 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:

a. 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.

b. 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.

c. 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.

d. 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.

e. 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 roblem 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 systems 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 College 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 College 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 College, 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. Relationship 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 Systems (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. 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 libraries;
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 collaborators 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. theses. 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 Donor Projects

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 assures coincidence of ROCAP and USAID/Costa Rica program objectives. The resultant collaboration between the Agricultural College and CATIE should be an exemplary case of inter-institutional collaboration.

As the Agricultural College 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 approximately 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 approximately 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. The most important accomplishment of the project will be the continued development of a cadre of agriculturalists specialized in production, administration, and management in the lowland humid tropics of the Central America and Panama region. They will be able to lead the way in the intelligent and efficient exploitation of this very delicate yet potentially significant ecological zone.

Specific achievements to occur under the project include the following:

1. Creation of a new four year learning-by-doing undergraduate Regional Agricultural College;

2. Expanded and upgraded graduate studies and non-degree programs at CATIE;

3. Approximately 390-400 undergraduates in training at any given time;

4. Approximately 100 B.S. degree graduates per year;

5. Approximately 60 M.S. degree graduates completing training annually;

6. Approximately 4,500 professionals trained through short and specialization seminars; and

7. Increased institutional linkages through networking activities.

As described in Section IV, "Cost Estimates and Financial Plan" and detailed in Annex II.A.4 and II.B.3, 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 College will be created and financed by the Project.

1. Regional Agricultural College

The project will provide the resources needed to create a new regional undergraduate college 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 College 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 in a wide range of agricultural areas in the industry.

The principal elements of this component will be the development of the professional staff (faculty/administration) required by the College 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 College.

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 College 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 about 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 College. During the early years of operation, this will be particularly important to the College 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. (See Annex II.B.6 for 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, see Annex II.B.6 for details on Faculty Staffing Patters.

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
Students Graduate	-	-	-	68	68	68	68	90
Total Enrolled*	75	143	210	278	303	325	348	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	8.7	8.9	9.0	9.1	9.3

* Assumes that 10% of each class does not complete training.

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

Four key administrative positions will be required for the College: the Rector, Provost, Dean for Academic and Student Affairs, and Dean 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 Rector, 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 College will, in part, depend on funds being raised from a variety of sources that will be used to capitalize a dollar endowment fund, see annex II.B.9 for details. As is the case with CATIE, the College 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 College will be developed. As appropriate, technical assistance will be provided to carry out the fund raising activities.

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 College as a teaching institution.

Several potential land sites in Costa Rica have been examined for the location of the College. 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 College. In that area, the College 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. Based on this criteria the Mission advertised interest in purchasing 3000 hectares in this area, reviewed the offers and, following AID procurement procedures selected a 2,899 hectare site 25 kms. from Guapiles, for which the Mission is currently negotiating a purchase option. This site will satisfy the needs identified above for the campus, and fields for experimental and demonstration plots. This site also has the advantage of an established working farm and livestock operation which the College will maintain as a source for additional income and as a practical teaching tool for the students.

Construction of the physical facilities will be accomplished through a four-phase program over the initial four years of project implementation. Facilities to be constructed include an administration building, classrooms and laboratories, animal and crop field/production units, student dormitories, faculty housing, recreation facilities and maintenance facilities. Figure 1 provides a schematic of the campus layout. A professional firm whose specialty is developing master college campus plans will be contracted to develop the final plan. 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 based on the above mentioned site are provided in Annex II.B.7. In addition to the campus for the College, the project will finance the purchase/rental 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 College's activities has been prepared based on experience in other institutions and is included in Annex II.B.4. 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.

c. Curriculum Development

The curriculum for the College has been designed to provide a B.S. degree over a four-year period. The college year is to be from mid-January to mid-December organized in three semesters of 15 weeks. 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.

EARTH... GUAPILES, COSTA RICA

PROPERTY AREA 200 Ha.

SAMPLE CAMPUS MASTER PLAN

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

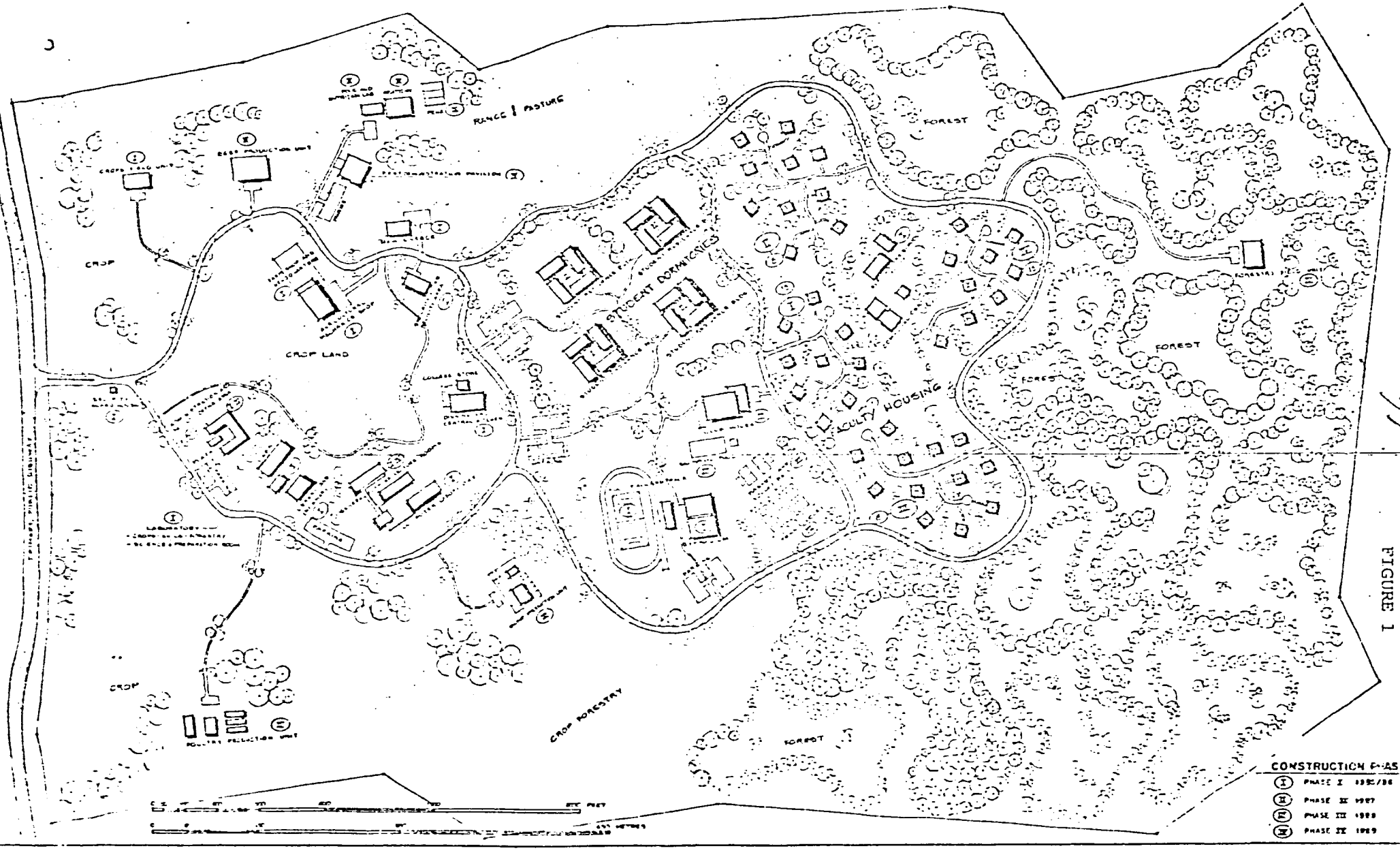


FIGURE 1

An initial curriculum program has been developed and is summarized in Table 2 (see Annex II.B.5 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.

TABLE 2

SUMMARY OF CURRICULUM

Major		Support		Breadth	
Crops	31	Electives	22	English	24
Ag. Mgt.	15	Ag. Project	24	English	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.

Prior to initiating classes, the proposed curriculum will be refined under the direction of the Dean of 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 College 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 College and its students. When appropriate, faculty and students from those institutions will be invited to participate in various activities.

The linkages between the College and CATIE are many, and will evolve as the College 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 institutuions 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 College 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 College. This will include providing limited numbers of faculty, short-term consultants and general backstopping and support as the College goes through the growth process. The emphasis of this linkage will be in the early years of the project when the College will be most vulnerable. Provision has been made, however, to finance some services throughout the life of the project, see Annex II.B.8 for details.

e. Local Currency Endowment

Over 50 percent of the College's operating costs will be for expenses in Costa Rica that can be financed with local currency (e.g. salaries of local and 25% of foreign staff, maintenance, equipment replacement, etc.). To cover the local currency operating costs, an endowment will be established with local currency available from USAID/Costa Rica's Economic Stabilization and Recovery Program.

The resources made available for the endowment ($50 million equivalent) are resources that must be "demonetized" due to the limitations contained in the 1985 IMF stabilization program. 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, as seen in the Financial Analysis, provides a stream of income that is sufficient to meet fully local currency annual operating 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 specialties.

The seven additional positions are as follows:

- Agricultural Economist/Farm 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
- Geneticist (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, threre 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 departmentally, 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), Geneticist (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 twenty 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 four classrooms, four seminar rooms, nine faculty offices and numerous ancillary support rooms.

3) Computer Center

Even without the proposed expansion f 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. Phase I (1986-88) will consist of procurement of an additional 40 hectares for small crop production, limited rehabilitation of existing buildings, and improving road access, electrical and water systems. Phase II, which consists of construction of dormitories for students and professionals, office/laboratory building, cafeteria, hybrid seed lab, storehouse and a residence for the station administrator, will be carried out after this six-year project with AID/COFISA Trust Fund earnings, or during this six-year project period using cost savings, funds of other donors, or additional AID/COFISA Trust Funds.

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 installatin 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 seven vehicles are planned for use by the departments for farm and La Lola research related activities. As detailed in Annex II.A.2, the La Montania 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 A&E 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, this 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 alumni 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) Development Office

As part of project paper preparation, technical assistance was provided to assess CATIE's institutional development needs and resulted in the design of a three-year program which is more fully detailed in Annex II.A.4. This program consists of a minimum level of staffing, consulting services, travel, promotional advertising and operation expenses for the development office.

The overall purpose of the program is to assist the institution to achieve longer-term self-sufficiency and increase outreach to alumni. It is anticipated that development office activities, which include corporate relations, international organization and foundation relations, major gifts, development publications and promotions and special consultation programs, will generate an estimated $3.0 million dollars over the six-year life of the project. These resources will be utilized to cover recurrent costs of the institution, including development office activities.

The proposed strategy for the development office is not the one many non-profit institutions have historically employed, namely asking for charity. Rather, based in part on the INCAE efforts achieved to date to support that institution, it will emphasize a business oriented marketing strategy directed at governments, foundations, international organizations and alumni. The CATIE development strategy will be based upon the recognition that the development office's activities are the management function primarily responsible for maintaining and improving the relationship of CATIE with the regional and international community and selected publics in a way that most effectively contributes to the achievement of CATIE's purposes.

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. It's 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 (1) the lack of sufficient periodical documents supportive of the teaching programs and (2) 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 Graduate Studies and Training 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 is for $33.4 million in USAID dollar resources, which includes $26.4 million for the Regional Agricultural College and $7.0 million for the CATIE component (See Table 3), and a total of $104.7 million in local currency equivalent, of which $89.6 million equivalent will be provided by the GOCR through the ESR stabilization program and $15.1 million equivalent will be contributed by CATIE. The local currency will be divided among the two components of the project as follows (see Table 7 for details of Agricultural College and Table 4 for details of CATIE component):

1) $60 million in local currency equivalent to establish the endowments for the Regional Agricultural College.

2) $29.3 million in local currency equivalent for capital expenses for the Regional Agricultural College.

3) Approximately $.3 million will also come from the Agricultural College endowment generations to be used for the local costs in the Support Institution Contract, see annex II.B.8 for details, and for Evaluations and Audits, see Table 9.

4) $6.5 million in local currency equivalent which will be generated from the CATIE/COFISA Trust Fund, see section V.C.1.c. for further details.

5) Approximately $8.6 million in local currency equivalent from CATIE's own resources in the form of applicable costs to the training activities.

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.

All construction cost estimates for both components have been reviewed and approved by USAID/Costa Rica's staff engineer, see annex II.B.7 for details.

A. CATIE

The CATIE component of the project includes A.I.D. resources of $7.0 million dollars, and CATIE's counterpart contribution of $15.134 million including $6.481 million in local currency generated from the CATIE/COFISA Trust Fund. Table 4 presents a total summary of both A.I.D. and CATIE contributions. Table 5 presents a yearly summary of A.I.D. and CATIE financed activities. Table 6 details total A.I.D. dollar and local currency contributions to the component.

TABLE 3

ESTIMATED YEARLY FINANCIAL PLAN

(A.I.D. CONTRIBUTIONS: $000)

	YEAR										
COMPONENT	1	2	3	4	5	6	7	8	9	10	TOTAL
I CATIE	693	1414	1388	1565	947	993	--	--	--	--	7000
II Agric. College	2875	2196	2363	2720	2222	2284	2622	2729	3123	3267	26400
	3568	3610	3751	4285	3169	3277	2622	2729	3123	3267	33400

TABLE 4

(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	1,061	8,762	9,823
III.	Curriculum and Administrative Development	1,932	574	2,506
IV.	Networking	300	--	300
V.	Land	--	400	400
VI.	Evaluation	60	--	60
VII.	Miscellaneous/Contingency	426	126	426
	TOTAL	7,000	15,134	22,134

1/ A.I.D. resources reflects dollar financing as detailed in Table 5.

2/ CATIE counterpart includes applicable costs to training activities, including maintenance of facilities, staffing, value of land, etc., as well as facilities/equipment and curriculum/administration activities financed from the CATIE/COFISA Trust Fund.

TABLE 5

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	481	325	540	2,596	10	1,657	10	2,277	10	1,078	10	829	1,061	8,762
III.	CURRICULUM/ADMIN	129	20	367	106	453	110	595	114	194	109	194	115	1,932	574
IV.	NETWORKING	--	--	60	--	60	--	60	--	60	--	60	--	300	--
V.	LAND	--	--	--	400	--	--	--	--	--	--	--	--	--	400
VI.	EVALUATION	--	--	--	--	--	--	20	--	--	--	40	--	60	--
VII.	MISC/CONTINGENCY	83	0	129	1	83	5	84	78	23	2	24	40	426	126
	TOTAL	623	738	1,414	3,930	1,388	2,640	1,565	3,381	947	2,301	993	2,144	7,000	15,134

1/ A.I.D. resources reflects dollar financing as detailed in Table 6.

2/ CATIE counterpart includes applicable costs to training activities, including maintenance of facilities, staffing, value of land, etc., as well as facilities/equipment and curriculum/admnistration activities financed from the CATIE/COFISA Trust Fund.

TABLE 6

DETAILED ANNUAL A.I.D. RESOURCES AND LOCAL CURRENCY GENERATED FROM CATIE/COPISA TRUST FUND: 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	--	40	--	--	--	757	--	--	--	--	--	--	--	797
B. Staff Housing	--	46	--	967	--	276	--	552	--	--	--	--	--	1,841
C. Student housing	--	100	--	1,053	--	--	--	1,045	--	422	--	100	--	2,720
D. Computer CTR	--	17	125	326	--	--	--	--	--	--	--	--	125	343
E. Primary School	--	--	--	--	--	--	--	70	--	--	--	--	--	70
F. La Lola	--	--	--	20	--	30	--	19	--	--	--	--	--	69
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	2,467	10	1,223	10	1,710	10	428	10	100	1,061	6,253
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. Development Office	--	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	1	83	5	84	78	23	2	24	40	426	126
VII. TOTALS	693	335	1,414	2,478	1,388	1,253	1,565	1,813	947	446	993	156	7,000	6,481

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. Regional Agricultural College

The agricultural college component of the project includes A.I.D. dollar financing of $26.4 million and GOCR counterpart local currency (dollar equivalent) financing of approximately $113.5 million. Table 8 presents a total summary of A.I.D. dollar and GOCR local currency contributions overall for each activity. Table 8 presents a yearly summary of AID yearly projected expenditures and Table 9 a yearly summary of both AID and GOCR yearly expenditures. Further detailed explanations and cost estimates are found in Annex II.B.3,4.

TABLE 7

AGRICULTURE COLLEGE-FINANCIAL PLAN

PROJECTED A.I.D. AND COUNTERPART COSTS ($000)

ACTIVITY	A.I.D.			GOCR1/		
	FX	LC	TOTAL	FX	LC	TOTAL
I. OPERATING EXPENSES						
A. Staff	15957		15957		13399	13399
B. Instructional Materials	100		100		325	325
C. Physical Plant					661	661
D. Equipment Replacement	746		746		2986	2986
E. Miscellaneous	1363		1363		6024	6024
SUBTOTAL	18166		18166		23395	23395
II. CAPITAL EXPENSES						
A. Construction	3355		3355		19009	19009
B. Equipment	2738		2738		1780	1780
C. Land					8500	8500
SUBTOTAL	6093		6,093		29289	29289
III. OTHER EXPENSES						
A. Local Currency Endowment					50000	50000
B. Dollar Endowment				10000		10000
C. Support University	1941		1941		165	165
D. Evaluations and Audits	200		200		127	127
SUBTOTAL	2141		2141	10000	50293	60293
IV. TOTAL	26400		26400	10000	102977	112977

1/GOCR funds for these activities are programmed from local currency available under USAID/C.R.'s Economic Stabilization and Recovery (ESR) Project. Of the amount shown in this column, all costs in Part I (Operating Expenses) will be paid from interest earned on the local currency endowment, and thus does not represent a new cash contribution to the project. Therefore, total GOCR input will be the local currency equivalent of $102,977,000 minus $23,315,000 or a total of $79,582,000, plus the local currency equivalent of $10,000,000 that will be converted into dollars for contribution to the dollar endowment giving a total contribution of $89,582,000.

TABLE 8

PROJECTION OF AID YEARLY EXPENDITURES FOR AGRICULTURAL COLLEGE ($000) 1/

	YEAR										
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	TOTAL
A. Operating Expenses	338	668	995	1414	1828	2062	2332	2565	2889	3075	18167
1. Academ. and Admin. Staff	271	578	879	1262	1638	1843	2066	2249	2510	2661	15957
2. Instructional Material	10	10	10	10	10	10	10	10	10	10	100
3. Physical Plant											
4. Equipment replacement		5	12	26	41	58	92	130	177	205	746
5. Miscellaneous	57	75	93	116	139	151	165	176	191	200	1363
B. Capital Expenses	2442	1344	1161	1001	144						6092
1. Construction	842	791	878	843							3354
2. Equipment	1600	553	283	158	144						2738
3. Land											
C. Other Expenses	95	183	207	304	250	223	290	164	234	191	2141
1. Support University	65	183	207	254	250	223	230	164	174	191	1941
2. Evaluations	30			50			60		60		200
E. Total Expenditures	2875	2195	2363	2720	2222	2284	2622	2729	3123	3267	26400

1/ Totals do not add in all cases due to rounding.

TABLE 9

PROJECTION OF YEARLY AID AND GOCR EXPENDITURES FOR AGRICULTURAL COLLEGE ($000)

	1986		1987		1988		1989		1990		1991		1992		1993		1994		1995		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
A. Operating Expenses 1/	338	632	668	1001	995	1420	1414	1857	1828	2298	2062	2548	2332	2858	2565	3272	2889	3634	3076	3876	18167	23395
1 Acad and Admin Staff	271	329	578	550	879	814	1262	1069	1638	1392	1843	1529	2056	1639	2249	1869	2510	2033	2661	2155	15957	13399
2 Instructional Material	10	16	10	21	10	27	10	32	10	34	10	36	10	38	10	40	10	40	10	40	100	325
3 Physical Plant		66		66		66		66		66		66		66		66		66		66		661
4 Equipment replacement			5	22	12	49	26	103	41	164	58	232	92	367	130	520	177	708	205	821	746	2965
5 Miscellaneous	57	221	75	341	93	464	116	585	139	641	151	685	165	728	176	777	191	787	200	794	1363	6024
B Capital Expenses	2442	14398	1344	4626	1161	5261	1001	4898	144	106											6092	29289
1 Construction	842	4769	791	4485	878	4978	843	4777													3354	19009
2 Equipment	1600	1129	553	141	283	283	158	121	144	106											2738	1780
3 Land		8500																				8500
C Other Expenses	2595	25011	2683	25031	2707	34	2804	38	250	41	223	32	290	35	164	21	234	24	191	26	12141	50293
1 Support University	65	3	183	22	207	25	254	27	250	30	223	19	230	21	164	6	174	6	191	7	1941	165
2 Evaluations & Audits	30	8		9		10	50	11		12		13	60	14		16	60	17		19	200	127
3 Endowments 2/	2500	25000	2500	25000	2500		2500														10000	50000
E. Total Expenditures	5375	40041	4696	30658	4863	6715	5220	6792	2222	2445	2284	2580	2622	2893	2729	3293	3123	3658	3267	3902	36400	102977

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

2/ Both dollar and local currency endowments are part of GOCR counterpart contributions

V. SUMMARY 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 CATIE 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 professionals, 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 handling 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. Regional Agricultural College

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 (see Economic Analysis). This conclusion has been supported by the recent EAP and USAID/Honduras task force report which "Recommended that such a step not be taken in the forseeable future due to the extraordinary difficulties that would be experienced by EAP in maintaining control, establishing facilities, staffing, etc." It also warned of the ecological danger of increased enrollment at the current campus in the future.

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.

3) 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.

Therefore, since none of these alternatives will likely be able to produce the complete graduate needed to achieve the goal of this project and since none of these alternatives are more cost-effective (see Economic Analysis) they were all rejected. At the same time the following considerations argued forcefully for the creation of a new institution:

-- The College 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.
-- The College is economically sound.

b. Technical Design Considerations

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 and need of the students;
-- the physical plant for the College 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 College.

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 benefitting 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.

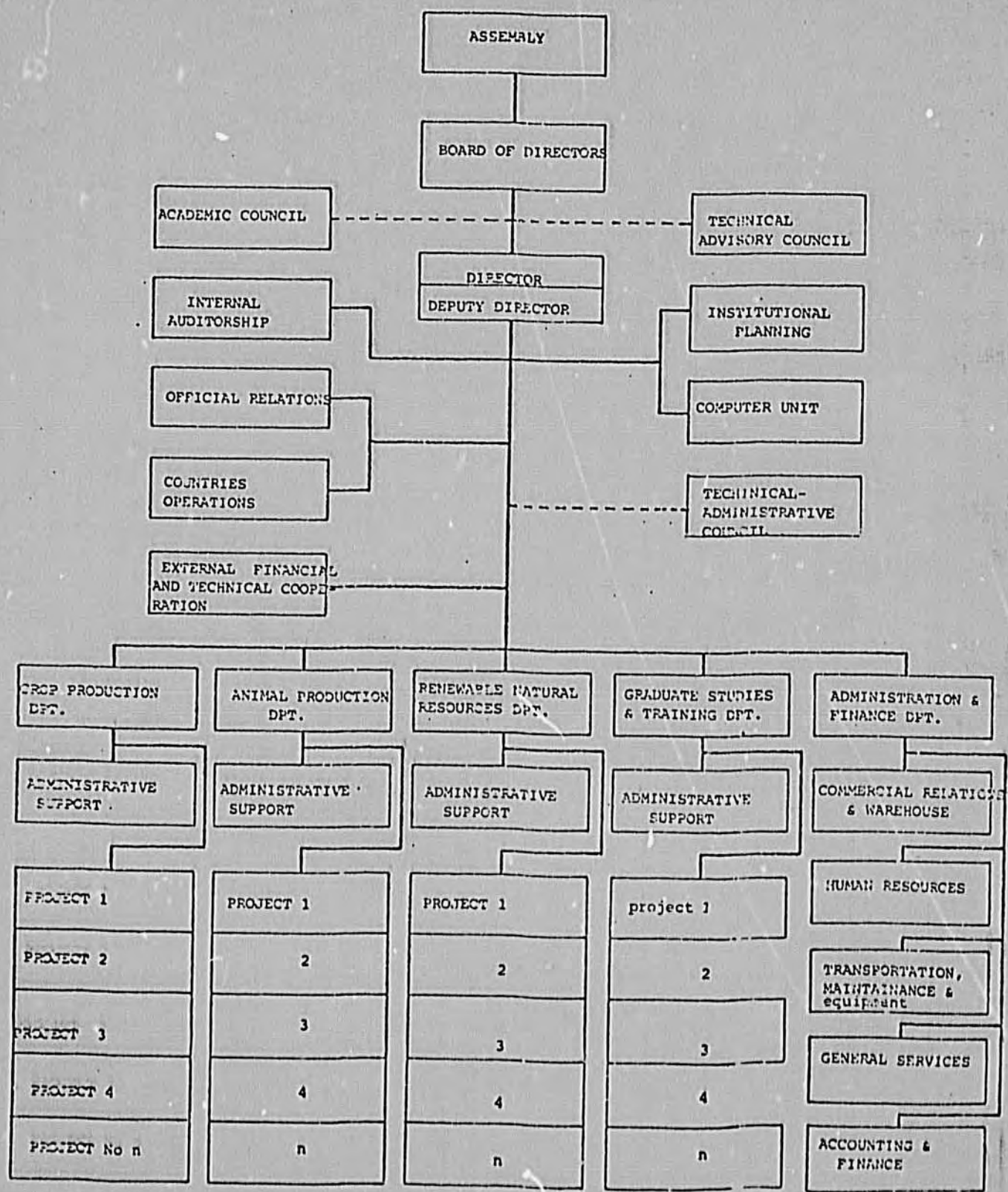
CATIE conducts research on a wide range of topics. Problem oriented research is focused in four major areas: annual and perennial crops, animal production, and renewable natural resources. In addition, CATIE sponsors disciplinary support research in several areas.

c. Current Organizational 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
TECHNICAL-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). 39[illegible] hectares are used for residential areas, buildings, and landscaped 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 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 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 bibliography 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. Regional Agricultural College

The institutional structure proposed for the Agricultural College 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 College. Administratively, a three-tier organization is planned consisting of a Board of Trustees, a Board of Directors, and a Rector. 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 (the endowments) of the College. 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 Rector and to formulate academic and administrative policies under which the Rector will develop and manage the institution. The Rector will appoint faculty members and principal administrative officers with the consent of the Board of Directors. Other staff will be appointed by the Rector. The Board of Trustees will meet at least once a year and the Board of Directors at least four times a year.

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.

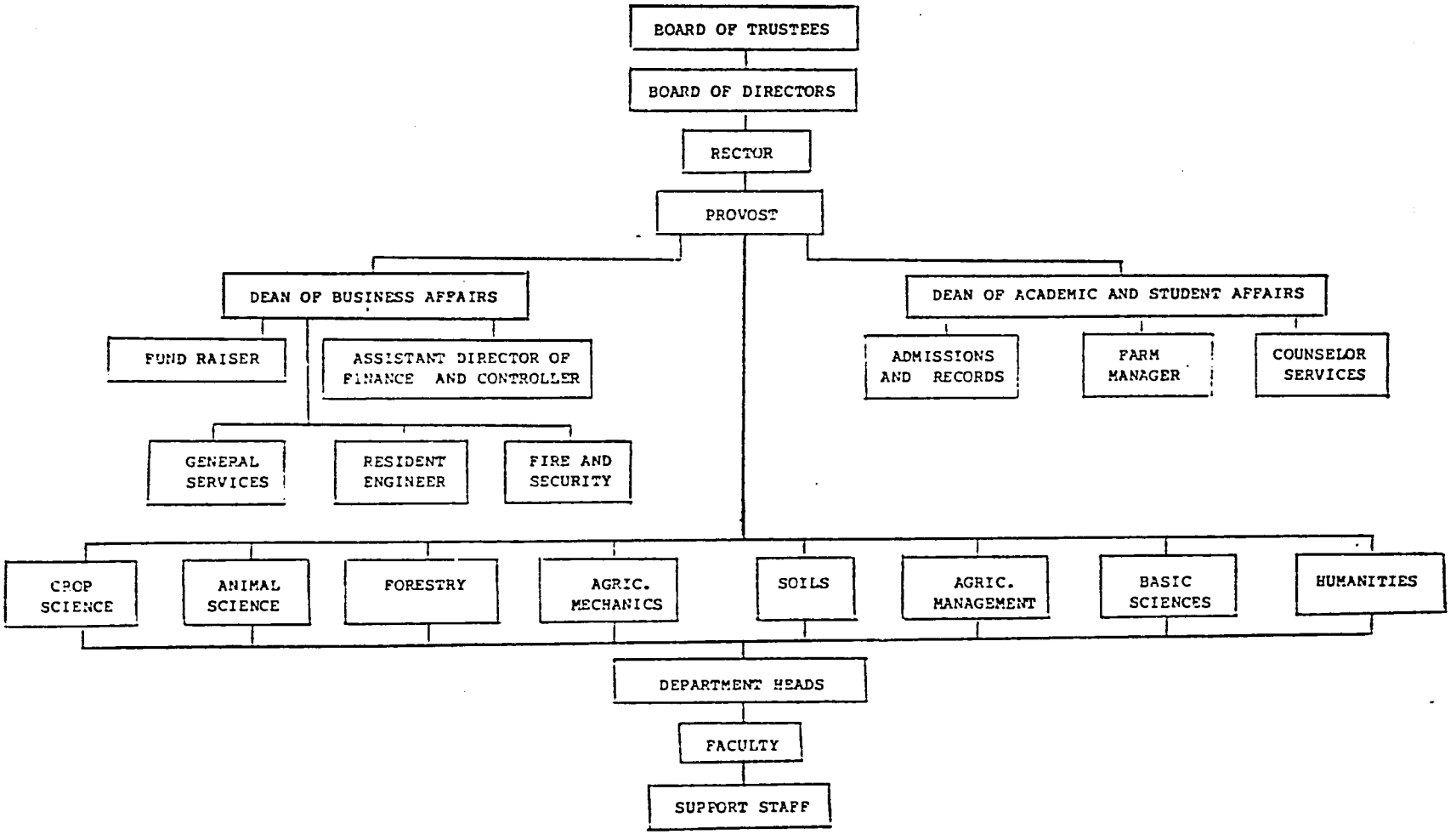

BOARD OF TRUSTEES
BOARD OF DIRECTORS
RECTOR
PROVOST
DEAN OF BUSINESS AFFAIRS
DEAN OF ACADEMIC AND STUDENT AFFAIRS
FUND RAISER
ASSISTANT DIRECTOR OF FINANCE AND CONTROLLER
ADMISSIONS AND RECORDS
FARM MANAGER
COUNSELOR SERVICES
GENERAL SERVICES
RESIDENT ENGINEER
FIRE AND SECURITY
CROP SCIENCE
ANIMAL SCIENCE
FORESTRY
AGRIC. MECHANICS
SOILS
AGRIC. MANAGEMENT
BASIC SCIENCES
HUMANITIES
DEPARTMENT HEADS
FACULTY
SUPPORT STAFF

FIGURE 3

a. Faculty and Staff

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

This ratio will permit instruction across the breadth the planned curriculum at the level of sophistication expected of a hi quality, baccalaureate degree program. For effective instruction, class si will not exceed 30 students. To accomodate a student body of 400 studer planned for the College, the faculty and administrative staff will numb approximately fifty when the College reaches full operation. Faculty membe will be expected to provide 12 weighted teaching units (wtu) of instructi each week plus 3 wtu of other assigned responsibilities such as supervision student activities, student academic and personal advisement, and other duti as assigned. (See Annex II.B.6, Faculty Staffing Patterns.)

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

b. Student Body

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

No shortage of applicants for the College will exist a every effort will be made to attract the best candidates and to select them the basis of fair, objective, efficient and uniform criteria and procedure Within this criteria, the College will actively seek qualified rural youth a develop a program of financial assistance to facilitate their attendance. T College will admit 100 freshmen a year when operating at full capacity, b will start with 75 in its early, formative years.

c. Infrastructure

1) Land

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

the necessary infrastructure, i.e. dormitories, classrooms, faculty housing, administrative buildings, etc., but will provide land needed for agricultural purposes, including 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. The Kellogg Foundation Task Force has determined that approximately 3,000 hectares will 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 Jose. 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 College, 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 College 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 four 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 bought/rented in San Jose and will be used as the College'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 College. After the College 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 exigencies, such as the illness of a child that requires hospitalization and special medical attention.

A complete equipment list has been developed for the College (see Annex II.B.4). 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 continuously 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 10

CATIE
COMPARATIVE CONSOLIDATED INCOME AND EXPENDITURES FOR THE 1984 PERIOD

	YEAR				
	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

TABLE 11

C A T I E

DETAILED INCOME AND EXPENDITURE STATEMENT

	1980	1981	1982	1983	1984
INCOME					
Member Quotas	844	923	990	1,211	1,257
Services and Assets Administration	712	754	482	590	1,266
Covenants & 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 Expenmses	-	-	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

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 Plant Product.	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 12

C A T I E

STATEMENT OF ASSETS, LIABILITIES AND
GENERAL WORKING FUND

Assets	1980	1981	1982	1983	1984
Cash and Banks	379	799	432	766	524
Investments	-	135	503	559	15
Accounts Receivable	401	463	494	645	1,331
Inventories	195	247	172	165	97
Prepaid Expenses	19	1	5	-	-
Special Funds (Covenants and Contracts)	694	272	207	309	-
Other Assets	-	-	-	-	-
TOTAL ASSETS	1,688	1,917	1,813	2,444	1,967
Liabilities & General 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 and 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 AND 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 Development Office activities. Development Office 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 $6.5 million will be utilized during the life of project. The remaining $6.5 million, combined with the projected $3.0 million to be generated by the Development office, will help meet the recurrent costs after the life of the project.

c. The Trust Fund Mechanism

Over the life of the project, local currency will be provided to CATIE through a trust fund arrangement under which CATIE will be the sole beneficiary of the income generated by the trust. The trust has been established as part of a local currency-financed coffee technification and diversification project being funded by USAID/Costa Rica.

Under that project, a trust fund (involving the equivalent

of $20 million in local currency) will be created to channel credit needed by participating coffee growers to improve productivity or to introduce alternative crops. The mechanism involves a flow of credit from the trust fund (which will be managed by a private financial institution as trustee) to the federation of coffee cooperatives, which will pass the funds to it member cooperatives, which will lend the resources to their individual members. The following interest rate structure is planned: 9% between the trust fund and the cooperative federation (FEDECOOP); 11%-13% between FEDECOOP and its member cooperatives (depending on the type of loan); and 18% between the cooperatives and the final borrowers. This structure will allow FEDECOOP and the cooperatives to cover their administrative costs as well as provide a small amount for the cooperatives to increase their capital bases.

Risk against bad or poorly performing loans will be minimized through two mechanisms. First, FEDECOOP and the cooperatives will hire additional extension personnel who will work closely with all participating farmers. Second, FEDECOOP has an arrangement with the cooperatives under which it is responsible for the marketing of the output of the cooperatives. Thus, FEDECOOP will receive all income from the sale of that output, and will be able to retain the amount needed to cover loan payments before passing the proceeds on to the cooperatives.

From this interest rate structure, the trust fund will receive 9% -- of which 2% will go to the trustee to cover administrative expenses and 7% will go to CATIE as the beneficiary of the trust.

Disbursements by the trustee to FEDECOOP will be made in accordance with a demand schedule which will be updated every six months. All funds in the trust and not required immediately for lending to FEDECOOP will be invested by the trust in short-term bonds and other financial instruments of the GOCR. The income from these investments will also accrue to CATIE as the beneficiary of the trust.

The sum of these two income streams has been projected to provide CATIE approximately $6.5 million in local currency over the life of the project. In addition, CATIE will be the sole beneficiary of the trust for eight years. This will generate an additional $6.5 million in local currency flows, for a total of $13.0 million over an eight year period.

d. 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 projects 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.

e. 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. Regional Agricultural College

The College 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 College will work to maintain expenses at a level consistent with or lower than its income.

This analysis examines the dollar and local currency funding available for the Agricultural College 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 College 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 ends.

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 approximately $89.3 million equivalent, broken down between land ($8.5 million), construction ($19.0 million), equipment ($1.8 million) other expenses ($0.3 million) and the endowment ($60.0 million). These resources will be provided from local currencies created under USAID/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 (see annex II.B.7 for construction costs and annex II.B.4 for equipment costs). Land costs were developed from a survey of land prices in the area between Guapiles and Limon where the College will be located - a total of 3,000 hectares at a price of $8.5 million. The $8.5 million cost can be broken down into three categories: 1) land, 2) improvements in the form of crops and animals and 3) infrastructure including houses, packing sheds, equipment, etc. The price for only the land is $2400 per hectare, thus the total for land alone is $7.2 million. The crop and animal improvements are $600,000 (300 hectares with improvements of $2000 per hectare) and the infrastructure is valued at $700,000. It should be noted that this price for the land is the highest quoted price and, if the final price should be lower, the benefits as presented in the economic analysis will even be greater. 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, see annex II.B.7 for details. Similarly, equipment costs were developed based on a survey of current market prices in the San Jose area and the United States, see annex II.B.4. Based on the above considerations, the design team has determined that the start up costs of $29.3 million in local currency equivalent is sufficient to meet the requirements of the Agricultural College.

Local currency will also be used to capitalize a colon endowment to be created for the College. A total of $50 million equivalent will be deposited into the colon endowment, in equal installments of $25 million 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 local currency operating expenses during the life of the project and all local currency recurring costs for ten years thereafter. As seen in Table 13, a conservative estimate of the local currency endowment is presented. Annex II.B.9 presents an analysis of the best and the worst possible scenarios of the cash flow.

Table 13 presents the twenty year local currency endowment cash flow that the Mission believes to be the most conservative if not the worst case. However, even for the worst case, as presented in Table 13, the local currency endowment covers all local currency expenditures for twenty years. It should be noted that the income sources to the endowment are from income generated at a 4.5% real interest rate and from domestic sales of farm production. At the present time Zamorano in Honduras provides for 80% of their operating expenses from farm production on less land then will be available to the College for agricultural production. Therefore, if the College is able to produce sufficient income from farm production to cover only 45% of the operating costs of the Agricultural College the endowment continues to capitalize to year 2005, twenty years from the start of the project, see Table 13. Annex II.B.9 goes into a complete analysis of the local currency endowment cash flow using different interest rates and amounts of farm production. Even if the real interest rate should decrease to 3.5% and farm production provide enough for only 60% of the operating costs, there will still be enough funds generated by the endowment to cover all local currency, see annex II.B.9 for details.

From the above analysis, the design team has concluded that sufficient local resources will be available to meet all local costs of the College, including recurrent costs, for the life of the project and more.

b. Dollar Costs

The project is designed to finance all dollar costs of the College 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 College 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, ($26.4 million), so that all other dollar income coming to the College 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 Annex II.B.3), the recurrent dollar costs the College will face will be slightly more than $3.2 million beginning in year 1996 at the end of the project. The endowment, therefore, must generate an income stream of at least the dollar operating costs if the College 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 nine year period beginning with the entrance of the first class, tuition income will generate approximately $8.9 million, see Annex II.B.3 for details.

-- Fund raising activities, coordinated by a staff member of the College, will generate $500,000 annually starting in year 1988.

-- Beginning in year 1992 it is assumed that the farm will begin receiving $300,000 in income from farm production in the form of export crops. The income will increase by 2.5% relative to price increases and beginning in year 1996 will cover at least 25% of all dollar operating costs. Farm production at Zamorano in Honduras covers 80% of operating expenses on less land than will be available to the College. Therefore the Mission believes that for farm production to cover at least 25% of operating costs is a conservative assumption.

-- In addition to these sources, the Government of Costa Rica has agreed to provide $10.0 million in local currency and convert the funds into dollars. This 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 $31.6 million. Beginning in year 11 recurrent dollar costs will be paid from the income of the endowment. The dollar funds will be placed in a U.S. trust account and will be invested in accordance with the policies established by the College's Board of Trustees. It is expected that a real return of 4.5 percent on investment will be realized. This real interest rate was provided by the Mission economists in order to take into consideration inflation.

Table 13 shows that the income from the endowment and other sources (farm production, matriculation fees and fund raising) will meet more than the dollar cost requirements. The Mission believes that the cash flow for the dollar endowment presented in Table 13 is the most realistic and conservative scenario. The scenario presented in Table 13 shows that after 20 years of covering all recurrent dollar costs the endowment will have increased from $31.6 million in the tenth year, EOP, to $38.3 million in year twenty. Capitalization of the endowment continues through year 2005, 10 years after the end of project date, and will continue to capitalize into the future. Annex II.B.9 presents a complete analysis of the best and worst scenarios for the dollar endowment by decreasing and increasing the different income sources. Capitalization occurs over a twenty-year period even if the GOCR provides only $5 million dollars, fund raising decreases to $250,000 per year and farm production covers only 25% of the costs, see annex II.B.9 for the complete analysis. From this analysis, the Mission has determined that sufficient dollar resources can be mobilized by the College 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 College is financially viable and will be able to function in the future without additional financial flows from AID.

TABLE 13

TWENTY YEAR PROJECTION OF ENDOWMENT CASH FLOW FOR AGRICULTURAL COLLEGE

DOLLAR ENDOWMENT ($000)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 EOP	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1 LC to dollars by GOCR	2500	2500	2500	2500																
2 Farm production 1/							300	307	315	323	815	864	916	971	1029	1091	1156	1226	1299	1377
3 Matriculation fees 2/	-	276	524	773	1021	1111	1194	1277	1360	1401	1443	1486	1530	1576	1624	1672	1723	1774	1827	1882
4 Fundraising and other			500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
5 Total income from sources	2500	2776	3524	3773	1521	1611	1994	2084	2175	2224	2758	2850	2946	3047	3153	3263	3379	3500	3627	3759
6 Beginning balance	2500	5308	9155	13340	15462	17769	20563	23572	26808	30238	34356	35492	36579	37609	38570	39453	40244	40929	41495	41925
7 Real interest at 4.5%	112	242	412	600	696	800	925	1061	1206	1361	1546	1597	1646	1692	1736	1775	1811	1842	1867	1887
8 Balance	2612	5631	9567	13940	16157	18568	21488	24633	28014	31599	35902	37089	38225	39301	40306	41228	42055	42771	43362	43812
9 Recurrent cost after EOP 3/											3261	3456	3664	3883	4116	4363	4625	4903	5197	5509
10 Ending balance	2612	5631	9567	13940	16157	18568	21488	24633	28014	31599	32642	33633	34562	35418	36190	36865	37430	37869	38166	38303

COLON ENDOWMENT ($000)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Beginning Balance	25000	50772	52489	54051	55441	56650	57780	58789	59623	60294	60862	61390	61876	62315	62704	63037	63311	63521	63661	63725
2. Real interest at 4.5%	1125	2285	2362	2432	2495	2549	2600	2646	2683	2713	2739	2763	2784	2804	2822	2837	2849	2858	2865	2868
3. Expenses 4/	643	1032	1454	1894	2339	2580	2893	3293	3658	3902	4019	4140	4264	4392	4524	4659	4799	4943	5091	5244
4. Farm Production 5/	289	464	654	852	1053	1161	1302	1482	1646	1756	1809	1863	1919	1976	2036	2097	2160	2224	2291	2360
5. Ending Balance	25482	52024	53396	54589	55597	56619	57487	58141	58648	59106	59581	60013	60396	60727	61002	61215	61361	61436	61434	61349

1/ Farm production covers 25% of operating costs beginning in year 1992 compared to Zamorano's 80%
2/ Matriculation fees increase by 3% per year starting in year 1995
3/ Recurrent costs increase by 6% per year
4/ Local currency expenses include operating expenses, support institution, and audits.
5/ Farm production covers 45% of LC operating costs beginning in year 1986 compared to Zamorano's 80%

c. Method of Implementation and Financing

The direct reimbursement financing method will be used for all project expenditures. This method has been employed with CATIE in all previous projects and has been judged to provide good internal control with low vulnerability. It is recommended the same method be used for the Agricultural College. Given the regional nature of the project and that the Agricultural College will be operating in many countries, reimbursement will be made in U.S. dollars to a separate bank account which the Agricultural College will maintain for the project in the United States.

Based upon periodic assessments of the accounting and internal control systems of the Agricultural College by both independent auditors and USAID/Costa Rica financial analysts, a Certified Summary Disbursing Report, accompanied by a SF-1034 to process reimbursement to the institution is accepted by USAID/Costa Rica's Controller's Office to document project expenditures. Post payment reviews are performed by USAID/Costa Rica'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.

d. Audit Coverage

The systems for internal control and accounting within the College for the financial management of the project will be designed and established by a certified CPA firm acceptable to AID.

To provide senior responsible officials of the College and AID with assurance that adequate financial management practices are exercised in handling resources provided under the project, an independent audit of the College's financial records will be funded under the "Evaluations and Audit" budget element of the table, see Table 9.

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. 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 Regional Agricultural College 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.

Given the important role of women in the agriculture sector, it is anticipated that women will be actively recruited to attend the College. In addition, the design of the physical facilities for the Agricultural College take into account this expectation, most notably in the dormatories where space is being planned for women students.

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 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 will have a positive impact on the social and economic well-being of the region as a whole.

E. SUMMARY ECONOMIC ANALYSIS

The complete economic analysis for the project is included in Annex II.D. The following represents a summary of the analysis of the project.

To simplify the presentation of the economic analysis, the project has been separated into two parts: CATIE element and the Regional Agricultural College element. In the latter case, least cost alternatives are discussed and an internal rate of return analysis is performed.

1. CATIE

The type of research the project will support for CATIE, and described in detail in Annexes II.A.1 and II.A.2, is similar to that conducted in many other agricultural research institutions. The research carried out by these institutions has been shown to produce rates of return ranging from 46% to 71%. At CATIE, such crops as rice, corn and beans are likely candidates for research. With other similar regions of the world currently producing substantially higher yields for these crops, the research by CATIE is likely to lead to dramatic productivity increases for the CA/P region.

Based on the comparison of the CATIE element with similar institutions, and on the review of the rates of return for these projects, it is estimated that the CATIE element of the project will produce an internal rate of return substantially greater than 15%.

2. Regional Agricultural College

a. Analysis of Least Cost Alternatives

1) No Real Alternatives

As discussed in more detail elsewhere in the PP, the Regional Agriculture College will offer a B.S. degree program which emphasizes applied, practical training. Graduates of the program will have both the skills and level of training demanded by private and quasi-private sector employers (see discussion of demand for agriculturalists under the section F). It is predicted that over the next few decades population growth and the expansion of agricultural operations will place greater demands on the fragile lands of the humid lowland tropics (HLT). Therefore, agricultural skills attuned to the special conditions of HLT areas are needed. The two critical factors needed to meet the project purpose and goal are hands-on experience and hands-on experience in the HLT. As a result, analysis of possible

less-costly alternatives revealed that there are no true alternatives for producing the type of graduate desired for the project, because in most cases almost identical facilities would have to be constructed in the HLT.

In summary, there does not appear to be a more cost-effective alternative than that represented by the new Regional Agricultural College.

2) Comparative Cost

The average cost per student of an agricultural education in the U.S. is estimated to be about $24,000 per year. For the proposed Regional Agricultural College, it is expected that the average cost per student will lie in the $13,000-$17,000 range. This figure assumes that each year, in addition to the full-time students, there will be 100 full-time equivalent students participating in short courses, seminars, at night, on weekends, during vacations, etc. The average cost figure for Zamorano is expected to reach $11,000 in the next year. Although it is impossible to quantify, it is expected that the increased benefits resulting from the longer, more sophisticated training at the Regional Agricultural College will more than offset this 2,000-$6,000 higher cost.

b. Internal Rate of Return Analysis

1) Introduction

Education projects such as this one pose a dilemma for economists because the benefits of expanded educational training are not easily quantified. The preferred method to judge whether this project produces an acceptable rate of return would be to quantify the increases in production and productivity, as well as the effect of reduced environmental degradation, anticipated in the agricultural sector. While the link between the graduates from the Regional Agriculture College and the agricultural sector is quite real, economic effects on the sector are indirect and diffuse. Therefore, it is very difficult to quantify, with any sense of reasonable accuracy, the direct effects these graduates may have on production and productivity of the agricultural sector. As an alternative procedure for measuring the benefits of the project and capturing the impact of these new graduates, salary differentials are used to estimate the major benefits in the internal rate of return (IRR) analysis of the project.

2) Basic Model

We first develop a conservative, "base" case, and then conduct sensitivity analysis as a means of arriving at an estimate of the rate of return for the project. The analysis assumes that there is more than adequate demand for the graduate student, as indicated by the survey. We assume that there are no price distortions of any kind. Although the usual ex-ante nature of some of the assumptions and estimates preclude a definitive answer on the precise return the economy may expect from this project, the

exercise is still quite useful because it does provide a sense of the "order of magnitude" for the rate of return (IRR) of the project.

In addition to the benefits resulting from salary differentials, benefits arising from matriculation, farm income, fund raising, and special programs are estimated. Another category of benefits, termed "external benefits", is included to capture those benefits not included in the salary differential. Two different types of costs are included in the analysis: construction, equipment, land, and operating costs through the year 2005, and the income foregone during the four years a student studies. The two major benefits, salary differential benefit and external benefit are described below.

3) Salary Differential Income Benefit

The salary information used in the analysis was obtained from the four country survey discussed in detail in Annex II.E. Because of the limited size of the sample, the survey results cannot be used to arrive at definite conclusions within specific confidence limits. However, the data do provide a good sense of the minimum and maximum salary differential that is likely to occur.

Graduates from the Regional Agricultural College will be quite different than graduates of existing agricultural colleges. Greater emphasis will be placed on acquiring practical skills. Combined with B.S. level training, such skills should result in a salary level for the Agriculture College's graduates somewhere between that of existing agriculture colleges and graduate level training.

4) Externality Income Benefit

External benefits have been included in the analysis in order to recognize and account for those additional benefits that are likely not to be captured by the salary differential. External benefits include changes in farm income that result from a) the passing from one farmer to another of skills and information learned at the college in the special programs, b) from the extension work performed by the students and then graduates of the College, and c) the increased income realized by others in the agriculture sector as a result of the increased efficiences provided by this new cadre of graduate. This category also includes those benefits to the economy from the reduced rate of environmental degradation which occurs as a result of the better understanding of the HLT made possible by the College and its graduates.

To clarify the meaning of these benefits an external benefit of $2,000 per graduate of the college might imply, for example, that a farmer, trained or taught by the graduate passes on this information to another farmer who uses this information to increase his farm income by $2,000 permanently. Thus, if this second farmer previously was earning $10,000 from his farm, he now would be earning $12,000/year; and all other things being equal, each year until his death, he will continue to earn $12,000. Another scenario might be 10 farmers, each realizing a $200 a year change. In the analysis, it is assumed that the external benefit continues through year 2034.

5) Results of the Basic Model and Sensitivity Analysis

The base case assumes that external benefits are zero. This implies that the salary differential captures all the benefits to the economy resulting from the increased training. Without any information to the contrary, for this base case it is assumed that the Regional Agriculture College graduate will command a salary half-way between the agricultural graduate and the person with graduate training. The salary differential between an Agriculture College graduate and a vocational school graduate, thus, becomes $472/month ($820-$348), or $5700/year. These are conservative assumptions which establish the minimum value for the IRR that can be expected from the project.

The sensitivity analysis varies the salary differential on the assumption that the survey results may understate the difference between levels of education. In addition, the zero value for the external benefit is replaced with three values on the assumption that the salary differential does not capture all the benefits flowing to the economy. All other benefits are assumed to remain constant. Sensitivity analysis is carried out to determine how much larger the IRR can be expected to be.

Twelve sensitivity analyses are included in Table 14. The analysis produces a range of IRR values from the conservative 5.3% of the base case to the less conservative 13.4% with its assumptions of a salary differential benefit of $8100 and an external benefit of $10,000 per graduate.

TABLE 14

IRR RANGES

	$0 External Benefit	$2000 External Benefit	$5000 External Benefit	$10000 External Benefit
Base Case Sal.Dif $5700	5.3%	7.2%	9.4%	12.2%
Sal.Dif $6500	6.6%	7.8%	9.9%	12.64%
Sal.Dif $8100	7.5%	9.0%	10.9%	13.4%

It obviously is difficult to estimate these two benefit elements. However, the $2000 estimate is an external benefit would appear not to be unreasonable. And, $6500 as a salary differential does not seem to

unreasonable either, given the fact that promotions are more rapid for those with degrees than those without, and that, over time, the difference in salary will grow between the vocational and college trained people. The $6500 salary differential is based on the assumption that the Regional Agriculture College graduate will recieve a monthly salary which is two-thirds of the way between an agricultural college graduate and a graduate with graduate school training. If this new graduate fulfills the designers' expectations, the salary levels should be high, and the promotion rates higher than normal. This line of reasoning argues for an IRR in the 7-8% range. This corresponds with Psacharopoulos's estimate for the rate of return of agricultural programs in LDC universities. (George Psacharopoulos, The Economics of Higher Education in Developing Countries, World Bank Reprint Series: Number 225).

If one believes that there will be a "research-like" aspect to the teaching at the college, and if one believes that the $2000 externality figure does not capture the value of the reduced rate of environmental degradation, then there is reason to believe that the IRR will exceed 9%.

In summary, the indicative evidence implies, that with no externalities, the project is likely to produce a rate of return slightly in excess of 5%. A modest assumption about the level of externalities and the environmental benefits raises the IRR to 7%. A slight increase in the salary differential produces a rate of return nearer 8%. If one believes that the research qualities of the college will produce significant externalities, as in the CATIE case, and if one believes that there will be significant cost savings to the economy as a result of the reduced rate of environmental damage, then an IRR as high as 12% becomes possible.

In light of the above discussion, if it were possible to properly measure all the externalities, the Mission believes it would be possible to demonstrate that the project will produce an IRR in the 8% to 12% range. On that basis, the Mission concludes that the Regional Agriculture College is economically justified.

F. Summary of Demand Analysis

The agricultural manpower demand survey was organized by USAID/CR and AID/W/PPC/CDIE. A survey expert from PPC came to Costa Rica and together with experts from EAP and the University of Costa Rica conducted 3 survey activities: 1) an employment tracer survey of 105 recent graduates of EAP and the University of Costa Rica; 2) an inventory of the 19 current agricultural training programs offered in Guatemala, Honduras, Costa Rica and Panama; and 3) a survey of 69 private and quasi-private sector agricultural employers in the areas of growers associations, multi-nationals, large farms, cooperatives, and banks.

The data provided by these studies were used to examine a) the need for improved agricultural education available in the CA/P region focused on agricultural systems in humid lowland areas; b) the importance of combining standard classroom instruction with applied field training in agricultural

programs; c) the needs of private sector employers for graduates trained in tropical agriculture and d) the estimated contribution of trained agriculturalists to the regional economy.

Survey data pertaining to agricultural training available in the CA/P region, and to private and quasi-private sector employment of agriculture graduates supports the following conclusions.

1. Private Sector Demand

1.1 General

Agricultural training available in the CA/P region should be better targetted on the needs of private and quasi-private sector employers.

1.2 Supporting Evidence

a) Employers report that recent agriculture graduates need additional training beyond normal job orientation.

b) A major weakness in current agricultural training cited by employers is a lack of administrative and business related skills.

c) Over the past three years, approximately 27% of graduates hired by private sector employers were for jobs in the area of extension/technical assistance. During that same period, agriculture schools produced no students who had specialized training in this area.

d) Over the past three years, employers have been hiring agriculture graduates for a variety of specialized jobs. Approximately fifty percent of the graduates hired in the past three years were hired for specializations not being produced by agriculture schools.

1.3 Specific to the Regional Agriculture College

The Regional College will fill an important gap in current agriculture training available in the region.

2. Importance of a B.S. Degree

2.1 General

A B.S. degree in agriculture will be increasingly important for employment and career advancement in the private and quasi-private sector in the coming years.

2.2 Supporting Evidence

a) Over the past three years, fifty-four percent of new hires reported by employers were agriculturalists with a B.S. degree.

b) Approximately fifty percent of the agriculturalists employers anticipate hiring in the next five years will have B.S. degrees.

c) The number of graduates with a B.S. degree will increase in the coming years. Combined with the apparent preference or need of employers for agriculturalists with degree level training, it is likely that those with a B.S. degree will have an even greater comparative advantage over non-degree holders.

d) Significant differences in salary corresponding to the level of training were reported for recently hired agriculturalists. Agricultural training also contributed to faster career advancement. It is likely that these initial salary differentials will expand over time.

2.3 Specific to the Regional Agriculture College

The Agriculture College will constitute a unique type of training institution in the CA/P region. The program of instruction it will offer, which combines applied training with B.S. level instruction, will produce agriculturalists with a set of skills useful to private and quasi-private sector employers.

3. Agricultural Operations in Humid Lowland Tropical Areas

3.1 General

Barring adverse economic and political conditions, it is likely that private and quasi-private sector employers will expand their operations in humid lowland tropical areas. This should generate additional demand for agriculturalists with the appropriate training.

3.2 Supporting Evidence

a) Approximately seventy percent of the employers responded that they expect to expand their operations in lowland tropical areas. An additional ten percent reported they were uncertain, which in part was due to current political problems. Therefore, the number who actually expand their operations in these areas could be even higher.

b) Approximately sixty percent of University of Costa Rica and EAP graduates in Costa Rica reported they had worked in lowland tropical agriculture. The majority of those responding to the question of how they learned about such work reported it was from personal experience.

3.3 Specific to the Regional Agriculture College

The training to be offered by the Agriculture College on agricultural systems in humid lowland tropical areas should produce graduates with the skills needed by employers who are currently operating in such areas and who intend to expand these operations.

4. Comparison of Agricultural Training Programs

4.1 General

An intensive program of applied agricultural training entails considerable operating expenses.

4.2 Supporting Evidence

a) The student per teacher ratio for technical schools, including EAP, are more favorable than the ratios for vocational schools and agriculture colleges.

b) The average expenditure per pupil is considerably greater for EAP than other agriculture schools. Similarly, technical schools spend more per pupil than agriculture colleges.

c) Tuition increases have been very large for EAP over the past five years (718%). Increases for vocational schools, technical schools and agriculture colleges have ranged from fifty to sixty percent.

d) Data on applications for admission and student enrollment indicate that the training capacity of technical schools is not expanding and EAP reported a decrease in applications and enrollment over the past five years. Vocational schools and agriculture colleges appear to be expanding to meet demand for agricultural training. Given cost differentials cited above, the expense of technical training might be channelling students to these institutions.

4.3 Specific to the Regional Agriculture College

If the Agriculture College can keep its costs below those of EAP, the school should contribute to meeting the demand for applied agricultural training.

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 the CATIE component of 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 of the CATIE component. 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 liaison with the individual technical departments. Finally, the Project Manager will serve as the contact for ROCAP staff on all implementation matters.

D. Regional Agricultural College Monitoring Responsibilities

The Board of Directors of the College will establish the basic policies and procedures to assure adequate controls over all aspects of operating the College. 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 Rector will be the primary counterpart and, through the project manager, will provide necessary liaison between the Mission and the College.

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

An important part of monitoring the performance of the Agricultural College will be annual assessments of student admissions. Basic data on nationality, socio-economic background, the number of scholarships awarded to students from poor families, and the percentage of female students applying for admission and the number admitted should be available from college records. The College will generate this data annually for each class of students. This report will allow assessing a) whether adequate numbers of students from rural poor communities are being admitted, and b) whether the progress of those students is satisfactory.

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 efforts. The single exception will be the recruitment of the coordinator, which will begin immediately upon satisfaction of conditions precedent. ROCAP staff, supplemented by 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. Regional Agricultural College

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 College 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 College will revise this schedule. At a minimum, 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.

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 and creates 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 create formal search committees which will place announcements in newpapers and technical publications and contact the USAIDs to identify potential candidates. Scopes of work will be 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. Regional Agriculture College

The College will serve as its own agent for the procurement of goods and services required for the project. Procurement procedures will be developed by the College 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.

TABLE 15

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. Development Office activities (project financed)						
9. Library materials procured						
10. Curriculum TA					0	
E. Networking						
1. Institutional linkages are pursued (project financed)						

TABLE 16

REGIONAL AGRICULTURAL COLLEGE

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

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

TABLE 17

REGIONAL AGRICULTURAL COLLEGE
IMPLEMENTATION CALENDAR

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

TABLE 17 (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 and audit	January, 1991
27. Third evaluation and audit	November, 1992
28. Final evaluation and audit	November, 1994

a. Personnel

The College will recruit to fill the faculty and administrative positions created by the project on an individual basis. Recruitment will take place primarily in the Americas although up to 10 percent of the staff will be from Costa Rica. 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 College 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 College following the guidance provided by 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.4 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.

c. Institutional Support

To assist in addressing the various problems that a new educational institution can be expected to encounter during its start up years, a link with a U.S. university that has an educational philosophy similar to the Agricultural College's is planned. A variety of support services will be provided through this link including: technical and professional expertise in planning activities; assistance in staff and faculty recruitment; provision of staff for interim periods; provision of training for staff upgrading; arrangements for staff exchanges; and other general support services.

It is planned that these services will be obtained from one U.S. university. A contract will be signed following an open competition among all interested universities. Notice of the competition will be announced through BIFAD as well as the Commerce Business Daily. An arrangement involving a lead university working with other universities, including nistorically black colleges and universities, will be encouraged. (Annex II.B.8 provides the budget for this activity.)

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.

An initial 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 they will be useful in assessing progress and adjusting the content and focus of discrete project activities as appropriate.

2. Regional Agricultural College

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 that projected at the design stage, and the financial situation of the College. The first evaluation will occur after year five when one class has graduated, and the second in year eight when the College will be operating at full potential. The second mid-point evaluation will also review the employment pattern of the first graduates of the College.

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 College have been met. Of particular concern in the final evaluation will be the size of the dollar endowment that the College will establish and a further assessment of the employment patterns of the graduates.

A student tracking system will be established as an integral part of the Agricultural College administration. The system will serve two important functions. First, it will provide necessary data for the second mid-point and final project evaluations. Second, the establishment of this system and its continued operation after the project is completed will be an important institution building objective for the project. The information provided by the system will enable College administrators to assess periodically the relevancy of the College's curriculum in light of the employment patterns of graduates.

On an annual basis, the College will mail an employment questionaire to all of its graduates. The questionaire would request information about the employment of the graduate during the past twelve months (e.g. employer, location, type of work, job position, salary, recent promotions, etc.), utility of training received from the Agricultural College, and recommendations for curriculum improvements. The questionaire should explain the importance of the information - i.e. improving the performance of the College, encourage them to cooperate, and inform the College of changes in their address. (The importance of this could be impressed upon while they are still students.) The length of the questionaire could conceivably be as short as one or two pages. Graduates will complete the form and mail it back to the College.

Requirements for creating a graduate tracking system are: a) development of an employment questionaire, b) an accurate mailing list, including an address for a next of kin who could be contacted in case the graduate moves and fails to notify the College, c) a microcomputer, d) a database program for managing and producing the mailing list (e.g., DBase

III), e) a staff person trained to maintain, update and use the system (a part time job), and f) sufficient budget to support the system. Standard summary tables could be developed to present the annual report on graduate employment. In a short time (after several classes have graduated), the data base would become a useful tool for developing career histories of Agricultural College graduates, identifying needed curriculum changes to better meet employer needs, etc.

Initial start-up costs will consist primarily of the equipment and short term TA to design the questionaire in conjunction with the interests of College administrators and train one person to use the system - probably costing no more than $10,000, less using local TA. Operating expenses and staff time requirements would grow each year as an additional 75 to 100 graduates are produced. But it would be a number of years before this function required even one full time person. After a decade or so of operation when the College has produced hundreds of graduates, the system could be staggered - e.g., half the graduates one year, the other half in the following year - to reduce data management requirements.

H. Waivers

The ability of both CATIE and the Agricultural College 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 processed as appropriate. 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 precedent 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, but to include students from non-Central American members of CATIE, such as the Dominican Republic; (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; (5) assign teaching responsibilities to all core budget funded technicians stationed at the Turrialba campus by year three or the project; (6) use its best efforts to broaden participation in either its board of directors, technical advisory council, or academic council by offering membership to international research organizations and foreign universities; (7) use its best efforts to recruit women faculty.

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 September 30, 1985.

2. Regional Agricultural College

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 College, will include the submission of evidence

that (a) the special law creating the College 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 College 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 September 30, 1985.

ACTION AID-7 INFO CHARGE A/DCM ECON/10

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AIDAC GUATEMALA FOR ROCAP

E.O. 12356: N/A
TAGS:
SUBJECT: ROCAP REGIONAL HIGHER EDUCATION PROJECT (596-0129
PP

REF.: (A) STATE 48793, (B) JOHNSON/CHAIJ TELCON, MARCH 29,

USAID	Costa Rica	
Route To	Act.	Info
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PPDE		✓
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ROCAP	X	

DUE DATE

1. THE PROJECT'S POTENTIAL LONG TERM SIGNIFICANCE FOR AGRICULTURAL DEVELOPMENT IN CENTRAL AMERICA AND THE MAGNITUDE OF RESOURCES PROPOSED FOR IT REQUIRE THAT CERTAIN ASPECTS BE FURTHER EXAMINED IN THE PERIOD BEFORE FUNDING CAN BE MADE AVAILABLE. AS A RESULT OF THE DAEC MEETING AND SUBSEQUENT REVIEW OF DAEC FINDINGS, WE FEEL THAT THE CONCERNS RAISED IN THE FOLLOWING PARAGRAPHS SHOULD BE EXAMINED IN FURTHER DEPTH BEFORE THE PROJECT CAN BE APPROVED.

2. INTER-AMERICAN AGRICULTURAL COLLEGE (IAAC) COMPONENT.

(A.) PROJECT RATIONALE AND STRATEGY. WE MUST CLEARLY LAY OUT THE RATIONALE FOR THE CREATION OF A FOUR-YEAR AGRICULTURAL COLLEGE FOR THE LOWLAND HUMID TROPICS WITHIN THE FRAMEWORK OF THE PROJECT PURPOSE AND PROBLEM STATEMENTS. IN DOING SO, WE MUST RIGOROUSLY DEMONSTRATE THAT THE IAAC IS THE MOST COST-EFFECTIBE WAY OF USING APPROXIMATELY DOLS 100 MILLION IN FOREIGN EXCHANGE AND LOCAL CURRENCY EQUIVALENT TO OVERCOME THE HUMAN RESOURCE CONSTRAINT TO INCREASED AGRICULTURAL PRODUCTION AND PRODUCTIVITY IN THE HUMID TROPIC LOWLANDS. WHILE THE PP DISCUSSES CERTAIN ALTERNATIVES FOR ADDRESSING THE HUMAN RESOURCE CONSTRAINT, WE HAVE TO GO BEYOND AFFIRMING THAT A B.S. DEGREE-LEVEL COLLEGE COURSE OF STUDY IS THE ONLY APPROPRIATE ALTERNATIVE FOR DEVELOPING THE PROFESSIONAL HUMAN RESOURCE BASE REQUIRED TO SOLVE THE PRODUCTION PROBLEM. THEREFORE WE NEED AN ANALYSIS CORROBORATING THIS POSITION. TO CARRY OUT THE ANALYSIS WE WILL NEED TO CLEARLY DEFINE THE HUMAN RESOURCE NEEDS WHICH EXIST AND THEN ANALYZE THE ALTERNATIVE MEANS OF ADDRESSING THE NEEDS.

(B.) NEEDS ASSESSMENT. THE PP SHOULD DEFINE THE SKILLS AND KNOWLEDGE LEVELS REQUIRED TO INCREASE THE PRODUCTIVITY OF AGRICULTURE IN THE LOWLAND HUMID TROPICS. POSSIBLE TYPES OF SKILLS WOULD INCLUDE

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ECHNOLOGY TRANSFER AGENTS (GENERAL, CROP SPECIFIC), FARM ANAGEMENT, RESEARCH TECHNICIANS, MARKETING/SALES, GRICULTURAL ENGINEERS, ETC. AN EFFORT SHOULD BE MADE TO UANTIFY THESE SKILLS REQUIREMENTS OVER A TEN YEAR PERIOD.

--THE MISSION MAY WISH TO REVIEW A NEEDS ASSESSMENT CARRIED OUT FOR A RECENT AGRICULTURAL EDUCATION PROJECT IN JAMAICA. THE ASSESSMENT FOUND THAT THE TYPES OF SKILLS REQUIRED BY THE PRIVATE SECTOR WERE MORE SPECIFIC THAN FOR THE PUBLIC SECTOR (WHICH WERE PRIMARILY ENTRY LEVEL EXTENSION AND AGRICULTURAL EDUCATION POSITIONS). IT FOUND THAT PRIVATE SECTOR SKILLS OFTEN COULD MOST APPROPRIATELY BE PROVIDED THROUGH IN-SERVICE AND MID-CAREER TRAINING PROGRAMS. THIS IS NOT TO SAY THAT THIS IS THE CASE IN CENTRAL AMERICA BUT IT IS AN EXAMPLE OF PROGRAM DIRECTION BASED ON THE RESULTS OF ANALYSIS.

(C.) CHOICE OF ALTERNATIVES AND COST-EFFECTIVENESS. THE PP SHOULD CLEARLY IDENTIFY THE EXISTING AND POSSIBLE FUTURE ALTERNATIVE SOURCES OF SUPPLY FOR THE SKILLS REQUIREMENTS WHICH HAVE BEEN DEFINED BY THE NEEDS ANALYSIS. IT SHOULD DETAIL THE NUMBER, TYPE, AND QUALITY OF TRAINED AGRICULTURALISTS BEING PRODUCED. TO THE EXTENT THAT THERE ARE UNMET HIGH PRIORITY SKILLS REQUIREMENTS OTHER THAN FOR AGRONOMISTS WHICH MAY NOT REQUIRE A FOUR YEAR COLLEGE PROGRAM, THE ANALYSIS SHOULD INCLUDE, IN addition TO ZAMORANO, THE NATIONAL UNIVERSITIES, AND U.S. TRAINING, OTHER EXISTING AND POTENTIAL TRAINING ALTERNATIVES. THESE MIGHT INCLUDE RETRAINING PROGRAMS FOR AGRICULTURAL TECHNICIANS WHO HAVE NOT SPECIALIZED IN HUMID LOWLAND TROPICAL AGRICULTURE, IN-SERVICE TRAINING PROGRAMS, PROVISION OF SECONDARY SCHOOL LEVEL AGRICULTURAL EDUCATION, OR PROVISION OF POST-SECONDARY ALTERNATIVES SUCH AS TWO OR THREE YEAR PROGRAMS.

--A REASONABLE ATTEMPT SHOULD BE MADE TO COMPARE THE COSTS OF THE FEASIBLE ALTERNATIVES FOR MEETING THE QUANTITATIVE AND QUALITATIVE GAP BETWEEN DEMAND AND SUPPLY FOR TRAINED AGRICULTURALISTS. THIS SHOULD COMPARE THE SET OF SERVICES OR ARRAY OF PROGRAMS THAT COULD BE PROVIDED BY IAAC WITH OTHER FEASIBLE ALTERNATIVE MEANS TO PROVIDE THE SAME SET OF SERVICES IN ORDER TO ASCERTAIN THE LEAST COST ALTERNATIVE.

(D.) ECONOMIC ANALYSIS. THE PROPOSED LEVEL OF EXPENDITURES FOR THE AGRICULTURAL SCHOOL, TOGETHER WITH ITS RELATIVELY LOW ANNUAL OUTPUT OF PROFESSIONALS,

SUGGESTS THAT A RATE OF RETURN ANALYSIS SHOULD BE ATTEMPTED, EVEN THOUGH THE LINK BETWEEN THE ULTIMATE OBJECTIVE OF THE PROJECT, INCREASED AGRICULTURAL PRODUCTIVITY, AND UNDERGRADUATE TRAINING IS INDIRECT AND DIFFICULT TO MEASURE. ROUGH CALCULATIONS CAN BE MADE FOR THE LEAST COST ALTERNATIVE WHICH WILL PROVIDE A SENSE OF THE MAGNITUDE OF THE RATE OF RETURN OF THE INVESTMENT.

---THE BEST BENEFIT MEASURE WOULD BE ESTIMATES OF THE CHANGES IN THE VALUE OF THE INCREASED AGRICULTURAL PRODUCTIVITY RESULTING FROM THE IMPROVED HUMAN RESOURCE BASE. UNFORTUNATELY, SUCH A MEASUREMENT IS DIFFICULT, IF NOT IMPOSSSIBLE TO OBTAIN. A GOOD, THOUGH ADMITTEDLY ROUGH, PROXY FOR THIS MEASUREMENT, HOWEVER, IS THE SALARY DIFFERENTIAL EXPECTED AS A RESULT OF THE INCREASED TRAINING. IT IS HARDLY A PERFECT PROXY, BUT IT CAN PROVIDE THE MISSION WITH A GOOD UNDERSTANDING OF THE ORDER OF MAGNITUDE OF THE RATE OF RETURN, AND THEREBY PLAY AN IMPORTANT ROLE IN DECISION MAKING.

---THE PP IMPLIES THAT THE STUDENTS FOR THE AGRICULTURAL COLLEGE WILL REPRESENT ADDITIONAL STUDENTS, I.E., THAT THE NUMBER OF STUDENTS ATTENDING OTHER INSTITUTIONS OF HIGHER LEARNING IN THE REGION OR OVERSEAS WILL NOT BE REDUCED AS A RESULT OF THE PROJECT. IT FOLLOWS FROM THE ABOVE THAT, WITHOUT THIS ADDITIONAL OPPORTUNITY FOR HIGHER EDUCATION AT THE AGRICULTURAL COLLEGE, A STUDENT WOULD END HIS/HER EDUCATION AT THE HIGH SCHOOL LEVEL. WHILE THERE INDEED MAY BE SOME SUBSTITUTION AND SOME ALTERNATIVES, THE BASIC ASSUMPTIONS PROVIDE THE GREATEST SALARY DIFFERENTIAL AND HENCE THE GREATEST AMOUNT OF BENEFITS. SENSITIVITY ANALYSIS CAN BE APPLIED TO DEMONSTRATE OR MEASURE THE IMPACT OF THESE BASIC STRONG ASSUMPTIONS.

---BASED ON THE ABOVE, WE WOULD SUGGEST THAT B/C OR IRR ANALYSIS, WHICHEVER IS PREFERRED, BE CONDUCTED ALONG THE FOLLOWING LINES.

---IT SHOULD BE POSSIBLE TO ESTIMATE A WEIGHTED AVERAGE SALARY FOR HIGH SCHOOL GRADUATES AND FOR GRADUATES FROM THE AGRICULTURAL COLLEGE. THE DIFFERENCE IS THE ANTICIPATED ANNUAL INCREASE IN BENEFITS (SALARY) PER GRADUATE AS A RESULT OF THE PROJECT. TO OBTAIN TOTAL BENEFITS, WE WOULD SUGGEST A 20 YEAR LIFE FOR THE SCHOOL AND 30 YEARS WORKLIFE FOR THE GRADUATES. TO ACCOMODATE UNEMPLOYMENT AND DEATH, WE WOULD SUGGEST A SERIES OF SENSITIVITY ANALYSES WITH THE GENERAL UNEMPLOYMENT RATE USED TO ESTIMATE THE UPPER LIMIT FOR THE TOTAL NUMBER OF WORKING GRADUATES. THE BUILDINGS SHOULD BE SALVAGED AT 50-75 PERCENT OF ORIGINAL VALUE (MIGHT WANT TO TEST THE SENSITIVITY OF THE RESULTS BY VARYING THE PERCENTAGE). THESE DATA CAN THEN BE USED TO PRODUCE A B/C RATIO OR AN IRR. IF THE B/C APPROACH IS CHOSEN, WE WOULD SUGGEST A 10 PERCENT DISCOUNT FACTOR BE USED.

(E.) COST ESTIMATES. THE ANALYSIS OF PROJECT COSTS PRESENTED IN THE PP NEEDS TO BE TAKEN TO A HIGHER LEVEL

OF ACCURACY SINCE, AT THIS TIME, SOUND UNIT COST ESTIMATES ARE LACKING. BECAUSE OF THE LARGE CAPITAL INVESTMENT REQUIRED, CONSTRUCTION COSTS SHOULD BE ESTIMATED WITH THE SAME DEGREE OF ACCURACY AND COMPLETENESS AS IF THE CONSTRUCTION WERE TO BE FINANCED WITH GRANT FUNDS. (IT IS LAC/DR'S UNDERSTANDING THAT THE INCLUSION OF GRANT FINANCED FOREIGN EXCHANGE COSTS FOR CONSTRUCTION AS SHOWN IN TABLE 8 OF THE PP IS ERRONEOUS. IF THIS IS NOT THE CASE, THAT IS, IF THERE WILL BE A GRANT FINANCED PROCUREMENT OF CONSTRUCTION SERVICES, THEN SECTION 611 OF THE FAA WOULD IN FACT BE APPLICABLE.)

--CONSTRUCTION COST ESTIMATES MUST BE BASED ON A SPECIFIC SITE (AS THE PP POINTS OUT, SITE WORK COSTS ARE LIKELY TO VARY TREMENDOUSLY DEPENDING ON THE SPECIFIC SITE SELECTED). THIS MAY REQUIRE THAT AN OPTION TO PURCHASE BE TAKEN IN ORDER TO ASSURE ACCURATE COST ESTIMATES WITHOUT INVESTING A SUBSTANTIAL SUM OF MONEY IN A SITE PRIOR TO A FINAL DECISION BY A.I.D. TO SUPPORT THE PROJECT.

--IN ESTIMATING CONSTRUCTION COSTS, QUANTITIES AND UNIT PRICES SHOULD BE SPECIFIED. THESE COSTS SHOULD BE DEVELOPED FOR THE VARIOUS TYPES OF CONSTRUCTION SUCH AS LABORATORIES, OFFICES, LIBRARY, ETC. MECHANICAL COSTS SUCH AS FOR AIR CONDITIONING, ELABORATE PLUMBING, OR ELECTRICAL WORK WILL AFFECT BUILDING COST. A SINGLE PER SQUARE METER COST FOR ALL SPACE WILL NOT SUFFICE. ALSO, AMPLE PROVISION FOR INFLATION AND CONTINGENCIES SHOULD BE MADE. THE PROCUREMENT PLANS FOR A AND E AND CONSTRUCTION SERVICES SHOULD MEET THE TEST OF SOUND BUSINESS PRACTICE.

--IN ADDITION TO MORE ACCURATE ESTIMATES OF CONSTRUCTION COSTS, DETAILED ESTIMATES OF OTHER INVESTMENT AND OPERATING COSTS SHOULD BE MADE. IN THE PP THERE WERE A NUMBER OF LINE ITEM COSTS (STAFF, INSTRUCTIONAL MATERIAL,

MISCELLANEOUS, CONSTRUCTION, UNIVERSITY SUPPORT) FOR WHICH NO SUPPORTING UNIT COST ESTIMATES WERE PROVIDED. THESE SHOULD BE PROVIDED.

--IT IS STRONGLY URGED THAT THE MISSION, ON THE BASIS OF THESE COST ESTIMATES, CAREFULLY EXAMINE THE PROJECT DESIGN TO ASCERTAIN WHERE COSTS MIGHT BE REDUCED. A DISCUSSION OF THE COST PER STUDENT IS APPROPRIATE IN THIS CONTEXT AS IS A THOROUGH ANALYSIS OF RECURRENT COSTS. THE PROJECT DESIGN SHOULD ASSURE THAT MAXIMUM UTILIZATION IS MADE OF BOTH PROFESSIONAL STAFF AND PHYSICAL PLANT.

(F.) FINANCIAL ANALYSIS AND ENDOWMENTS. GIVEN THE MANY COST OVERRUNS BEING ENCOUNTERED IN INFRASTRUCTURE PROJECTS, WE MUST BE CERTAIN THAT THE TOTAL PROJECT COSTS ARE ACCURATE. AS STATED IN THE REFTEL A COST/REVENUE ANALYSIS SHOULD BE INCLUDED IN THE PP TOGETHER WITH AN EXPLANATION OF KEY ASSUMPTIONS. THE DETAILED COST ESTIMATES AND PROJECTIONS OF REVENUES FROM THE ENDOWMENTS, TUITION AND OTHER SOURCES SHOULD BE USED TO STRENGTHEN THE FINANCIAL ANALYSIS. THE PP SHOULD DISCUSS THE DEGREE TO WHICH THE SCHOOL WILL BE ABLE TO OBTAIN PRIVATE SECTOR SUPPORT AND GENERATE REVENUES FROM TUITION, N.B. IT IS EXPECTED THAT STUDENTS WILL BE CHARGED TUITION ON AN ABILITY TO PAY BASIS. IT SHOULD ALSO DISCUSS THE FEASIBILITY AND LIKELIHOOD OF A GOCR CONTRIBUTION TO THE DOLLAR ENDOWMENT FOR THE IAAC IN VIEW OF THE MACRO-ECONOMIC CONDITIONS WHICH WILL CONFRONT COSTA RICA DURING THE MEDIUM TERM.

--THE PP SHOULD EXAMINE ADVISABILITY OF THE UTILIZATION OF SCARCE DA FUNDS TO PAY DOLLAR COSTS IN THE OUT YEARS OF THE PROJECT IN ORDER THAT THE ENDOWMENT FUND MIGHT GROW. GIVEN THE DEMAND FOR DA RESOURCES, THE MISSION SHOULD LOOK AT THE APPROPRIATE LEVEL OF THE ENDOWMENT VIS A VIS OTHER REVENUE SOURCES. WE SUGGEST THAT THE ENDOWMENTS COVER NO MORE THAN 60 PERCENT OF OPERATING COSTS AND THAT OTHER REVENUE SOURCES BE EXPECTED TO COVER THE REMAINDER.

--GIVEN THE LONG TIME HORIZON AND THE DIFFICULTY IN ESTIMATING COSTS AND REVENUES OF NEW ENDEAVORS SUCH AS THE PROPOSED COLLEGE, IT IS IMPORTANT TO CARRY OUT A SENSITIVITY ANALYSIS OF THE FINANCIAL PROJECTIONS. IN PARTICULAR IT IS NECESSARY TO SHOW THAT THE SIZE OF THE DOLLAR AND LOCAL CURRENCY ENDOWMENTS ARE ADEQUATE UNDER DIFFERENT ASSUMPTIONS ABOUT RECURRENT COSTS AND RETURNS TO THE ENDOWMENT FUNDS.

(G.) TARGET GROUP/BENEFICIARIES. THE PP SHOULD CONTAIN A FULL DISCUSSION OF THE BENEFITS TO THE A.I.D. TARGET GROUP. THIS SHOULD INCLUDE A DISCUSSION OF THE EFFECTS OF THE PROJECT ON THE RURAL POOR IN THE LOWLAND TROPICS. IT SHOULD CLARIFY THE MEASURES WHICH WILL BE USED TO ASSURE THAT POOR RURAL YOUTH WITH AGRICULTURAL BACKGROUNDS WILL ATTEND THE SCHOOL. IT SHOULD SPECIFICALLY ADDRESS THE QUESTION OF FINANCIAL ASSISTANCE TO STUDENTS AS WELL AS OTHER SPECIAL MEASURES WHICH WILL

ASSURE THAT THERE ARE STUDENTS WHO COME FROM THE A.I.D. TARGET GROUP. A TARGET ENROLLMENT FOR LOWER INCOME STUDENTS (INCLUDING RURAL YOUTH) SHOULD BE ESTABLISHED FOR THE SCHOOL. THE RATIO OF THE ENDOWMENT FUND TO OTHER REVENUE SOURCES SHOULD BE CORRELATED TO THE PERCENTAGE OF POOR YOUTH TO BE EDUCATED AT THE COLLEGE.

3. CATIE COMPONENT.

(A.) CONSTRUCTION COSTS. ALTHOUGH CONSTRUCTION IS TO BE FINANCED WITH LOCAL CURRENCY GENERATED THROUGH A TRUST FUND RATHER THAN BY APPROPRIATED FUNDS, IT IS NECESSARY TO ASSURE THAT CONSTRUCTION COSTS ARE SATISFACTORILY ESTIMATED. THEREFORE NEW COST ESTIMATES SHALL BE PREPARED. THESE SHALL BE REVIEWED AND APPROVED BY A QUALIFIED DIRECT HIRE ENGINEER. COMMENTS ON THE IAAC COST ESTIMATING PROCEDURES ARE ALSO APPLICABLE TO THE CATIE CONSTRUCTION.

(B.) FUND RAISING. AT THE DAEC IT WAS CLARIFIED THAT A.I.D. FUNDS WILL NOT BE USED AS PART OF A DIRECT FUND RAISING EFFORT BUT RATHER WOULD BE USED TO ASSIST IN ESTABLISHING AN INSTITUTIONAL DEVELOPMENT OFFICE WHICH WOULD HAVE, AMONG OTHER PERMANENT RESPONSIBILITIES, FUND RAISING. THE MISSION SHALL MODIFY THE TEXT AND FINANCIAL TABLES OF THE PP TO REFLECT THIS UNDERSTANDING. IT WILL ALSO REVIEW THIS COMPONENT CAREFULLY TO ASCERTAIN: (1) WHETHER THE COMPONENT IS OVER-FUNDED; AND (2) THE NATURE OF THE CULTURAL FACTORS WHICH NEED TO BE CONSIDERED IN FUND RAISING EFFORTS.

4. PROJECT DEVELOPMENT. PLEASE NOTE THAT, AT THIS TIME, NO FY 1985 FUNDING IS AVAILABLE FOR THE PROJECT. IT IS POSSIBLE THAT FUNDING MAY BECOME AVAILABLE IN SEPTEMBER FROM FUNDS CURRENTLY RESERVED FOR THE TCIP. GIVEN THE

TIME FRAME WHICH IS FORSEEN FOR THE AVAILABILITY OF FUNDING FOR THIS PROJECT THERE IS SUFFICIENT TIME TO DO THE ANALYSES REQUESTED. WE REALIZE THAT THE ABOVE REPRESENTS A HEAVIER WORKLOAD FOR THE MISSION THAN WAS INDICATED IN REF B. HOWEVER, GIVEN THE MAGNITUDE OF THE PROJECT IN TERMS OF RESOURCE REQUIREMENTS AND ITS AMBITIOUS CHARACTER, WE FEEL THAT A SPECIAL EFFORT MUST BE MADE TO ASSURE THAT WE ARE ALLOCATING AND UTILIZING OUR RESOURCES EFFICIENTLY. THEREFORE, WHILE ANOTHER DAEC REVIEW WILL NOT BE HELD, A SENIOR LEVEL GROUP WILL REVIEW THE PP AS MODIFIED PER GUIDANCE IN SECTION TWO ABOVE WHEN IT IS RECEIVED BY THE BUREAU. WE WOULD EXPECT, HOWEVER, THAT PRE-PROJECT WORK CAN CONTINUE WHILE THE ANALYSES REQUESTED IN SECTION TWO ARE BEING CARRIED OUT. SHULTZ
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ACTION ROCP INFO AMB DCM AID ECON CHRON/5

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C 160243Z FEB 85
FM SECSTATE WASHDC
TO RUEHGT/AMEMBASSY GUATEMALA IMMEDIATE 2169
INFO RUEHSJ/AMEMBASSY SAN JOSE IMMEDIATE 3172
BT
UNCLAS STATE 048739

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TOR: 19:54
CN: 64323
CHRG: RCCP
DIST: RCCP

AIDAC GUATEMALA FOR RCCAP (ADC 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 02660

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

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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

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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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 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 College 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 reports, 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 Regional Agricultural College and 2. Expansion and strengthening 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 assumptions, 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 College	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	15,957,000	3,221,000	19,178,000		
2. Facilities/Equipment	6,938,000	1,061,000	7,999,000		
3. Curriculum & Administrative Development	270,000*	1,932,000	2,202,000		
4. Networking	1,942,000	300,000	2,242,000		
5. Miscellaneous/Contingency	1,363,000	426,000	1,789,000		
6. Evaluation	200,000	60,000	260,000		
TOTALS	26,400,000	7,000,000	33,400,000		

*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.

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

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	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(a). 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 aggregate 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	
_____	_____
_____	_____
_____	_____

I.D.

II. 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.

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 -

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.

Sr. Curtin Winsor, Jr 4 5/10/84

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.

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

BANCO CENTRAL DE COSTA RICA
SAN JOSE, COSTA RICA

Olivier Castro P.
GERENTE GENERAL

13 de mayo de 1985
G/No. 108

Señor
Daniel A. Chaij, Director
Agencia para el Desarrollo Internacional
Misión Económica de los Estados Unidos
en Costa Rica
Presente

Estimado señor:

Nos referimos a su nota del 10 de los corrientes dirigida a la Presidencia Ejecutiva de este Banco, en la que solicita la aprobación para que AID deposite anualmente, por un período de cuatro años consecutivos, el equivalente en colones de US$2,5 millones cada año, en una cuenta que gane intereses a nombre de una corporación fiduciaria sin fines de lucro, con el fin de financiar el establecimiento de la Escuela Agrícola de la Región del Trópico Húmedo, en Costa Rica.

Nos complace informarle que el Banco Central de Costa Rica está en un todo de acuerdo con lo planteado en dicha nota, toda vez que la finalidad del proyecto es merecedora, en nuestro concepto, de absoluto apoyo por parte de las autoridades del país.

Sin otro particular, nos suscribimos de usted atentamente,

jmm.
cc: Presidencia Ejecutiva
Dirección División Financiera

CENTRO AGRONOMICO TROPICAL
DE INVESTIGACION Y ENSEÑANZA

Turrialba - Costa Rica - Teléfonos: 56-61-31 - 56-01-69 - 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.

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 asrect 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

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

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.

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

CATIE -INSTITUTIONAL ANALYSIS

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 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.

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.

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 Regional Agricultural College, I have concluded and do hereby certify that in my judgement the Regional Agricultural College will have the financial and human resource capability to effectively maintain and utilize the facilities to be constructed for the College under the Project: Regional Agricultural Higher Education.

August 7, 1985
DATE

Daniel A. Chaij
Director
USAID/Costa Rica

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

- 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.

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.

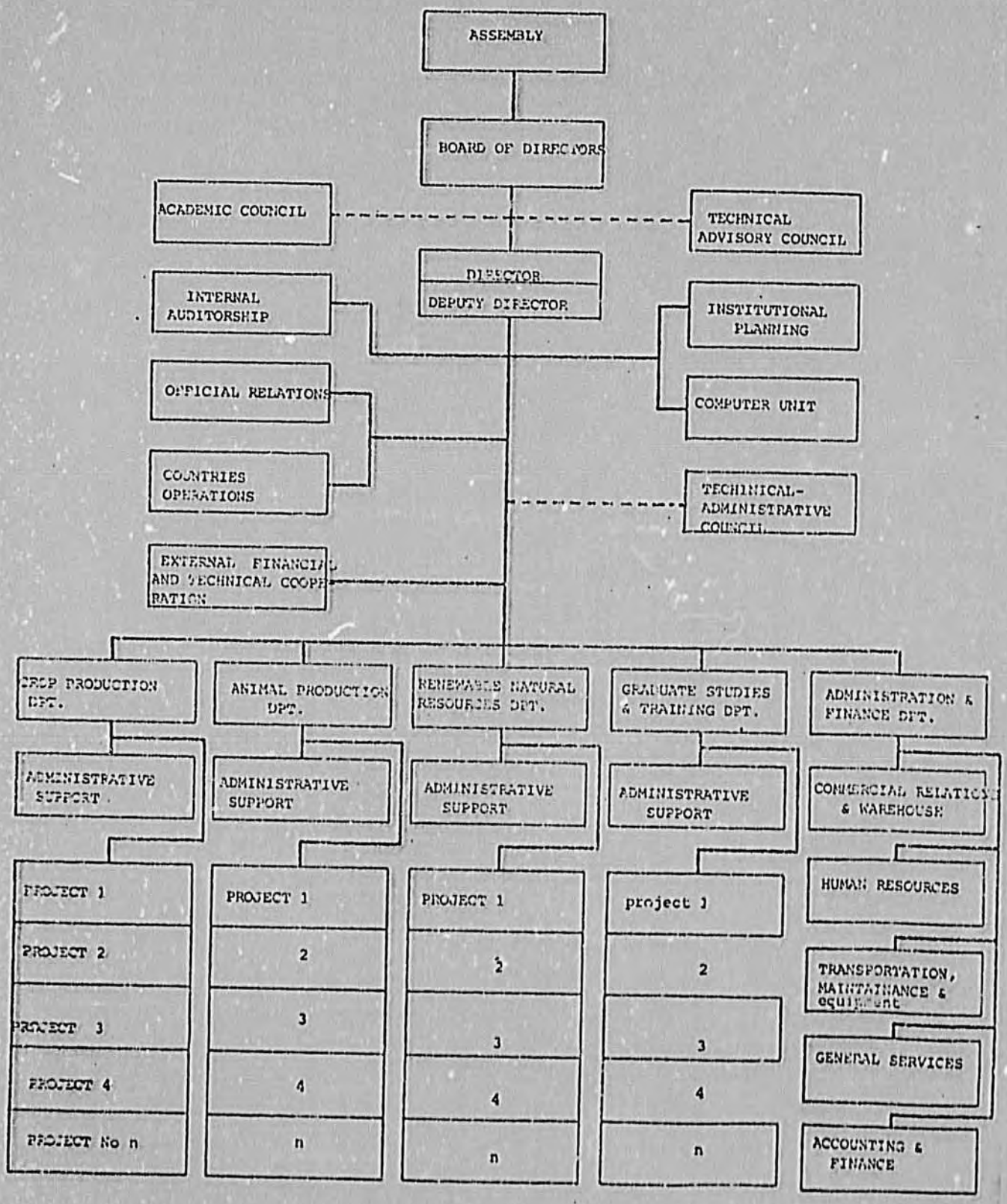
CATIE's small farm production systems research program has been widely accepted and has significantly influenced the orientation of agricultural research in the region. The systems approach of the research considers the farm production unit as a whole: the various interacting subsystems are developed 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.

5. 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
TECHNICAL-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

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.

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 with 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 interdepartmental 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. INSTITUTIONAL 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	Quart Offer
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 RCCAP).

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.

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

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.

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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

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 (Barnstead).
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.

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).

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 RCCAP) 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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IIA

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

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 conserving 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.

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.

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 limitind componds. Mineral nutrition, also elementary nutrition course for agroforestry and wildlife students in RNR department.

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 specializing in these aspects (thesis students).
Forest Inventory Specialist	Ph.D	Coordinate team-taught introductory 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 with 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 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.

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 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

CATIE-DETAILED COST ESTIMATES

I. INTRODUCTION

The project provides financing for four project components. These are: (a) staff development (teaching); (b) facilities and equipment; (c) curriculum and administrative development; and (d) networking. Section III (Project Description) and Annex II.A.2 (Technical Analysis) describe the overall intent and impact of carrying out these activities. Detailed below are the cost estimates which were used to develop the detailed budgets presented in Section IV (Cost Estimates and Financial Plan). All costs are presented in U.S. dollars, financed by AID dollar assistance or through local currency generations.

II. STAFF DEVELOPMENT

The project provides financing for sixteen professionals who will have teaching responsibilities under the project. Table 1 details each of these individuals. Salary calculations are based on existing CATIE pay scales adjusted every two years to reflect estimated pay increases for merit and cost of living increases. Beginning in 1989, CATIE will absorb three faculty members under core budget funds. These are: (a) Ag/Econ. Farm Budgetary Specialist, (b) Tropical Soils Specialist and (c) Animal Physiologist. The remaining teaching faculty are absorbed under the core budget beginning in late 1990.

III. FACILITIES AND EQUIPMENT

The joint AID/Coopers and Lybrand institutional analysis of CATIE, conducted in January 1984, determined that CATIE's use of existing facilities and equipment has reached its peak utilization level. Based in part on this evaluation, the project development team used the recently produced CATIE 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 financed under the project.

A. Facilities

Construction will consist of student housing, faculty houses, a graduate education building with classroom offices, a computer center, and expansion of the primary school. In addition, the La Lola agricultural experiment station will be rehabilitated and CATIE's basic water and electricity stations will be expanded. Limited vehicle,

ANNEX TABLE I - DETAILED STAFF DEVELOPMENT BUDGET
(US $000)

POSITION	1985		1986		1987		1988		1989		1990		
Serving CATIE													
Ag Econ/Farm Budgetary Specialists	-	-	-	-	42	-	42	-	-	-	-	-	
Tropical Soil Specialist	-	-	-	-	53	-	55	-	-	-	-	-	
Biometrician	-	-	53	-	53	-	55	-	55	-	56	-	
Extension/Transfer of Technology	-	-	-	-	42	-	42	-	44	-	44	-	
Genetist	-	-	53	-	53	-	55	-	55	-	56	-	
Animal Production													
Pasture Agronomist	-	-	53	-	53	-	55	-	55	-	56	-	
Grassland Management Specialist	-	-	-	-	42	-	42	-	44	-	44	-	
Animal Nutrition Ruminant	-	-	53	-	53	-	55	-	55	-	56	-	
Animal Physiology	-	-	-	-	42	-	42	-	44	-	44	-	
Animal Health	-	-	-	-	42	-	42	-	44	-	44	-	
Renewable Natural Resources													
Natural Forest Management Spec.	-	-	-	-	42	-	42	-	44	-	44	-	
Forest Inventory Specialist	-	-	53	-	53	-	55	-	55	-	56	-	
Plant Production													
Tropical Fruits Specialist	-	-	53	-	53	-	55	-	55	-	55	-	
Tropical Ecologist	-	-	-	-	53	-	53	-	55	-	55	-	
Plant Resources Genetist	-	-	-	-	53	-	53	-	55	-	55	-	
Plant Nutritionist	-	-	-	-	42	-	42	-	44	-	44	-	
TOTAL	-	-	318	-	782	-	796	-	660	-	665	-	3,221

1/Individuals are estimated to cost $53,000 Ph.D. (P4-4 according to IICA salary scale which includes relocation, housing and dependent educaton costs) and $42,300 for M.S. level (P4-3).

Because of costruction of housing during 1986 only six of the professionals will be on board in 1986. Figures include step increases as per IICA/CATIE salay schedule.

audiovisual and ancillary equipment for the laboratories, farm and computer center will be procured. Technical assistance will help CATIE develop a master facilities and maintenance plan. This is budgeted as follows:

Master Plan

Local Currency Costs		
a.	3 people/6 months a $1,500	$27,000
b.	Secretarial Support, printings, etc.	5,000
c.	35% overhead a+b	11,200
	SUB-TOTAL	$43,000
Foreign Exchange Costs		
a.	2 people for 3 months at $250/day	45,000
b.	Perdiem (90 days a 70x2)	12,600
c.	Air fare (700x2)	1,400
d.	In-country travel	500
e.	Other Direct Costs	500
f.	40% overhead	24,000
	SUB-TOTAL	$84,000
	TOTAL (Rounded)	$127,000

1. Staff Housing

Twenty single-family detached houses will be constructed over a three-year period for the 16 professional staff, the Graduate Program Coordinator and three visiting professors. Eleven houses are planned for 1986, three for 1987 and six for 1988. Total living area will measure 165m2. Each house will consist of three bedrooms, two bathrooms, family living and dinning areas (see Figure 1 attached).

Cost Estimates

Phase I - 1985-86

Cost/m2	m2	Cost/Unit*
558	165	$ 92,050

11 houses x $92,050 = 1,012,550

*Inclues construction hookups, landscaping, air conditioning, equipment, A&E and administrative services.

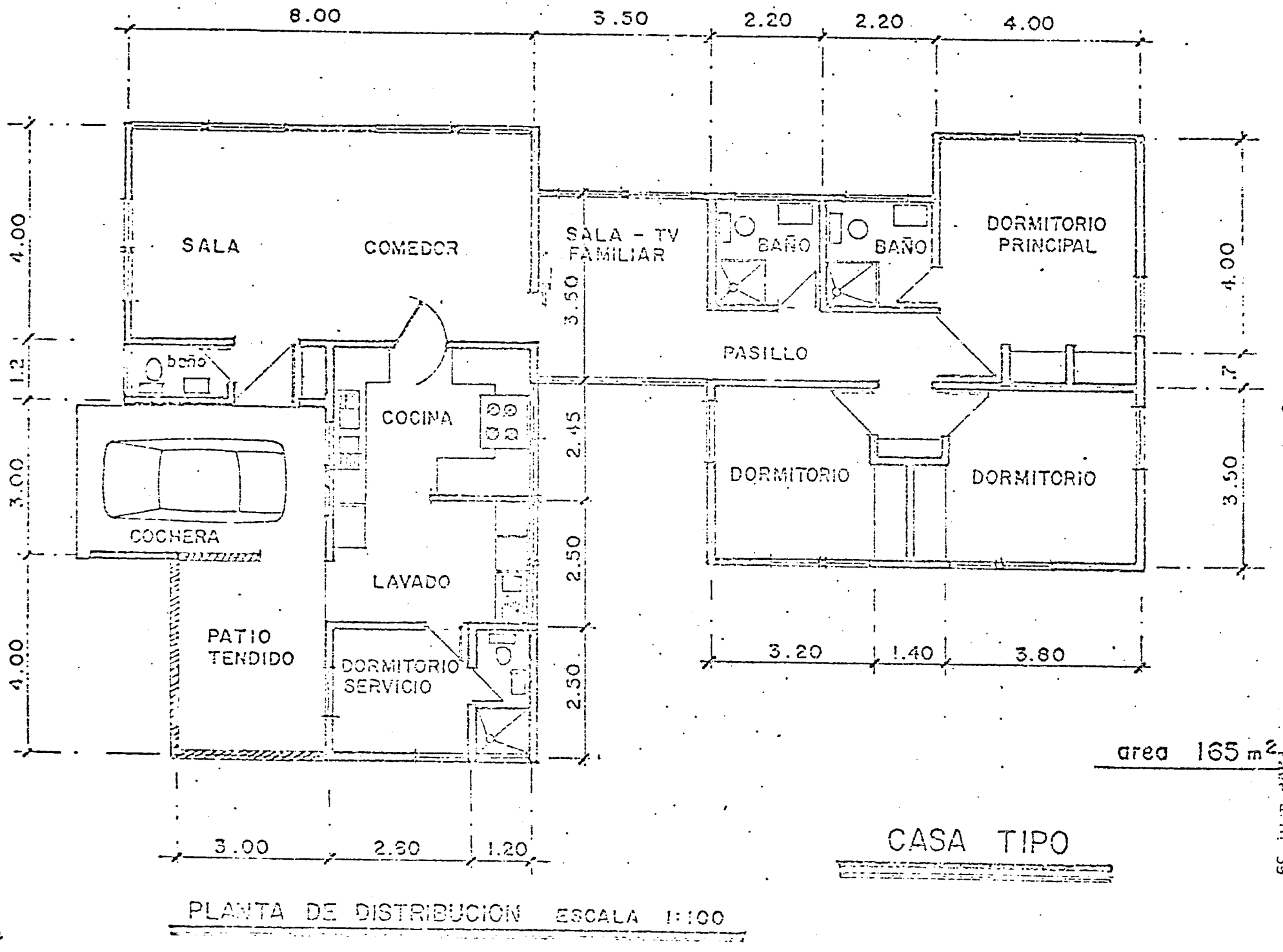

8.00
3.50
2.20
2.20
4.00
SALA
COMEDOR
SALA - TV FAMILIAR
BAÑO
BAÑO
DORMITORIO PRINCIPAL
baño
COCINA
PASILLO
COCHERA
LAVADO
PATIO TENDIDO
DORMITORIO SERVICIO
DORMITORIO
DORMITORIO
4.00
1.2
3.00
4.00
3.50
2.45
2.50
2.50
4.00
.7
3.50
3.20
1.40
3.80
3.00
2.80
1.20
area 165 m²
CASA TIPO
PLANTA DE DISTRIBUCION ESCALA 1:100

Figure 1

Phase II - 1987 - 1988

9 houses x $92,050 = $828,450

Implementation Schedule

Phase I

Preparation of detailed design plans	June-August, 1985
Bidding and award process	Sept.-Nov., 1985
Construction initiated and completed	Dec. 1985-Dec. 1986

Phase II

(Using same design plans as for Phase I Houses)	June 1987
Bidding and award Process	August 1987
Construction initiated and completed	Aug. 1987-Sept.1988

2. Student Housing

Construction and upgrading of student housing will occur in two phases 1985-86 and 1987-88 due to the flow of local currency resources.

Phase I - 1985-86

a. Dormitories

A one-story 40 room student dormitory building housing both married and single students will be constructed (see Figure 2 attached).

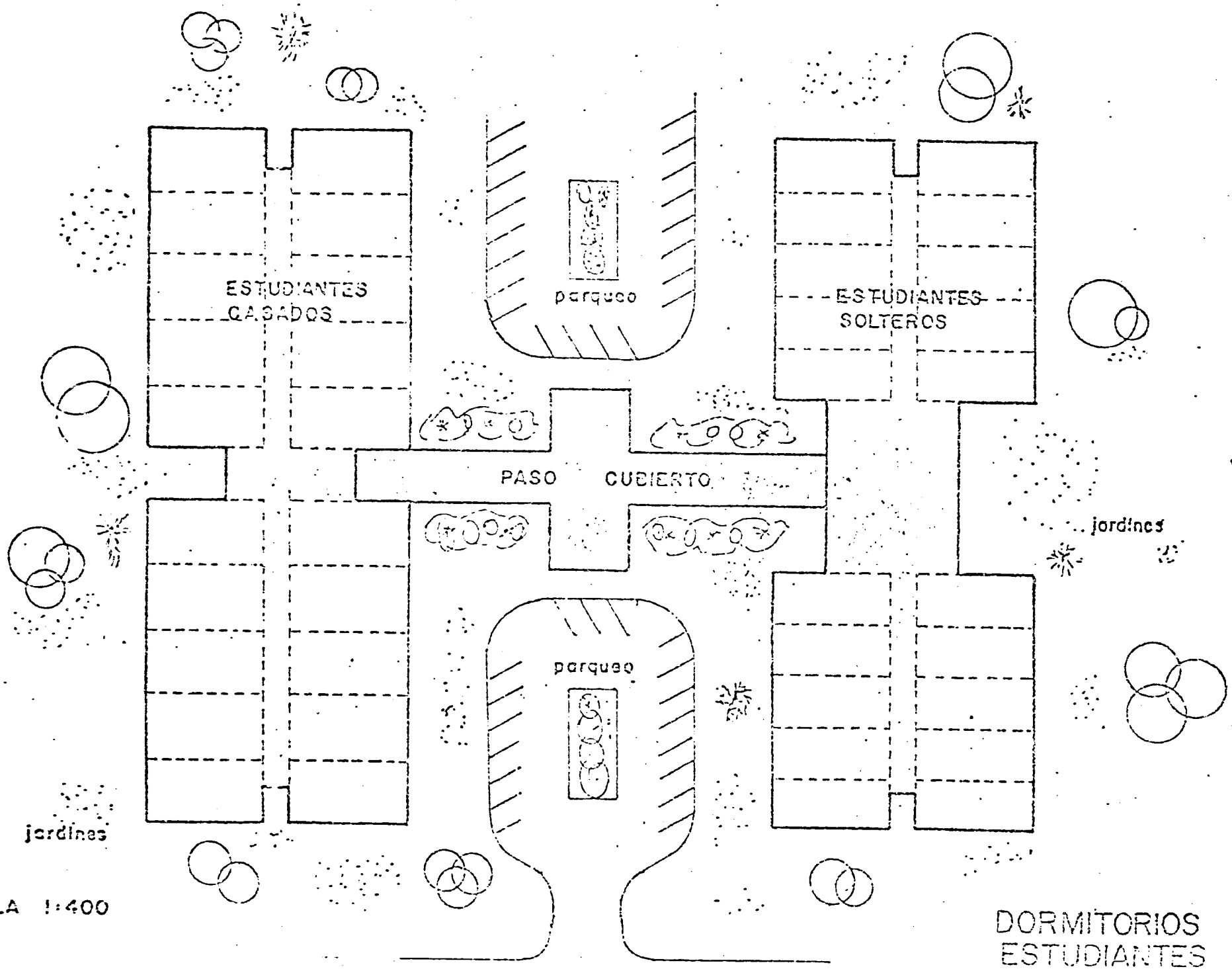
Twenty double occupancy rooms measuring 40 m2 will be allocated to single students. Each room will have a separate bath and bookcase partitions to allow some privacy. A total of 40 single students will be housed. The remaining twenty rooms (measuring 50 m2) will be allocated to married students. Each room will have a separate bath and small sink and kitchenette unit with combination range/refrigerator (see Figure 2). The building willd also contain a common kitchen area and recreation room. The total area of the building will be approximately 2000 m2.

Cost Estimate

Cost/m2	m2	Cost/Bldg.
552	2000	1,103,080*

*Cost includes construction, utility hookups, landscaping, air conditioning, equipment, A&E and administration and inflation.

Figure 2



DORMITORIOS ESTUDIANTES

Mineral nutrition, also elementary nutrition course for agroforestry and wildlife students in RNR department.

Implementation Schedule

Preparation of detailed design plans	June-August 1985
Bidding and award process	Sept.-Nov., 1985
Construction initiated and completed	Dec. 1985-Dec. 86

b. Renovation of Existing Student Housing

To address the acute housing situation in the short-term, two existing dormitory buildings currently housing 24 single students, will be renovated (partitions replaced, plumbing, electrical and light fixtures upgraded) in 1985. Estimated cost of this renovation is $30,000.

Two other large houses each housing approximately four married students and their families (total of 8 students) will also be renovated in the first year of the Project. The estimated cost is $10,000 per unit, total cost is $20,000. After graduate student housing becomes available in 1989, these facilities will later be used to house specialization course participants.

Implementation Schedule

Preparation of renovations plans	June-August, 1985
Phased renovation starts	September, 1985
Renovation completed	December, 1985

Phase II - 1988-1989

Married student housing would be constructed as part of Phase II construction activity. Three separate one story buildings each housing 10 married students and their families (total of 30 students) will be constructed. Two buildings are planned for 1988 and one for 1989.

Each apartment will have 75m2 of living area consisting of a sink and kitchenette, master bedroom, children's bedroom and living/dining area (see Figure 3 attached).

Cost Estimates

Cost/m2	m2	Cost/Building*	Total
$696	750	$522,333	$ 1,567,000

*Includes construction, utility hookups, landscaping, equipment, air conditioning, A&E and administration and inflation.

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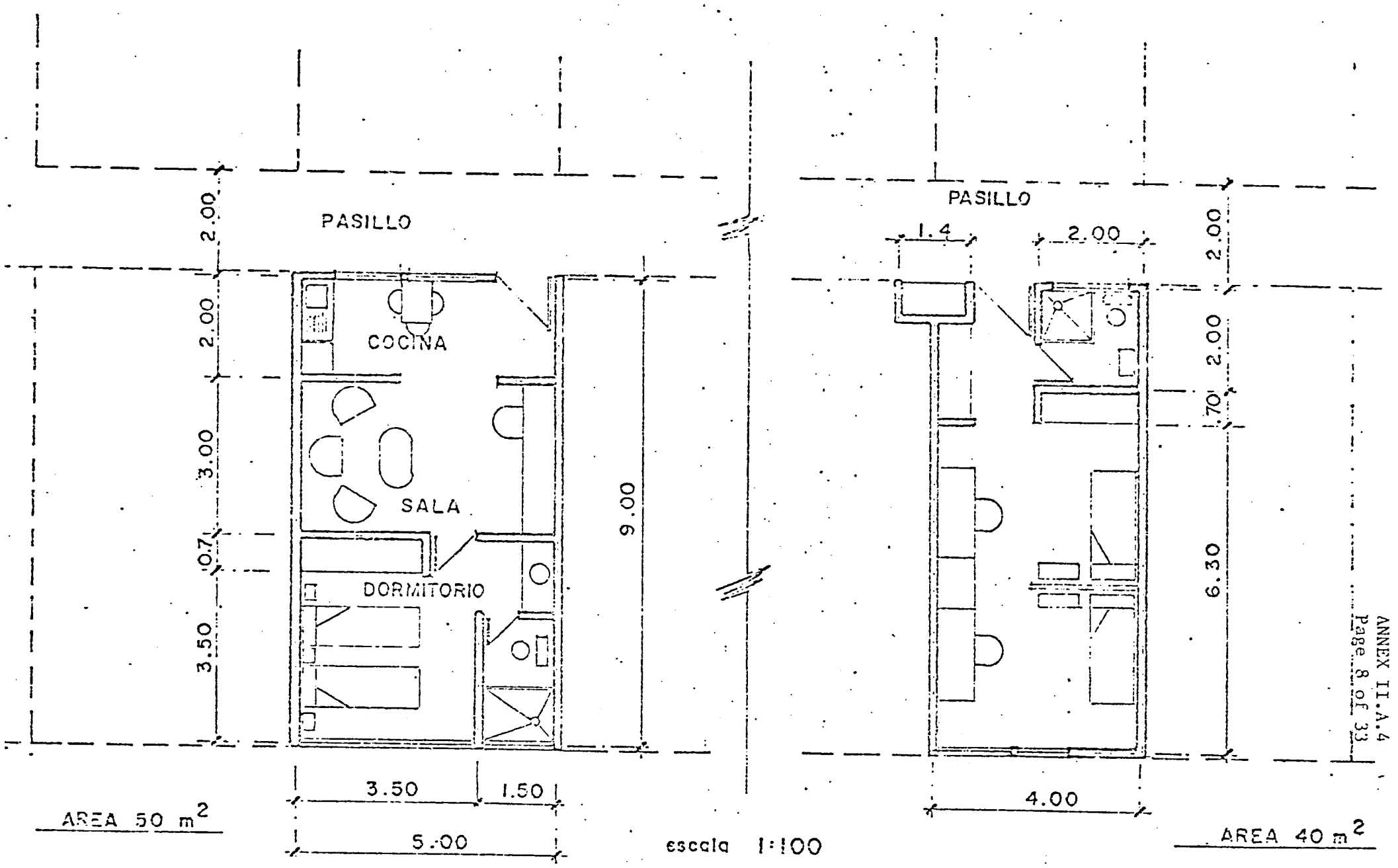
Figure 3



APARTAMENTOS TIPO
ESTUDIANTES CASADOS

DORMITORIO TIPO
ESTUDIANTES SOLTEROS

Impact of Construction and Upgrading of Student Housing

Facility	Number of Students Housed
Two student dormitories	24
Two houses for married students	8
Women's dorm area in administration building	4
	36

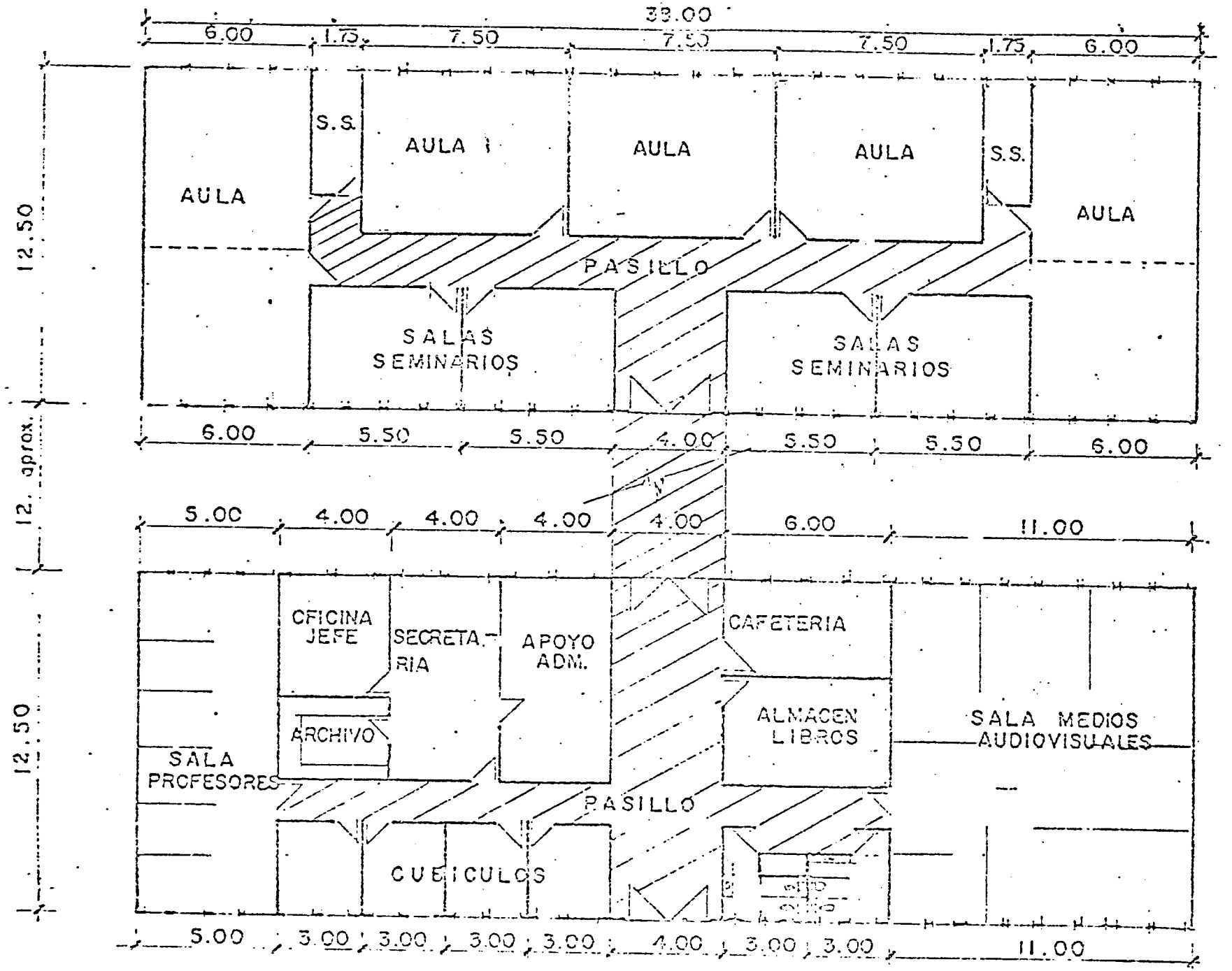
The remainder of the approximately 50 students currently have to find housing in Turrialba. Proposed student housing construction and upgrading will provide housing for the following number of students:

Facility	Number of Students Housed
Phase I	
Dormitory building constructed	60
Upgrading of two existing dormitory buildings	24
Upgrading of existing married student buildings	8
Existing women's dorm area (Administration Bldg.)	4
By end of 1986	96
Phase II	
Married students buildings (3 units constructed)	30
Cummulative by end of 1989	126

3. Classroom and Office Building

A classroom and office building for CATIE's graduate program will be constructed during the second year of the Project (1986) (see Figure 4). The Classroom building measuring approximately 1,000 m2 will contain the following:

	Rooms	M2
4	Classrooms with a capacity of 30 persons (54m2 each)	216
4	Seminar Rooms with a capacity of 12 persons (30m2 each)	120
9	Offices for facultry (12 m2 each)	108
6	Faculty-student consultation rooms/offices (12 m2 each)	72
1	Educational material preparation room	150



escala 1:200

EDIFICIO DE ENSEÑANZA Y CAPACITACION

	Rooms	M2
1	Audiovisual equipment room	16
1	Office (Head of the Post Graduate & Training Dept.)	20
20	Offices for administrative assistants	24
1	Secretarial area	30
1	Reception area	12
1	File Room	24
1	Coffee Room	20
1	Storage room	25
2	Bathrooms	33
Circulation area (15% of above sub-total)		130
		1000m2

Cost Estimate:

Cost/m2	m2	Cost/Building*
$797	1000	$796,835

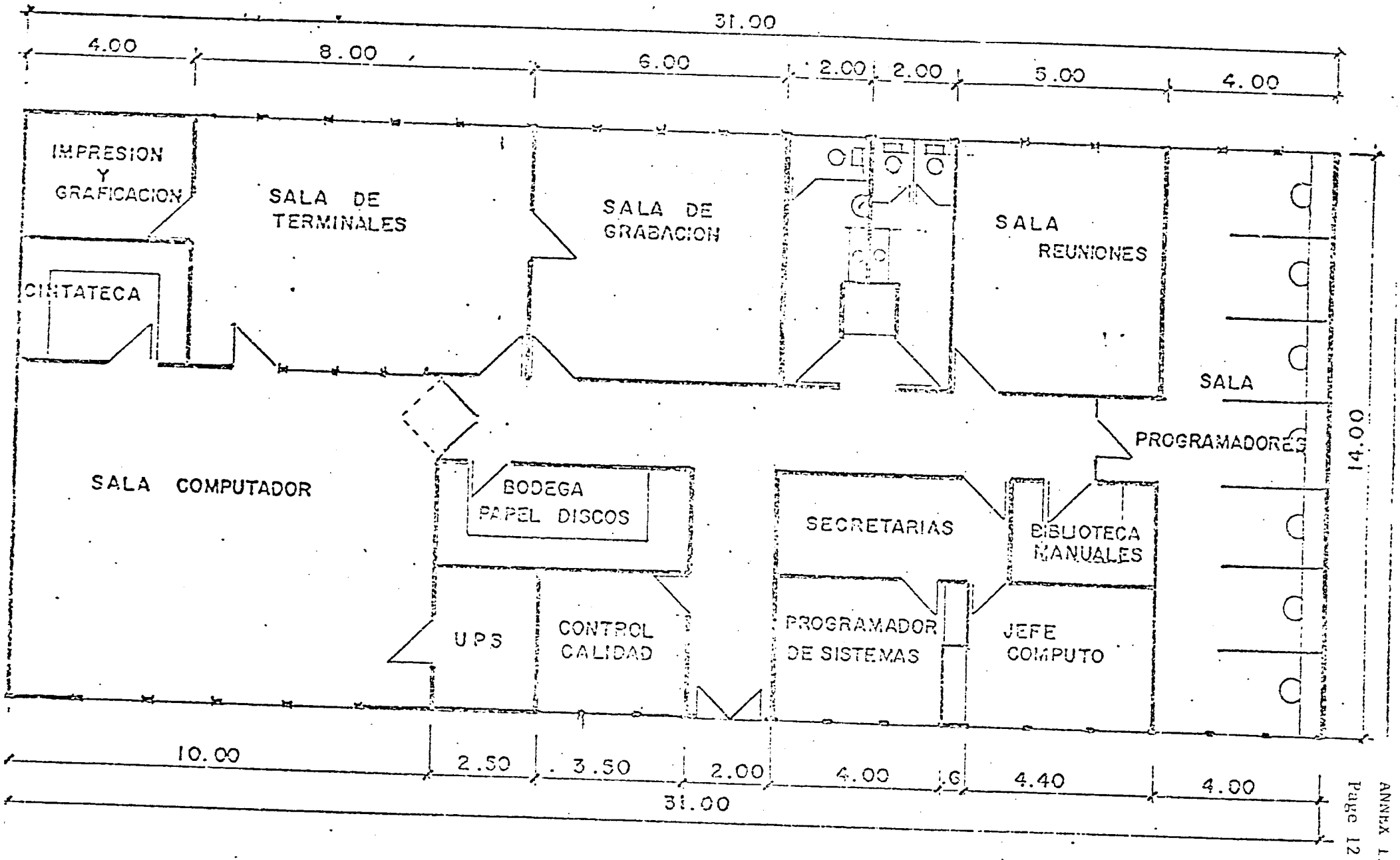
4. Computer Center

The current building housing the Computer Center cannot handle the additional upgrading and purchase of equipment contemplated under the ROCAP Regional Integrated Pest Management, Watershed Management and the FY85 Tree Cropping and Fuelwood Production Projects. Therefore a new Computer Center will be constructed in 1986 (see Figure 5).

The Computer Center building measuring approximately 430 m2 will contain the following:

Rooms	M2
Computer and word processing room	80
User terminal room	50
Printer and graphics room	12
Recording room	40
Storage room	12
Uninterruptable power supply room	12
Disk library	10
Library room	9
Classroom (capacity of 20 persons with two terminals)	30

*Cost includes construction, utility hookups, landscaping, air conditioning, A&E and administration and inflation.



CENTRO DE COMPUTO ESCALA 1:125

Rooms	M2
Office for Head of the Computer Center	12
Office for System Programmer	9
Secretarial Space	16
8 offices for program assistants and other (9m2 each)	72
Bathrooms	26
Circulation area (10%)	40
	430

Cost Estimate:

Cost/m2	m2	Cost/Building*
$797	300	$342,900

Dollar Cost	1985 fx	1986 fx
30 KW uninterruptable power supply		50
4331-L11 Processor (4 MB Main Memory)		15
Additional Disk Unit (370 MB)		28
Second Tape Drive (6250)		20
Additional Communication Lines		12
		$ 125

(Cost estimates based on CATIE Computer Center: Overview and Recommendations Part II Report Carol Bradford Ward, AID/W).

5. Primary School

CATIE has a primary school for children of permanent staff members. Currently, the building consists of three classrooms. Under the project, the building will be expanded (see Figure 6) to provide for four additional classrooms and a storage room.

Cost Estimates

Cost/m2	m2	Cost Rennovation	5% A&E Services 1988
300	205	$61,500	$ 3,075

A&E services incurred in 1988	$ 3,000
Contruction costs in 1988	61,500
Classroom furnishings (desks, chairs, blackboards) in 1988	5,500
TOTAL	$ 70,000

*Cost includes construction, utility hookups, landscaping, air conditioning, A&E and administration.

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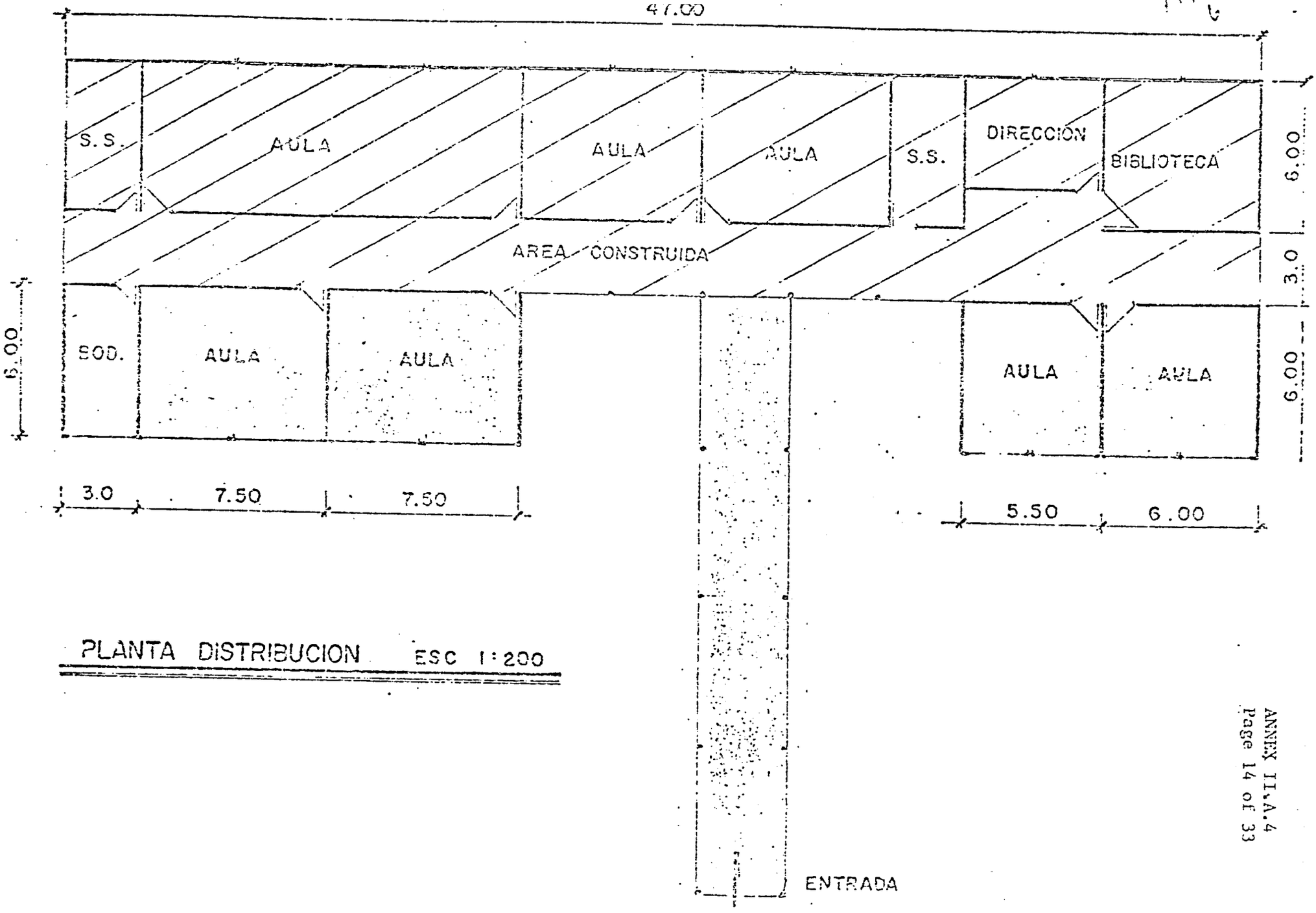

PLANTA DISTRIBUCION ESC 1:200

AMPLIACION ESCUELA PRIMARIA

6. Water and Electrical Systems Improvements

The proposed construction activity under this project will tax CATIE's existing water supply and electrical service systems. As detailed below, local currency and foreign exchange costs will be financed under the project. Upgrading of both systems will be carried out in two phases: Phase I activities (1985-86) will concentrate on improving the "main lines" suppliyng both power and water as well as the requirements of the area where construction activities occur; Phase II activities (1987) will focus on upgrading the distribution grids for existing residential and academic areas of CATIE. The upgrading requirements and cost estimates were discussed with CATIE arquitect (who obtained price quotations from suppliers) and reviewed by the USAID/CR engineer. Cost estimates have been adjusted for inflation.

(A) Water System

CATIE's potable water supply comes from a natural spring adjacent to the junction of the Turrialba and the Reventazon Rivers. A pumping station is located at the site of the spring where the water is pumped a vertical distance of 135 m. The existing pump is a Gould Model 3316 rated at 30 HP, 230/460 volts, 3,500 RPM with a pumping capacity of 100 gallons/minute. The pump operates approximately 12 hours per day to maintain CATIE's water tank which is described in detail below.

A 4" cast iron pipe approximately 1.5 km in length connects the pumping station with the water tank. While technically adequate, over-time the actual diameter has shrunk to less than 3 inches due to rust and mosts of the joint have deteriorated as well.

Needed Improvements Phase I

In order to ensure the availability of water to the area of expansion (both residential and academic) proposed under the project several improvements are required:

1. Pumping Station

An additional pump is required to ensure the availability of water. The existing pump will continue to provide service but the pumps will be connected with a cut-over switch. A chlorinator unit is needed at the pumping station to maintain potability. A containing wall needs to be erected around the pumping station site to protect the spring from any surface contamination from the Turrialba River. Finally an electrical line needs to be strung between the pumping station and the water tank (currently the pump is turned on and off manually by CATIE maintenance who check the water level in the tank).

2. Main Water Line

The existing 4" main water line should be changed to 6" PVC pipe to handle the higher capacity of the new pump and the requirements of filling an additional water tank (described below).

3. Water Tank

An additional metal holding tank (duplicating the existing tank) with a capacity of 185,000 gallons is required to ensure the availability of water to the campus expansion area. In addition both tanks will require automatic water-level regulators to switch the pumps on and off.

4. Distribution Grid

A 4" PVC main line from the new water tank to the expansion area will be required so that buildings under construction can be connected to the water supply.

Cost Estimates Phase I Water Supply Improvements ($ 000)

Item/Activity	1985 FX	1985 LC	1986 FX	1986 LC
Pumping Station				
Pump (50 H.P. three phase 230/460 volts, 150 gallons/minute capacity)	-	-	4	-
Construction containing wall	-	6	-	-
Chlorinator	3	-	-	-
Electrical line (pump to tanks)	-	1	-	-
Main Water Line				
Installation 1.5 km 6" PVC line $10/m	-	15	-	-
Water Tank				
Construction & placement of 185,000 gallon metal holding tank	-	-	-	12
Water level regulator	1	-	1	-
Distribution Grid				
Installation 1.0 km 4" PVC main line from tank to expansion area	-	-	-	10
Installation 4" and 3" pipe 3 km in expandion area	-	-	-	40
TOTAL PHASE I	4	22	5	52

Needed Improvements Phase II:

CATIE older residential and academic areas need to have their deteriorating 4" and 3" water lines replaced. It is estimated that approximately 8 km of pipe will need to be replaced.

Cost Estimate:

Item/Activity	1987 FX	1987 LC
Install 4" and 3" PCV lines 8 km 12/m		96
TOTAL		96

(B) Electrical System

CATIE is currently served by a 13,000 Volt Costa Rican Electricity Institute (ICE) line that enters the campus at the main entrance. The line splits to three step-down transformer sites on the campus. CATIE currently suffers constant problems from intermittent blackouts and power surges which affect delicate laboratory instruments and motors.

Needed Improvements Phase I

The local ICE engineer informed members of the project team that these problems could be eliminated by running a 34,500 Volt private line 3 km through CATIE property from the ICE substation to the main campus area. In addition, CATIE needs to replace its existing transformers capable of stepping down the 34,500 volt line to 13,200 volts. Additional stepdown transformers from 13,500 volts to 133/230 volts will also be required.

The internal distribution grid to the campus expansion area will also be necessary. It is estimated that approximately 5 km of internal grid will be needed. In addition, distribution lines, totalling approximately 3 km, to existing laboratory facilities need to be replaced

Cost Estimates

Item/Activity	1985 FX	1985 LC	1986 FX	1986 LC
- Installation 3 km 34,500 volt line $10,000/km	-	30	-	-
- Installation 2 transformers 34,500 volts/13,200 volts 650 KVA rating $6,000 each	12	-	-	-

Cost Estimates

Item/Activity	1985 FX	1985 LC	1986 FX	1986 LC
- Installation 2 transformers 13,500 volts to 133/230 150 KVA rating $4,000 each	8	-	-	-
- Installation of 5 km of internal grid lines $5,000/km new areas	-	-	-	25
- Installation of 3 km of internal grid to laboratories, etc. $5,000/km old area	-	15	-	-
	20	45	-	25

Needed Improvements Phase II

Phase II improvements will consist of replacing existing deteriorated grid lines in older academic and residential areas. It is estimated that approximately 8 kms of line will have to be replaced.

Cost Estimates

Item/Activity	1985 FX	1985 LC	1989 FX	1989 LC
Installation of 8 km of grid lines $5,800/km	-	-	-	46
TOTAL	-	-	-	46

7.(A) La Lola Experimental Station

Formerly operated by the United Fruit Company, the La Lola experimental station is a central facet of CATIE's research activities and an income earner to CATIE through the sale of cacao seeds. Restoration of the station will occur in two phases. Phase I (1986-88) will consist of procurement of an additional 40 hectares for small crop production, limited rehabilitation of existing buildings, and improving road access, electrical and water systems. Phase II, which consists of construction of dormitories for students and professionals, office/laboratory building, cafeteria, hybrid seed lab, storehouse and a residence for the station administrator, will be carried out after this six-year project, with AID/COFISA Trust Fund earnings, or during this 6-year project period, using cost savings, funds of other donors, or additional AID/COFISA Trust funds.

Phase I (1986-1988) Costs

1.	Land procurement	$ 40,000
2.	Restoration	10,000
3.	Water and Electricity renovation	11,000
4.	Road access improvement	7,500
	TOTAL	$ 68,500

7.(B). Equipment

To support the expansion of the training programs, projec financing of vehicles and equipment is being provided.

1. Vehicles

A total of seven vehicles will be provided in 1985 as follows:

1.	One microbus	$ 26,000
2.	Two vans (2x$18,000)	36,000
3.	Four pick up trucks (4x$12,000)	48,000
	TOTAL	$110,000

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2. Laboratory and Farm Equipment

CATIE staff from the Animal Production, Plant Production and renewable Natural Resources departments carried out an intensive joint review and analysis of required laboratory materials and equipment. The requirements are based on the current/future graduate staff and student research studies and the laboratory and farm related work of the graduate program (Refer to the CATIE Annex II.A.2.Technical Analysis which contains a description of the existing and planned laboratory and farm facilities and services).

The following table contains a list and costs of the equipment for the various departmental laboratories and for the farm. Cost estimates were obtained from recent editions of scientific equipment catalogs. CATIE intends to order and purchase much of this equipment in bulk to benefit from discounts that are normally available from the scientific equipment suppliers. Expenditures are projected to occur as indicated in the following table. Expenditures in 1985 are primarily for the joint and individual needs of the Animal Production and Renewable Natural Resources departments.

SUMMARY AND DETAILS OF LABORATORY AND EQUIPMENT

	$
Soils laboratory: Plant Production Department	131,500
Animal Production and Renewable Natural Resources Depts.	156,900
Natural Resources Department	66,000
Pathology Laboratory: Plant Production Department	131,800
Plant Physiology Laboratory: Plant Production Dept.	72,000
Air Conditioning Units (6)	4,500
	562,700
(Rounded	563,000)

($000)						
Project Expenditures by Year:	1985	1986	1987	1988	1989	1990
	FY	FY	FY	FY	FY	FY
	223.0	300.0	10.0	10.0	10.0	10.0

DETAILED LABORATORY AND FIELD EQUIPMENT
Plant Production Department: Soils Laboratory

	$
Atomic Absorption	40,000
Analytical Fertility Equipment	3,000
Colorimeter	5,000
2 Balances	6,000
2 Potentiometers	3,000
2 Ovens	5,000
Still	3,500
Equipment for Cation Exchange Analysis	9,000
Reagents & Glassware	15,000
2 Vacuum Pumps	900
Compressor	800
Equipment for Soil Physics Analysis	8,800
Incubator	3,000
Mill	3,500
Soil Certification	4,200
Stirrer	1,600
Conduct	1,500
Neutron Probe	7,000
Ion electrodes	3,500
Centrifuge	8,000
TOTAL	131,500

ANIMAL PRODUCTION AND RENEWABLE NATURAL RESOURCES DEPARTMENTS

Animal Production Department		$
1.	Physiology Equipment	$ 3,000
2.	Pasture Sampling	
	Shears, field balance	2,700
	Field Samples (motorized)	5,000
3.	Milk Analyzer	7,000
	SUB-TOTAL	$ 17,700

Joint Laboratory Equipment for AP and RNR Deparments

A. Routine Analysis

1. Nutrition

Protein Analysis	$ 21,000
Water bath shaker (digestibility)	4,000
Fiber determination	11,700
	37,200

2. Component determination (fats, sugars, phenols, alkaloids, etc).

Chromatograph HPLC	$ 28,000
Accesories gas chromatograph	6,000
Double beam U.V. spectrophotometer	15,000
Refrigerated centrifuge	18,000
Freeze driers	12,000
	79,000

3. Support Equipment

Water distiller	$ 3,000
Sample mill	2,500
Analytical balance	4,000
Rotavapor	2,000
Hot plates, stitters, pH meter, etc.	6,000
Glassware and reagents	6,000
	23,500

Sub-Total	$ 139,200
Total Animal Production and Renewable Natural Res.	$ 156,900

RENEWABLE NATURAL RESOURCES DEPARTMENT

	$	$
Mensuration/Inventory Equipment		12,000
Minor mensuration equipment	7,000	
Sketchmaster	3,000	
Planimeter	2,000	
Growth Chambers (2)		8,000
Analytical Balances (2)		7,000
Greenhouses and Nursery Equipment		5,000
Forestry greenhouse and nursery	1,500	
Agroforestry greenhouse	3,500	
Autoclave(1)		7,000
Seed Collection Equipments		4,000
Refrigerators w/temperature control and Recorder (2)		1,500
Incubator(1)		2,000
Parabolic Antena		10,000
Microbiological Materials		5,500
Seed Separator (1)		1,500
Ovens (1)		2,500
		66,000

PLANT PRODUCTION DEPARTMENT: PHYSIOLOGY LABORATORY

	$
10 solar radiation measuring devices	20,000
2 leaf areas measurement devices	14,000
3 microclimate analyzers	15,000
2 balances	6,000
2 ion selection devices	2,000
2 junior spectrophotometers	4,500
1 osmometer	3,000
6 compressors	2,500
Reagents & glassware	5,000
TOTAL	72,000

PLANT PRODUCTION DEPARTMENT: PHYSIOLOGY LABORATORY

	$
4 microscopes	12,000
4 stereo microscopes	7,200
Phase continuous microscope	20,000
Stereo microscope	4,000
2 isolating rooms	8,400
Microtome and accessories	6,000
2 potentiometers	3,000
Colorimeter	2,000
6 spore traps	12,000
6 hygrothermographs	4,800
5 incubators	10,000
Refrigerator	1,000
3 balances	7,500
Rotavapor device	3,000
2 vacuum pumps	900
2 homogenizers	900
Centrifuge	5,000
Oven	3,000
Waterbath	3,600
Dehumidifier	4,500
Glassware	7,000
Reagents	6,000
TOTAL	131,800

ANIMAL PRODUCTION COMMERCIAL FARM

Budget 1984

Expenditure (milk 5966, Beef 68990)	128,653
Income (milk and meat)	190,047
% profit on expenditure	32.30%

Note:

Expenditure only includes the commercial activities of the farm and does not include salaries of professors, trips in Central America, etc.

Only milk and some cream are sold as milk products. Butter and cheese would give a higher return.

ANIMAL PRODUCTION FARM

	$
Tractor with mower, plow, harrow	45,000
Rehabilitation of milking and creamery equipment	
Milking equipment with weighing and sampling parts (4 units)	4,000
Additional cold compressor	15,000
Butter churn	3,000
Steam generator	10,000
Cheese vat	20,000
Homogenizer	50,000
Minor accessories	3,000
	$ 150,000

Money is also needed to provide extra workers in the farm to perform the field experiments, etc., for the students and teaching staff.
e.g. 5 workers = $10,000 per year.

VI. 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 create a development office for CATIE.

It is envisioned that in addition to fully strengthening the two-year graduate program, the newly developed Graduate Studies and Training Department will provide both short-term and specialization training for CATIE graduates and other professionals currently working in productive agriculture.

A. Staffing

The project provides financing for three administration professionals to oversee and implement CATIE's training programs and alumni affairs. These are: (1) Coordinator of the Graduate program, (2) Director of Non-degree Training, and (3) Director of Alumni Affairs. the first two are dollar financed beginning in 1985 and the third is through local currency financing beginning in 1987. Cost Estimates are as follows:

Position1/	1985		1986		1987		1988		1989		1990		[illegible]	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
			($000)											
Coordinator	27	-	53	-	55	-	55	-	56	-	56	-	302	-
Director Non-Degree Train.	27	-	53	-	55	-	55	-	56	-	56	-	302	-
Director Alumni Affairs	-	-	-	-	-	15	-	15	-	16	-	16	-	62
TOTAL													[illegible]	62

1/Dollar financed individuals are estimated to cost $53,000 initially (P4-4 according to IICA salary scale which includes relocation, housing and dependent education costs. 1985 details one-half year initial employment. Local currency financed position based on CATIE salary scale for level hire professional positions.

B. Non-Degree Training Programs

Short-courses, seminars and in-service training are an important dimension of CATIE's overall education program. During the life of the project, it is anticipated that CATIE's donor financed specialization and short-term courses will continue to be financed. Under the project, CATIE will hold a series of annual in-service training seminars for recent graduates, agricultural professionals and scientists in the areas of specialility of the graduate program. A total of US$260,000 is allocated for this activity over the life of the project to be divided equally between basic crop, export crop livestock production and renewable natural resources seminars. Annually, twelve in-service training programs are budgeted at US $52,000, as detailed in the following table

ANNUAL BUDGET PLAN FOR GRADUATE TRAINING SEMINARS

Area of Speciality or Sub-Speciality	Local Expenses & Perdiem for 15 (Dollars)	Transportation and Other Costs for 15 Candidates (Dollars)
Basic Food Crops		
Rice	2,475	1,860
Corn	2,475	1,860
Beans	2,475	1,860
Export Crops		
Cacao	2,475	1,860
Coffee	2,475	1,860
Bananas	2,475	1,860
Livestrock Production		
Dairy	2,475	1,860
Beef	2,475	1,860
Small Ruminants	2,475	1,860
Natural Resources		
Soils	2,475	1,860
Forestry	2,475	1,860
Watersheds	2,475	1,860
TOTALS	29,700	22,320

Estimated annually cost is $52,000 (rounded) x 5 years = $260,000

C. Development Office

A development office will be established, and a long-term development program will be implemented over a three-year period will include office support, staffing, consultancies and equipment. The overall budget is as follows:

ESTIMATED COSTS AND PROPOSED BUDGET
($)

	Year I	Year II	Year III	Total
1. Staffing 1/	34,200	99,500	105,000	238,700
2. Consulting Services	61,550	30,000	35,000	126,550
3. Travel	2,000	50,000	50,000	102,000
4. Promotion/Advertising	50,000	60,000	60,000	170,000
5. Office Operations 2/	36,000	26,000	30,000	92,000
6. Miscellaneous	5,000	5,000	6,000	16,000
TOTAL	188,750	270,500	286,500	745,250

(CATIE will supply one vehicle for development purposes)
1/ Include $10,000 for renovation of existing space for Development Office.

2/Salary costs seem inflated primarily due to the hiring of the Chief of Development at a salary of approximately $45,000. This salary level requires gross expenditures of approximately $80,000 according to current IICA salary scales.

Office Preparation - Immediately after Year I begins, the project will finance the establishment or renovation of a suitable suite of offices for the development function. The cost of renovating and furnishing such an office, exclusive of office equipment, is estimated to be approximately $10,000.

Staffing - In year I, CATIE and a short-term consultant will begin the process of identifying, interviewing and selecting an individual for the position of Chief of Development, hopefully to join as soon as possible, but probably in the seventh or eight month. The successful candidate will command a salary of between US$45,000 and US$50,000, exclusive of other costs associated with the position. Estimated Year I costs are $30,000. A senior level secretary will also be hired to operate the office on a short-term basis, handling the necessary day-to-day items, and assisting with the necessary consultants. The annual cost of the secretary is about $450 per month, local currency or $US 4,200 per year.

Development Study/Analysis Consultants - As soon as possible after project approval, a consulting firm will be employed to projecting the CATIE image to complete the CATIE development study. This is the basic document which will determine the approach to be used by CATIE for future fund-raising. Costs vary from firm to firm, but is is anticipated that a budget of between $15,000 and $30,000, exclusive of international travel and out-of-pocket expenses (in lieu of per diem) is needed. Expenses and travel are estimated at $4,800 international travel (4 round trips from U.S. to Costa Rica at $600 each); $4,200 lodging and meals for one consultant (probably two will be required) and $8,400 for two for a total cost of $38,400. Six to eight weeks will be required to complete this task.

Case Statement - The purpose of the strategic analysis is to develop the appropriate strategy to be employed with current donors to increase their participation and financial support of CATIE, and with potential donors. This are the primary "sales" document to be used. In Year I it is estimated that 20,000 case statements will be produced at a cost of $4.50 to $6.00 each. Estimated printing costs are $12,000. Mailing costs are estimated to be $3,000.

Short-Term Consulting Assistance - It is anticipated that three consulting assignments, requiring two short-term consultants will be utilized in Year I. In the first instance, a short-term consultant will be used to analyze and screen candidates for the Consultants to complete the Strategic Analysis, and present their recommendation to CATIE. It is estimated this task will require six man days at $300 per day ($1,800), travel approximately $800, with a per diem of $75 for four days ($300). The total costs of this effort are estimated to be $2,900.

A short-term consultant will also be retained to assist CATIE in the advertising, screening and interviewing of potential candidates for the position of Chief of Development, with the objective of selecting three individuals for final interviews by CATIE personnel. Estimated costs for this effort are as follows: Advertising costs in appropriate media, $50; telecommunications, $100; consultant cost of $300 per day for five man-days, $1,500; and other unknown costs should CATIE decide to have final interviews in the U.S. Total cost for this activity is estimated to be $2,400.

A short-term consultant will be used to research and compile an appropriate prospect list of multi-national and international organizations and foundations who are prime prospects for sources of financial support. This level of effort is estimated as follows: five consultant man-days at $300 per day, $1,500; travel, $500 per diem $450; report preparation, $100. Total costs for this activity are estimated to be $2,850.

Development Office Equipment - In order to develop an alumni and donor data base it is recommended that the following equipment be installed in the Development office: Word processing equipment, including high speed printers (2) and two stations, $16,000 to $20,000;

one (1) microcomputer with adequate storage capacity, $3,000 to $5,000; various office supplies and solicitation items representing CATIE, estimated at $2,400 for supplies and approximately $2,000 for representation items (CATIE promotional items). Estimated costs for this category range from $23,400 to $29,400. For planning purposes, recommend $26,000.

Advertising and Market Penetration - In Year I, CATIE will place institutional ads in appropriate journals and publications within the target group of supporters and potential financial sources, whether governments, foundations, or international organizations.

Miscellaneous Cost - It is difficult to estimate what additional costs will be incurred.

Budget Explanation and Rationale - Years II and III

Staffing - In the second and third years of the project, it is anticipated that the Chief of Development will be a full time position. He/she will be assisted by two individuals - referred to as secretaries - who will perform a variety of duties. Major salary costs are for the Chief, since the other two individuals will be on the local salary scale. Total salary costs are projected at $99,500 in Year II and $105,500 in Year III.

Consulting Services - Projected costs of consulting services in Years II and III total $65,000. The primary consultant costs occur in Year I when it is necessary to have a case statement developed and tested. Current consulting costs for such an effort in 1985 are approximately $20,000 per month.

Travel - Travel expenses are intended to accomplish the primary purpose of soliciting corporations, international organizations, governments and others to support CATIE. In Years II and III the total proposed is $100,000. This will provide for at least one major solicitation by the Director of CATIE, the Chief of External Finance, the Chief of Development, and possibly an experienced fund-raising professor to make one trip per month over the life of Years II and III.

Promotion/Advertising

The allocation of $60,000 in each of Years II and III will begin an attempt to bring the CATIE name to the attention of potential friends and supporters of the institution. It is the purpose of these funds to carefully select the most widely circulated and respected media to begin the process of institution identification.

Office Operations - The projected costs of office operations are $26,000 and $30,000 respectively for Years II and III. These figures are

conservative estimates since there is no historical data to support local costs of massive mailings, equipment and supplies. The miscellaneous category is intended to provide some cushion should it be needed in the efficient operation of the office of development.

Miscellaneous -- The proposed budget of $5,000 in Year II and $6,000 in Year III is intended primarily to cover unplanned or unanticipated costs or cost overruns in other categories. The total amount is $11,000 for the two-year period.

D. Library Material and Equipment

Adequate periodical and reference materials are essential to the graduate teaching program. Throughout the life of the project, US$30,000 will be provided annually to finance subscription costs of requisite materials. Illustrative examples of the type of materials presently lacking in the CATIE library, which will be selected include the following:

Chemical Abstracts
Science Citation Index
Journal Soil Science
Soil Science
Amer J. Soil Science
Geoderma
Soil Biol. Biochem.
Plant and Soil
Soil Science and Plant Nutrition
Communications in Soil Science and Plant Analysis

In addition, $45,000 is budgeted to replace the existing copying machine at the library. This will occur in 1985, Year One of the project.

E. Curriculum Technical Assistance

CATIE is currently developing ten year development plans for each of its departments. Following initial implementation of the plan and the revised M.S. training program, technical assistance in curriculum and departmental administration is planned for year four of the project. Four professionals (each for 3 months) are planned as follows:

Contract Costs
I

a. Personnel

1.	Leader 250 a 64 days	$16,000
2.	Veg. Prod. 250 a 64 days	16,000
3.	Animal Production 250 a 64 days	16,000
4.	Natural Resources 250 a 64 days	16,000
b.	Perdiem $70/3/90 days	18,900
c.	Air Travel 800x3	2,400
d.	DBA Insurance 6%	3,840
e.	Other Direct Costs	500
f.	40% overhead	35,856
	TOTAL	$ 125,496

IV. NETWORKING

Under the project this activity will provide $60,000 annually for building upon the research and training activities at CATIE. While specific activities of networking will be developed in year one of the project, it is envisioned that the networking activities will be 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 (IICA, CIAT) and soils (North Carolina State, USDA). Illustrative budgeting is as follows:

ANNUAL BUDGET PLAN FOR NETWORKING

Area of Speciality or Sub-Speciality	Travel	Contributions to Networking Research
Basic Food Crops		
Rice	1,600	3,000
Corn	1,600	3,000
Beans	1,600	3,000
Export Crops		
Cacao	1,600	3,000
Coffee	1,600	3,000
Bananas	1,600	3,000
Livestock Production		
Dairy	1,600	3,000
Beef	1,600	3,000
Small Ruminants	1,600	3,000
Natural Resources		
Soils	1,600	3,000
Forestry	1,600	3,000
Watersheds	1,600	3,000
SUB-TOTALS	19,200	55,200
MISCELLANEOUS		10,800
TOTAL		60,000 (Rounded)

REGIONAL AGRICULTURAL COLLEGE - INSTITUTIONAL ANALYSIS

A. Location

Given that the primary objective of the College is to train agronomists skilled in the production methods applicable to the tropical humid lowlands, the College 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 College. Also, Costa Rica has an enviable record of political stability which will contribute to the institutional stability of the College. Furthermore, legislation is now making its way through the Costa Rican Legislative Assembly which will authorize the establishment of the College 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 tropicas 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 College, 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 College. 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 to 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 College. 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 College, 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 Regional Agricultural College 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 Rector and to formulate the broad academic and administrative policies under which the Rector will develop and manage the institution. The Rector will appoint faculty members and major administrators with the consent of the Board of Directors. Other staff will be appointed by the Rector.

Assistance in identifying and screening candidates for membership on the Board of Trustees and Board of Directors will be provided by the Support University. 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 once a year and the Board of Directors at least four time 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 should given consideration, in the selection 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. The international agricultural centers in Latin America
i. The W. K. Kellogg Foundation.
j. A graduate of Zamorano who is involved in agricultural production, processing, and/or processing, and marketing.

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 should be represented on the Board:

a. Banking and investment capabilities.
b. Knowledge of management and organization 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 Rector

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

The Rector 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 College'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, 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 support of the College;

j. To give leadership to curricular development;

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

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

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. Provost

An early appointment following that of the Rector will be a second major administrator, who with the Rector, can set in motion the planning and development of the administrative and academic programs.

Since the College 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 and financial management will be complex, yet must fit into and complement the learning-by-doing academic program. Thus the Provost will participate in all aspects of planning the institution, ranging from student housing, to the use of the farm land for learning, to planning academic buildings and equipment, to planning the curriculum, developing a system of management and overall development of the students and finally to develop an administrative and financial management system. The provost would be expected to serve as Acting Rector when the Rector is not present at the College. Therefore, the Provost would need to have the ability to do most all of the items listed under the Rector's position.

The person recruited for this position should have:

a. An earned doctorate in agriculture or related field;
b. Practical work experience in agriculture or agribusiness;
c. Experience in a developing country;
d. Demonstrated ability to manage complex systems preferably in the development of colleges.

4. Dean of Academic Affairs

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

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. Fluency in Spanish and English.

f. Experience at a higher educational institution in a student counseling and services role is imperative;

g. Fluency in Spanish and English;

h. Experience in and knowledge of several Latin American cultures.

5. Dean of Business Affairs

It is important that the business and financial matters of the College 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. Criteria for selection are:

This will require the services of someone who has the ability to conceive, plan and manage resources in an efficient and effective manager, so as to maximize their impact on the educational program. The individual selected should have:

a. Experience in higher education related to its business an 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;

e. Experience in some agricultural enteprise;

f. A high sense of integrity and honesty.

6. Comptroller

From the beginning of the development of the College, there is a need for someone to work under the Assistant Director of Business and Finance, who is knowledgeable about accounting and auditing, and who can develop the accounting system of the College 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.

7. Resident Engineer - Development and Maintenance

In the planning, construction, and operational phases of the College, there will be a need for someone who has engineering ability to help develop and to assess plans for construction, watch construction for adherence 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 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 an cultural values;

e. Have knowledge of the humid tropical environment.

8. Security Officer

Another position that will be of vital importance from the time of purchase of the land on through the completion of the buildings and the initiation of the classes will be security of 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, this person will 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 instituion and its graduates than the decisions on hiring faculty. Therefore, high standards have been set for recruitment and selection of the international faculty.

An aggressive recruitment effort will be made to acquire outstanding faculty. In addition to traditional announcements being sent to agricultural colleges, technical colleges and international employment services, special effort will be made with former Peace Corps, volunteers and Extension Services.

The following areas are 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 interdisciplinary and team efforts;

- Knowledge of agriculture in the humid tropics.

In addition to a core faculty (those employed full-time with the intent of being long-term) these additional types of faculty will 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 College 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 and Development will have as his principal responsibility the "planning and development" of farm activities to insure that these further the College'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 an research during the period. He will work cooperatively with the Agricultural Economics and Management Marketing Specialist.

a. The Farm Planning and Development Specialist will:

1) 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;

2) provide budgets to be submitted to the administration for land clearing, drainage, soil conservation, and other farm development projects;

3) advise the College's administration on the prices for hiring farm labor or for contracting farm jobs;

b. He should be well trained in agriculture with an 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 Ph.D. in his field is desirable.
g. Awareness of the humid tropical environment is desirable.

2. Agricultural Economics and Management - Marketing

a. This technician should:

1) Determine the cost/price relation for all farm production activities;

2) Support the concept that the College's main objective is education, but that determination of a profit or loss for each farm production project is important and should be accomplished;

3) work cooperatively with the Farm Planning and Development Specialist, and with the College's Administration and Faculty.

b. This person should be well trained in Agricultural Economics; a Ph.D. 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, dining 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 College; 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. Work experience in Latin America is desirable.

4. Soils - Water - Plan - Animal Interactions

Adequate development of agriculture in the humid tropics is largely dependent 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 were broken. It is theorized that some areas of the humid tropics could become "wet deserts" if the covering plants are removed an not adequately substituted by others. A soils specialist who is knowledgeable of humid tropical soils will be on the faculty at a very early stage of the College's development.

This specialist should have:

a. A masters or Ph.D. degree in soils.

b. Work experience in tropical soil conditions.

c. Excellent oral and written communication skills.

d. Willigness to work on institutional farm projects with other faculty members and students.

e. Fluency in Spanish and English.

5. Crops Broadly Defined

Forestry and livestock will be important areas of training in the College; however, crop production will be the principal teaching and working activity.

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.

The Crop Specialists will work in close cooperation with the Farm Planning and Development Specialist and with the 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 English;

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).

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6. Livestock

Even though livestock production will not be a major activity at the College, some animal husbandry course should be taught. A livestock specialist will be hired during the initial phase to determine which areas of animal husbandry the College will develop, and to assist in the planning and implementation of these projects.

This specialist should:

a. Have a Masters or Ph.D. degree in the subject matter of his/her 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. Be 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 letf in forests or reforested. Those responsible for developing agricultural projects in the humid tropics should given 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 College. Therefore, early selection of a Forestry - Management - Exploitation Specialist seems imperative.

This Forestry Specialist should:

a. Have a Masters or Ph.D. degree in Forestry;

b. Have a knowledge of tropical rain forest ecosystems;

c. Have work experience in forest management/exploitation is highly desirable.

d. Have ability to communicate well in verbal and written form.

f. 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. An Aquaculture Specialist will be hired to develop this potential at the College 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 a related subject;

c. Be committed to the "learning by doing" method of teaching;

d. Be fluent in Spanish and English.

Regional Agricultural College - TECHNICAL ANALYSIS

The analysis presented in this section first reviews the demand for the type of training to be provided by the Regional Agricultural College 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 technical 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 College, looked at the alternatives to establishing a new institution, and developed a realistic plan for the development of the proposed new College.

A. 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 America 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 sciencies 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 the region (see Annex II.E) shows a strong preference for technical school (including 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 College 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 existing agricultural areas, there is also increase 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 natural 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 Panama (Cultivos No Tradicionales para Exportacion de las Zonas Humedas Bajas Tropicales de Centroamerica y Panama, SIECA/ECID/MOCA Div. Inf. 024-83, Guatemala, March 1983). Of the 14 commodities studied, 9 have the potential for considerable expansion, both in area in production and employment generation. Information on these nine products are provided in the table below:

DEVELOPMENT POTENTIAL OF THE LOW HUMID TROPICS IN CENTRAL AMERICAN AND PANAMA

Crops	Area in Production	Potential	Potential Employ. Generation 100 Days/Yr
	(1,000 Ha)		
Cacao	42	38	4,499
Cashew	10	20	893
Pineapple	11	22	4,964
African Palm	28	38	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

These production figures generally refer to 1980 or 1981. No doubt some expansion is already underway (see Annex II.E, future expansion). 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 College begins graduating students.

It is 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 into consideration the increased demand of some larger private enterprises that may be established or expand their operations in the low humid tropics. (The high probability of such expansion is discussed in Annex II.E). Nor does it allow for the possibility than 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 College will not be a problem. By the time there are graduates from the College, 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 College 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 College, 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 College, it will mean that there will be fewer Ingeniero Agronomo graduates competing for private sector slots.

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Comparison of Current Employment of Graduates of the University of Costa Rica 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 College than government hiring policies. Fortunately, there appears to be an increasing awareness among Central 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 Regional Agricultural College 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 College 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 these indications USAID/Costa Rica went further and commissioned a larger study of the region to determine employer preferences (Annex II.E) The analysis' conclusion supported the previous studies and assumptions:

1.- Agricultural training available in the CA/P region should be targeted on the needs of private and quasi-private sector employers;

2.- A B.S. degree in agriculture will be increasingly important for employment and career advancement in the private and quasi-private sector in the coming years;

3.- Combined applied training with B.S. level instruction will produce the most desireable agriculturalists;

4.- it is likely that private and quasi-private sector employers will expand their operations in humid lowland tropical areas, creating additional demand for agriculturalists with the appropriate training.

Based on the information available there appears to be ample demand within Central America for the planned graduates of the Regional Agricultural College. Both national universities and EAP are taking only a small percentage of eligible qualified candidates. For example, EAP admitted only 18 Costa Rican 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-fith 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 College will come primarily from the private sector, and this demand is expected to continue to rise significantly.

B. Alternatives to a New Institution

As a part of the design process, four alternatives to the establishment of a new institution were reviewed:

1- expand Zamorano (EAP);
2- expand CATIE at Turrialba;
3- expand and modify the output of the national universities;
4- expand undergraduate training in the U.S.

The results of the design team's review are presented below:

1. 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 College. The Board of Directors 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 percentager of the students. This has been under consideration for a number of years, and EAP and USAID/Honduras recently contracted a task force to analyze the options for expansion. The final report recommended an expansion of current curriculum in order to offer an advanced degree of Ingeniero Agronomo; however, in reference to additional campus(es): "It is recommended that such a step not be taken in the foreseeable future due to the extraordinary difficulties that would be experienced by EAP in maintaining control, establishing facilities, staffing, etc."

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, however, the USAID/Honduras task force to EAP recommended against the expansion primarily because of the extraordinary difficulty of managing a second campus is accepted, then the costs of establishing the new College 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 of 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 couple 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 a Regional Agricultural College could have a negative impact on EAP, but the design team and the Kellogg Foundation Task Force do not feel that there is justification for this concern. There appears 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 th Regional Agricultural College should continue to expand, particularly in the private sector. While there would be some advantage to the Regional Agricultural College 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 College 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(see Annex II.B.3).

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.

2. Expand CATIE

CATIE also has the advantage of being a long-established institution of international standing. As an international institution, 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 launch 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 of the Agricultural College 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.

3. 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 institutions 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:

1.- try to have an impact in all of the universities concurrently or;

2.- try to attach the "hands-on" type program to one particular university, e.g. one in Costa Rica.

Trying to work with five of 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 College. Whether it would be feasible to establish an endowment fund solely for the Agricultural College of a national university seems highly unlikely and raises the question of long-term financial viability and independence.

4. 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 its "hands-on" pedagology, and it is not located in a lowland humid tropical area. There are institutions in the Southern U.S. 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 or more cost-effective 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 Regional Agricultural College in the lowland humid tropics with a site as close as feasible to San Jose and CATIE is the best available alternative.

OPERATING COST ESTIMATE ASSUMPTIONS

FOR AGRICULTURAL COLLEGE

Below are listed the cost estimates and assumptions used to develop the yearly operating cost budget for the Agricultural College. These assumptions are based on the models of California Polytechnic State University, the Panamerican School of Agriculture in Zamorano, Honduras and International Agricultural Research Centers. A six percent increase per year on salaries is assumed. Foreign staff salaries will be paid 75% in dollars and 25% in local currency, local hire staff are paid 100% in local currency.

Staff

1. Administration:

Position	Begins	Salary	Benefits (40%)	Year 1	Year 2
Rector	Jan. 86	70,000	28,000	98,000	98,000
Provost	Apr. 86	65,000	26,000	68,250	91,000
Dean of Academic Affairs	July 86	50,000	20,000	35,000	70,000
Dean of Business Affairs	July 86	50,000	20,000	35,000	70,000
Controller	Apr. 86	40,000	16,000	42,000	56,000
Resident Engineer	Apr. 86	20,000	8,000	21,000	28,000
Farm Manager	Apr. 86	15,000	6,000	15,750	21,000
				315,000	434,000

2. Faculty:

Salaries based on mean associate professors, $40,000, therefore with benefits (40%), the average salary will equal 56,000 per faculty member per year.

By year the Faculty cost will be:

	YEAR ($000)									
	1	2	3	4	5	6	7	8	9	10
Foreign hire										
Cost/faculty	56,000	56,000	59,360	62,921	66,696	70,697	74,938	79,434	84,200	89,252
Number	.83	6	12	19	25	27	29	30	32	32
Cost ($000)	47	336	712	1,195	1,667	1,908	2,173	2,383	2,694	2,856
Local Hire										
Cost/faculty	56,000	56,000	59,360	62,921	66,696	70,697	74,938	79,434	84,200	89,252
Number	.49	2	4	5	7	7	7	8	8	8
Cost ($000)	27	112	237	315	467	495	525	635	674	714

3. Clerical:

.24 clerical positions per faculty member.

Salaries were calculated as: (.33)(US RATE)=(.33)($18,000)=$5,940=$6,000.

Clerical support for the administrators would be 4 persons plus 2 persons for student records and finance. The salary would be $7,000 per person.

Therefore by year clerical staff will be:

	YEAR									
	1	2	3	4	5	6	7	8	9	10
Adm. Cler.										
Cost/person	7,000	7,420	7,865	8,337	8,837	9,368	9,930	10,525	11,157	11,826
Number	3	6	6	6	6	6	6	6	6	6
Faculty Cler.										
Cost/person	6,000	6,360	6,742	7,146	7,575	8,029	8,511	9,022	9,563	10,137
Number	2	2	4	6	8	9	9	9	10	10
Total cost	33,000	57,240	74,158	92,898	113,622	128,469	136,080	144,348	162,572	172,093

4. Technicians:

It is assumed that there would be .20 technical positions per faculty member.

Salaries were calculated using the following equation:
(.33)(US RATE)=(.33)(24,000)=8,000.

Therefore by year technician will be:

	YEAR									
	1	2	3	4	5	6	7	8	9	10
Cost/person	8,000	8,480	8,989	9,528	10,100	10,706	11,348	12,029	12,751	99,951
Number	2	2	3	5	6	7	7	8	8	8

5. Farm Positions:

It is assumed there would be a need for 1 position per 200 hectares for a 3,000 hectare farm. The salary would be $5,000 per position. Therefore 15 persons will be needed over and above these already employed by the farm. A per year cost will be $75,000.

6. Security:

It is assumed that five positions (one chief and four employees) are needed. Total cost for salaries per year would be $27,000 ($7,000 for the chief and $5,000 each for the employees).

7. Grounds and Maintenance:

It is assumed that 12 persons at $5,000 per person will be needed, therefore the total per year would be $60,000.

8. Instruction expense:

This to purchase consumable supplies for instruction, e.g. chalk, chemicals, etc. The cost is estimated at $20,000 base plus $75 per student per year.

By year the cost would be:

	YEAR									
	1	2	3	4	5	6	7	8	9	10
FX	0	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
LC	0	15,625	21,250	26,875	32,500	34,375	36,250	38,125	40,000	40,000
TOTAL	0	25,625	31,250	36,875	42,500	44,375	46,250	48,125	50,000	50,000

9. Physical Plant:

Telephone:	10,000
Electricity:	5,600
Building Materials:	12,632
Faculty Housing Material:	37,894
Total	66,126

10. Equipment Replacement:

It was assumed an average life of 8 years including books.

By year the cost for equipment replacement would be:

	YEAR									
	1	2	3	4	5	6	7	8	9	10
FX	0	4,258	9,081	19,496	31,253	71,191	99,713	132,431	159,198	159,198
LC	0	27,287	61,511	128,678	205,199	289,504	458,087	649,608	885,384	1,026,199

11. Student Meals:

It was assumed $4.00 per day per student, therefore at 335 days/year=1340 per student.

By year the cost for meals would be:

	YEAR									
	1	2	3	4	5	6	7	8	9	10
LC	0	100,500	201,000	301,500	402,000	435,500	469,000	502,500	536,000	536,000

- Operating Reserve:

Six percent of total annual operating costs.

- Capital Reserve:

Six percent of initial capital construction was estimated $40,000 for dollar costs and $90,000 for local currency costs per year. This reserve will provide for unexpected capital outlay.

YEARLY OPERATING EXPENSES FOR AGRICULTURAL COLLEGE ($000)

	1986		1987		1988		1989		1990		1991		1992		1993		1994		1995		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
1. Staff	271	329	576	550	879	814	1252	1069	1635	1392	1843	1529	2066	1659	2249	1669	2510	2033	2661	2155	15957	13399
a Faculty	35	39	252	195	534	415	897	613	1251	854	1432	972	1630	1058	1767	1231	2021	1347	2142	1428	11930	8194
b Administration	236	79	326	108	345	115	366	122	388	129	411	137	436	145	462	154	489	163	519	173	3977	1326
c Clerical		33		57		74		93		114		128		136		144		165		172		1115
d Technician		16		17		27		48		61		75		79		90		102		108		629
e Farm		72		69		84		89		95		100		106		113		120		127		939
f Security		27		29		30		32		34		36		38		41		43		46		356
g Maintenance		60		64		67		71		76		80		85		90		95		101		791
2. Instructional Material	10	16	10	21	10	27	10	32	10	34	10	36	10	38	10	40	10	40	10	40	100	325
3. Physical Plant		66		66		66		66		66		66		66		66		66		66		661
4. Equipment Replacement			5	22	12	49	26	103	41	164	58	232	92	367	130	520	177	708	205	821	746	2986
5. Student Meals		100		201		302		402		436		469		502		536		536		536		4020
6. Operating Reserve	17	31	35	50	53	72	76	94	99	116	111	126	125	136	136	151	151	161	160	168	963	1104
7. Capital Reserve	40	90	40	90	40	90	40	90	40	90	40	90	40	90	40	90	40	90	40	90	400	900
8. Total Operating Exp.	338	632	668	1001	995	1420	1414	1857	1828	2298	2062	2548	2332	2858	2565	3272	2689	3634	3076	3876	18167	23395

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STUDENT NUMBER FOR ADMISSION, ATTENDANCE AND SCHOLARSHIP FOR AGRICULTURAL COLLEGE

	1987	1988	1989	1990	1991	1992	1993	1994	EOP 1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Number of new students admitted	75	75	75	75	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
2. Number not continuing from previous year 1/		7	7	7	7	10	10	10	10	10	10	10	10	10	10	10	10	10	10
3. Number of students attending	75	142	210	278	302	324	347	370	370	370	370	370	370	370	370	370	370	370	370
4. Number of students on full scholarships 2/	15	28	42	55	60	65	69	73.9	74	74	74	74	74	74	74	74	74	74	74
5. Number of students paying partial fees	60	114	168	222	242	260	278	296	296	296	296	296	296	296	296	296	296	296	296
6. Number of students graduating				68	68	68	68	90	90	90	90	90	90	90	90	90	90	90	90

1/ This is estimated to be 10% per class, the same as U.S. universities that have a rigid screening process
2/ This is estimated at 20% of attending students, the same as Zamorano

YEARLY INCOME FROM MATRICULATION FEES FOR THE AGRICULTURAL COLLEGE

	1987	1988	1989	1990	1991	1992	1993	1994	EOP 1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Number of students attending	75	142	210	278	302	324	347	370	370	370	370	370	370	370	370	370	370	370	370
2. Number of students paying matriculation fees	60	114	168	222	242	260	278	296	296	296	296	296	296	296	296	296	296	296	296
3. Total college operating costs ($000)	1669	2415	3271	4126	4510	5190	5836	6523	6953	6953	6953	6953	6953	6953	6953	6953	6953	6953	6953
4. Average cost per student ($000)	22	17	16	15	15	16	17	18	19	19	19	19	19	19	19	19	19	19	19
5. Matriculation fee per student 1/	5577	5084	4573	4460	4579	4798	5046	5296	5645	5645	5645	5645	5645	5645	5645	5645	5645	5645	5645
6. Matr. fees, if charged full oper. costs ($000)	401	560	765	990	1106	1246	1401	1565	1669	1669	1669	1669	1669	1669	1669	1669	1669	1669	1669
7. Income from matr. fees based on $4600 2/	276	524	773	1021	1111	1194	1277	1360	1360	1360	1360	1360	1360	1360	1360	1360	1360	1360	1360

1/ The cost per student is 50% of the matr. fees, the same as Zamorano
2/ $4600 is used so first year students are not overly charged for increased early year operating costs, $4600 is the average amount for the first 10 years

EQUIPMENT SPECIFICATIONS

The following equipment specifications have been assembled utilizing the suggestions offered by the Task Force, by consulting teams of educators, and in harmony with the curricular recommendations. It is fully recognized that no two educators would fully agree on each item contained in the listing which follows. The acquisition, however, of the items listed, or an equal substitute, will enable the college administration and faculty to begin operation with a minimum amount of annoyance or lack of efficiency. It is thought that the college administration and faculty, once selected and brought on board, may have an opportunity to express their preferences or otherwise modify the list for years two and beyond.

The list, where possible, indicates the probable location of use and storage for each piece of equipment. It is hoped that the college administration, faculty and staff will recognize the need for security and responsibility while maintaining an open spirit of cooperation among all probable users. It is recommended that a system of inventory control and tool/equipment checkout be established very early with an individual assigned active responsibility for monitoring the system.

Text and reference books have been budgeted for on the assumption that the college will provide all necessary texts.

For most equipment selections, reference has been made to certain available commercial catalogs. The individual reference members may be of use to individuals who are subsequently assigned the task of ordering each of these items. In general, brand names are not important, however, I do hope that the purchasing officer will examine the specifications for the items which have been selected, and will order like or equal equipment. The catalogs which have been used include:

Distribution Company	Code
American Scientific	AM SCI
Soil Test Division of ELE	ELE
NASCO	NASCO
Broadhead-Garrett Co.	B/G

The facility and equipment listing has been organized as follows:

A. Value summary by year of construction and use.

B. Equipment, Furniture supplies which should be acquired for each area.

DESCRIPTION OF ROOMS AND BUILDINGS

	Year of Need
1 - General Purpose Lecture Room	1
2 - General Purpose Lecture Room	1
3 - General Purpose Lecture Room	2
4 - General Purpose Lecture Room	2
5 - General Purpose Lecture Room	3
6 - General Purpose Lecture Room	3
7 - General Purpose Lecture Room	4
8 - General Purpose Lecture Room	4
9 - Laboratory, Crops/Soils/Forestry	1
10 - Agricultural Mechanics Shop	2
11 - Farm Center	2 & 3
12 - Computer Laboratory/Center	2
13 - Infirmary	1
14 - Library	1
15 - Science Laboratory and Preparation Room	2
16 - Dining Room	1
17 - College Store	3
18 - Student Residences	1
19 - Student Residences	2
20 - Student Residences	3
21 - Student Residences	4
22 - Fire and Security	1
23 - Administrative and Faculty Offices	1, 2, 3, 4 & 5
24 - Campus Buildings and Ground Maintenance	2
25 - Crops, Field Unit	2
26 - Food/Nutrition/Meats Laboratory	2
27 - Abbitoir	2
28 - Swine Production Unit	3
29 - Poultry Production Unit	3
30 - Beef Production Area	4
31 - Forestry Field Unit	4

SUMMARY OF EQUIPMENT NEEDS FURNITURE AND SUPPLY COSTS BY ROOM

AREA	YEAR OF ACQUISITION* 1	2	3	4	5	TOTAL
1	9,312					9,312
2	9,312					9,312
3	9,312					9,312
4	9,312					9,312
5		9,312				9,312
6		9,312				9,312
7			9,312			9,312
8			9,312			9,312
9	109,289					109,289
10	70,657					70,657
11	300,000	79,826				379,826
12	102,575					102,575
13	93,700					93,700
14	133,450					133,450
15	206,091					206,091
16	162,320					162,320
17		79,500				79,500
18	186,900					186,900
19	186,900					186,900
20		186,900				186,900
21			186,900			186,900
22	129,420					129,420
23	329,819	34,560	34,560	34,560	34,560	468,059
24	75,978					75,978
25	106,453					106,453
26	231,390					231,390
27	70,000					70,000
28		25,685				25,685
29		55,845				55,845
30			36,150			36,150
31			75,150			75,150
Books	35,475	51,673	53,151	46,093	17,117	203,509
Faculty Furniture	161,060	161,060	161,060	161,060	161,060	805,300
Total New Equipment	2,728,725	693,673	565,595	241,713	212,737	4,442,443
Equipment Replacement**	0	27,287	61,511	128,678	205,199	422,675
TOTAL	2,728,725	720,960	627,106	370,391	417,936	4,865,118

*This is the year to begin acquisition. The actual need is the following year.

**See next page.

Replacement equipment allocation assumes average equipment life of 8 years, including furniture, recognizing that some items will need replacement at end of first year. The following percentages have been utilized:

YEAR OF ALLOCATION	BASE YEAR(S) AND PERCENTAGE	AMOUNT
2	Total equipment cost for year 1 x 1%...	27,287
3	(year 1 x 2%) + (year 2 x 1%)...	61,511
4	(year 1 x 4%) + (year 2 x 2%) + (year 3 x 1%)...	126,678
5	(yr. 1 x 6%) + (yr. 2 x 4%) + (yr. 3 x 2%) + (yr. 4 x 1%)...	205,199
6	(yr. 1 x 8%) + (yr. 2 x .6%) + (yr. 3 x 4%) + (yr. 4 x 2%)(yr. 5 x 1%)...	289,504
7	(year 1 x 13%) + (year 2 x 8%) + year 3 x 6%)...	458,087
8	(year 1 x 18%) + (year 2 x 13%) + (year 3 x 8%)...	649,608
9	(year 1 x 24%) + (year 2 x 18%) + (year 3 x 13%)...	885,384
10	(year 1 x 26%) + (year 2 x 24%) + (year 3 x 18%)...	1,026,199

LIST OF EQUIPMENT NEEDED FOR EACH ROOM

GENERAL PURPOSE LECTURE ROOM (Area 1-8)

QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
60	Student desks - metal frame, flat, not sloping, top at least 18" x 24" x 1"		$ 125	$7,500
2	Table, wood, 42"W x 1 1/4"TH x 60"L	BG-159440	375	750
2	Instructor chair, wood	BG-440338	56	112
2	Instructor Podium		100	200
2	Overhead projectors		250	500
2	Projection screens, 8'W x 6'T, cieling mount	BG-418553	125	250
				$9,312

LABORATORY, CROPS/SOILS/FORESTRY (Area 9)

1	Scale, Balance, 0-4100 g.	AmSci B1242-41	$1,442	$ 1,442
1	Scale, Balance, 0-30 and 0-600 g.	AmSci B1422-10	1,995	1,995
1	Environmental Chamber - Lab. Line	Nasco 28500 P	1,613	1,613
1	Incubator, American S/P	AmSci J1425-40	1,421	1,421
12	Alcohol Lamps	Nasco 74-102P	4	48
12	Timer, 1-60 minutes	Nasco C5941P	13	156
6	Timer, 1-120 minutes	Nasco C5940P	40	240
1	35 mm. Microscope Camera Unit, with Expostar Shutter Control	AmSci 1053F	1,875	1,875
1	Stereo/200M Microscope	AmSci 561B1	903	903
2	Portable Balances, 2000 g.	AmSci B1921-105	95	190
12	Scale, Pull Spring	AmSci B1985-5	6	72

QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
1	Weight Mass Set, 10-100 mg.	AmSci B2211	143	143
1	pH Meter, Portable, pH/MV/ Temperature	AmSci H4000-15	395	395
1	Incubator, Classroom	AmSci J1612	290	290
2	Utility Cart	AmSci C1200-2	110	220
1	Platform Truck, 600 lb. Cap.	AmSci C1202-51	218	218
6	Physical Soil Survey Set	ELE 50005	350	2,100
6	Physical Soil Survey Set	ELE 50010	450	2,700
6	Field Soil Sample Set	ELE 51010	150	900
6	Field Sampling Set	ELE 51005	200	1,200
15	Universal Laboratory Sets	ELE 57905/1	650	9,750
15	Pocket Stereoscope	ELE 500-010	35	525
6	Double Prismatic Square	ELE 500-126	75	450
6	Range Finder	ELE 500-116	125	750
6	Automatic Level Set	ELE 500-120	400	2,400
1	Theodolite	ELE 500-142	1,200	1,200
6	Nylon Coated Steel Tape	ELE 500-162	45	270
1	Stevenson Screen, with Legs	ELE 504-122, 124	285	285
1	Thermohygrograph	ELE 506-160	725	725
10	Thermohygrograph Charts	ELE 506-176	25	250
10	Humidity Pens for Thermohygrograph	EL 506-164/10	25	250
10	Thermomete Pens for Thermohygrograph	EL 506-164/20	25	250
4	Rainguage with Data Logger	EL 502-044	800	3,200
1	Data Processor/Printer	502-044 (EL 502-055)	1,000	1,000
1	Wind Speed and Direction Recorder	(EL 503-042/02)	850	850
1	Combined Wind Speed and Direction Transmitter	(EL 503-028)	600	600
2	Soil Colorimeter Unit	EL 513-025	400	800
4	Refill Package for Colorimeter Unit	EL 513-025/10	50	200
1	Instructor Demonstration Table	BG-465027	2,500	2,500
2	Emergency Eye Wash Station	BG-S1349-2	325	650
1	Counter Top, Cabinet and Hood Units	(See Page 43)	3,000	3,000
1	Wall Table and Cabinets (See Page 44 - Cal Poly)		4,000	4,000
1	Kjedlahl Unit	ELE 52555-1	5,500	5,500
1	Chemical Analysis Set	ELE 52500/1	4,000	4,000
30	Non Poisonous Insect Killing Jars	Nasco SB 9387P	2	60
1	Digital Moisture Meter for Rice, Maize, Cereal Grains	Nasco 25872N	1,375	1,375
1	Laboratory Tester/Cleaner with 2 extra Screens	Nasco Z9216N and 22457N	1,025	1,025
1	Grain Temperature Probe	Nasco C11885N	300	300

QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
1	Grain Sampling Probe	Nasco Z9416N	135	135
1	Instructor Laboratory Chair/Stool		220	220
3	Student Table Units	See Page 19	4,500	13,500
30	Student Adjustable Stools	AmSci L5111-11	100	3,000
3	Wash Cabinets with Sinks	See Page 19	3,000	9,000
12	Microscopes, American Scientific M3000	See AmSci Pg. 629	900	10,800
2	Microscopes, Trinocular	AmSci XH100TUA	2,490	4,980
1	Garden Insect Collection	Nasco LS425P	50	50
1	Beneficial Insects Collection	Nasco LS439P	25	25
1	Harmful Insects Collection	Nasco LS438P	37	37
1	Soil Classes Collection	Nasco LS519P	17	17
1	Grasses Collection	Nasco C10642P	38	38
4	Seed Sample Display Box	Nasco C9695P	29	116
30	Plant Press	Nasco SA2726P	32	960
50	Absorption Paper for Plant Press	Nasco SA4460P	20	1,000
24	Riker Insect Mounts 6 1/2 x 8 1/2	Nasco SA4441P	2	48
24	Riker Insect Mounts, 12" x 16'	Nasco SA4444P	6	1440
12	Insect Pins No. 2	Nasco S8229P	3	36
12	Insect Pins No. 2	Nasco S7828P	3	36
12	Insect Pins No. 4	Nasco S8230P	3	36
25	Insect Nets with Extra Bag	Nasco SA3150P and SA3151P	17	425
50	Insect Spreading Board	Nasco SB1884P	8	400
				$109,289

AGRICULTURAL MECHANICS SHOP (Area 10)

6	Gas Weld Goggles, Flip Front	BG-261973	8	48
24	Replacement lens	BG-406299	1	24
24	Replacement Cover Plates	BG-261655	1	24
1	Carpenters Level	BG-215687	22	22
1	Carpenters Level	BG-579256	28	28
3	Framing Squares	BG-227042	24	72
3	Tri Square	BG-472946	11	33
5	1/2" Tape Rules	BG-226503	7	35
2	100' Tape Rules	BG-579519	33	66
2	Marking Gauge	BG-22666Y	6	12
4	Steel Bar Clamps	BG-224881	10	40
6	Antispatter "C" Clamp	BG-592820	11	66
6	Antispatter "C" Clamp	BG-592841	16	96
6	Vice Grip "C" Clamp	BG-224709	14	84
3	Swivel Base 4" Vice	BG-223973	255	765
1	Combination Pipe Vice	BG-209447	272	272
1	Pipe Cutter 1/8" - 2"	BG-222904	70	70
2	Wood Chisel Set	BG-233004	117	234
2	Combination Punch and Chisel Set	BG-225902	37	74

QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
6	Scratch Awls	BG-428611	4	24
2	Pry Bars	BG-229070	10	20
2	Pipping Bars 3/4" x 24"	BG-229081	10	20
2	Nail Sets 2/32"	BG-228988	2	4
2	Nail Sets 5/32"	BG-229015	2	4
1	Nail Puller	BG-586170	25	25
3	Utility Knife with Replacement Blades	BG-354611, 354622	7	21
1	Soldering Gun Kit	BG-126191	44	44
1	Solderless Terminal Kit	BG-172678	19	19
40	Visitor Safety Classes	BG-261772	1	40
10	Face Shield	BG-261706	11	110
5	Warning Stripe Tape	BG-262848	15	75
1	Battery Charger, 15 Amp. 12V Automatic/Manual		91	91
1	Timing Light	BG-166924	67	67
1	Digital Engine Systems Analyzer	BG-244628	125	125
1	Abrasive Cut Off Saw	BG-477548	540	540
10	Fire Blanket	BG-242706	25	250
1	Safety Glasses and Metal Cabinet	BG-471987	419	419
6	Curved Claw Hammer	BG-227690	14	84
4	Ripping Claw Hammer	BG-227729	15	60
2	Ball Pein Hammer	BG-227824	9	18
2	Ball Pein Hammer	BG-227846	10	20
2	Ball Pein Hammer	BG-227879	13	26
1	Black Smith Hammer	BG-373823	18	18
2	Plastic Mallets	BGH-480311	6	12
3	Screw Driver Sets	BG-195595	20	60
2	Screw Driver Set	BG-291296	160	320
1	Plane Set	BG-291409	218	218
1	Hand Saw Set	BG-291410	160	160
2	Hand Tool Set	BG-291486	151	302
2	Embossing Kit	BG-315312	44	88
4	Hack Saw Grames	BG-235150	12	48
24	Hack Saw Blades	BG-235288	.28	7
24	Hack Saw Blades	BG-235306	.28	7
4	Carbide Tip 7 1/4" Saw Blades	BG-442461	7	28
4	Carbide Tip 7 1/4" Saw Blades	BG-399845	9	36
4	Carbide Tip 8" Saw Blades	BG-399866	8	32
4	Carbide Tip 12" Saw Blades	BG-159071	16	64
4	Flat Files - 10" - Bastard	BG-241804	4	16
4	Flat Files, - 10" - Smooth	BG-241897	6	24
12	File Handles - 10"	BG-241038	1	12
6	File Card and Brush	BG-240901	5	30
3	Drawing Pencils - 4B (1 Doz. Box)	BG-120999	6	18
3	Drawing Pencils - HB (1 Doz. Box)	BG-205318	6	18
3	Drawing Pencils - H (1 Doz. Box)	BG-304072	6	18

QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
20	Metal Lead Pointer	BG-332730	11	220
12	Pencil Sharpeners		12	144
5	Electric Engravers	BG-517325	10	50
1	Arc Welding Transparencies	Nasco Z5540P	175	175
1	Shop Tool ID Transparencies	Nasco Z11930P	10	10
4	High Speed Drill Set	BG-218484	14	56
1	115 PC Drill Set	BG-204834	312	312
3	5" Heavy Duty Vice, Swivel Base		405	1,215
3	Drill Set	BG-218430	115	345
1	Wood Bit Set	BG-100371	80	80
1	Brace and Bit, 12"	BG-231181	42	42
1	Tap and Die Set	BG-219052	102	102
6	Center Lube	BG-217978	6	36
2	Thickness Gauge	BG-183706	20	40
1	Pipe Threader 1/8" - 1 1/4"	BG-222579	268	268
2	Pipe Wrench 10"	BG-223019	11	22
2	Pipe Wrench 18'	BG-223030	20	40
2	Pipe Vice 1/8 - 2"	BG-223103	62	124
1	1/2" Pipe Bender with Handle	BG-292412, 293364	23	23
1	1" Pipe Bender with Handle	BG-293342, 293426	48	48
1	Pipe Reamer Ratchet	BG-479255	91	91
2	Concrete Mixer 4 Cuft UTM with 5LP Gas Engine	BG-492251	1,100	2,200
1	Jitter Bug - Concrete	BG-223253	41	41
2	Concrete Mason's Kit	BG-447085	124	248
1	Radial Arm Saw 12", Auto Brake 230V, Single Phase	BG-110323	1,219	1,219
1	Automatic Return Device	BG-360650	32	32
1	Table Saw Tilting Arbor	BG-233713	2,190	2,190
3	Work Tables with Lockers Below Vista Green	BG-451856	1,069	3,207
3	Work Tables with Lockers Below Vista Green	BG-451867	809	2,427
1	Power Jointer 6", 115V	BG-259617	1,386	1,386
1	15" Drill Press 115V Variable Speed, Floor Stand	BG-429435	1,302	1,302
2	3/8" Variable Speed Hand Drill, Reversible		114	228
2	1/2" Variable Speed Hood Drill, Reversible		145	290
2	Portable Sader Saw	BG-583150	135	270
1	20" Drill Press, 230V, Variable Speed, Floor Stand	BG-259482	3,000	3,000
3	10" Grinder Single Phase	BG-259555	688	2,064
2	6" Bench Grinder/Buffer	BG-400310	406	812
1	Belt Sander 3" x 24"	BG-243670	209	209
1	7 1/4 Circular Saw	BG-517296	45	45

QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
2	Gas Weld Carts	BG-203071	166	232
15	Chipping Hammers	BG-549900	6	90
10	Flint Spark Lighter	BG-549882	2	20
30	Flint Renewals	BG-549893	.50	15
10	Vice Grip Weld Clamp	BG-203166	15	150
10	Weld Tip Cleaners	BG-203005	2	20
1	Paint Sprayer	BG-340530	399	399
1	10 Ton Bench Press	BG-326590	720	720
1	Puller Set	BG-340998	472	472
1	Puller Set Accessories		441	441
9	12 Gauge Steel Top Wall Bench with Lockers Below - Vista Green	BG-452603	759	6,831
5	12 Gauge Steel Top Wall Bench with Locking Cabinet Below	BG-453259	575	2,875
100	Combination Prolock - Keyed Alike with Control Key	BG-451930, 469898	5	500
2	Metal Bench, 12 Gauge Top, 64"W x 54"D		615	1,230
5	Metal Table, 12 Gauge Top, 64"W x 28 1/2"D		409	2,045
1	Enclosed Shop Desk	BG-567477	368	368
3	Combination Cabinets, 36"W x 24"D x 78"H	BG-462179	289	867
4	Double Door Storage Cabinet 36" x 24" x 78"	BG-462219	268	1,072
3	Drawer Unit Cabinet, 36"x12"x75"	BG-398015	1,371	4,113
20	Closed 5 Shelf Metal Shelving 36" x 24" x 75"	BG-221649	112	2,240
5	All Purpose Vertical Storage Racks 48" x 34" x 108"	BG-461523	300	1,500
1	Swivel Chair, Adj./25 - 33"L	BG-468500	96	96
3	12 Pc. Combination Wrench Set	BG-570156	60	180
3	15 Pc. Metric Combination Wrench	BG-570675	82	246
2	27 Pc. 3/8" Drive Socket Set		125	250
2	22 Pc. 3/4" Drive Socket Set		360	720
2	16 Pc. 1/2" Drive Metric Socket Set 87		174	348
2	Deluxe Grease Gun, with Step Handle and 24 Cartrige	BG-192604, 576079 192615	70	140
24	WD14	BG-250192	3	72
2	Blow Gun	BG-259292	9	18
2	Tin Snips, 2" Cut	BG-181108	8	16
2	Tin Snips, 3 1/4" Cut	BG-210113	13	26
10	Set of Firebrick for Gas Weld	BG-458030	36	360
5	225 AC Arc Welders, 230V	BG-202404	178	890
7	225 AC/DC Arc Welder	BG-333682	332	2,324
1	230V Portable DC Arc Welder, AC Power Generator, with Electric Start		2,517	2,517

QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
1	Accessory Set for Portable Welder	BG-202291	95	95
10	Gas Welding Kit	BG-201306	398	3980
12 Pair	Gas Weld Check Valves 9/16"	BG-291274	14	168
15	Arc Weld Helmets, Flip Front	BG-262055	22	330
20 Pair	Arc Weld Gloves	BG-202744	11	220
10	Arc Weld Leather Aprons	BG-493305	21	210
1	Under Carriage for Portable Welder	BG-161551	103	103
1	Hand Chain Hoist 1 1/2 Ton	BG-361420	178	178
2	Emergency Eye Wash Stations	BG-S1349-2	325	650
				$70,657

GENERAL FARM (Area 11)

The following equipment is for general use on the farm and college campus. The new college administration, faculty and staff should adopt a strong policy which assigns priority use to complimenting the instruction first. Economic efficiency as well as practical considerations, do not permit a separate equipment inventory for each campus function, therefore, a spirit of team work and cooperation must prevail.

QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
1	Ditch Trencher, Hand, 18"D x 4"W, Trench Capacity		8,000	8,000
1	Aluminum Goose Neck Stock Trailer 22'L x 3'W with Stock Divider Panels		14,000	14,000
1	Steel Goose Neck Flat Trailer for Moving Tractors and Equipment		12,000	12,000
1	Forklift 10 Ton Cap. Pneumatic Tires for Off Pavement Mobility		20,000	20,000

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QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
1	Grain Drill 8'		3,000	3,000
1	Sprayer, High Pressure		2,000	2,000
1	Scraper, 6", 3 Pt Hitch, 1yd.		2,000	2,000
1	Portable Grain Auger, 14', Screw Type		2,500	2,500
1	Tractor, 4-Wheel Drive, Diesel With Pto, 3 Point Hitch, Roll Over Protection, Field Tires		41,000	41,000
2	Tractor, Utility, Diesel with Pto, Roll Over Protection, Adjustable Front and Rear Axle to Max. 84"		27,000	54,000
	Rear Tine Cultivator, 5 LPT		1,000	1,000
1	6' x 3 Point - 2 Gang Disc with Trash Blades on Front Gang		2,000	2,000
1	Rotovator for a 3 Point Hitch Pto Driver		5,000	5,000
1	Flail Type Mower, 3 Pt Hitch Pto Driven		304	304
1	3 Point Tool Bar with Two 18" Ripper Shanks		2,500	2,500
1	6' Spring Tooth Harrow, 3 Point Hitch		3,500	3,500
1	6' Spike Tooth Harrow, 3 Point Hitch		2,500	2,500
1	4-Wheel Utility Trailers, Flat Bed, 6'W x 10'L, Hard Wood Bed Surface, 15" Tubeless Tires	2,500	4,586	4,586
1	Sprayer, Gas Engine, 100 Gal. Tank, Spray Boom on Rear, Hand Spray Capability	2,500	2,500	2,500
1	Sprayer, Orchard, 100 Gal. Cap Gas Engine		8,500	8,500
1	Tractor, 4-Wheel drive; 50" Lp, Front End Loader with 1 cubic yd. Bucket, Roll-Over Protection, Pto, Backhoe with 12" and 18" Buckets		57,000	57,000
2	Pickup, Diesel, 1/2 Ton, 4-Wheel Drive, Radio, 8' Standard Bed, Mud and Snow Tires, Trailer Hitch and Towing Package; Automatic Transmission, Egg Shell White Paint		17,000	34,000
2	Pickup, 1 Ton, Crewcab Seat 6, Diesel 4-Wheel Drive, Radio, 8'Flat Bed with 48" Removable Stake Racks, Mud and Snow Tires, Trailer Hitch with Towing Package, Automatic Transmission, Egg Shell White Paint		19,000	38,000

QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
1	5 Ton Truck, 5 Speed Transmission, Two Speed Aux. Transmission, Diesel, Radio, Air Conditioning, 14' Flat Bed, Hydraulic Dump Capability for Bed, 48" High Solid Racks, Removable in 8' Sections with Steel Stakes		35,000	35,000
2	500 Gallon Fuel Storage Tanks		5,000	10,000
2	Electric Fuel Transfer Pumps		1,000	2,000
10	Junction Boxes	BG-577261	27	270
5	Extension Cords 50'	BG-1762V	12	60
5	Extension Cords 25'	BG-176200	8	40
12	Lawn Spring Rake	BG-154330	12	144
12	5 Tine Fork	BG-154765	29	348
12	3 Tine Cultivator	BG-152759	7	84
2	Post Hole Digger	BG-153181	36	72
1	Sledge Hammer, 8 lbs.	BG-367046	28	28
1	Sledge Hammer, 12 lbs.	BG-160526	37	37
1	Axe, Single Blade	BG-160906	24	24
6	Bubble Soaker	BG-307398	3	18
6	Hose Twist Nozzle	BG-142000	5	30
4	Wheel Barrow, 5 2/4 Cuft	BG-225640	114	456
2	Convert, Trucks (400 lb. Cap.)	BG-301633	90	180
4	8' Wood Step Ladders	BG-140545	114	456
1	23' Wood Extension Step Ladder	BG-141062	213	213
10	Floor Brushes 24"	BG-257823	14	140
20	Floor Brushes 24"	BG-257878	21	420
20	Handle Braces	BG-140271	2	40
20	Utility Brushes 8"	BG-257984	4	80
6	Hudson Sprayer	Nasco C8609N	45	270
20	Hudson Sprayer - Bak Pak	Nasco C8524N	98	1,960
25	Hand Pruner	Nasco C9219N	16	400
12	Pruning Saw	Nasco C8470N	19	228
12	Pole Pruning Saw	Nasco C8471N	55	660
6	Heavy Duty Tree Trimmer	Nasco C8515N	67	402
24	Open Back Shovel	Nasco C8574N	16	384
24	Field Hoe	Nasco C9819N	11	264
24	Level Headrake	Nasco C8654N	15	360
12	Hedge Shears	Nasco C10733N	14	168
24	10 Tooth Rake	Nasco C8885N	10	240
12	Plastic Flagline	Nasco C9146N	1	12
12	Plastic Flagline	Nasco C9147N	1	12
1	Cyclone Seeder/Spreader	Nasco C8502N	250	250
2	Precision Seeder, with Seed Plates C11904N, CC11905N, CC11902N, C11901N, CC11903N	Nasco C8862N	60	120

QUANT.	DESCRIPTION	SUPPLIER	UNIT PRICE	TOTAL
2	Seed Plate Ste[illegible] Case	Nasco C11906N	7	14
6	Pot Lable, Bundle, 12"	Nasco C9278N	6	36
4	12 Gouge Steel Top Wall Bench with Lockers Below-Vista Green	BG-452603	759	3,036
2	12 Gauge Steel Top Wall Bech with Locking Cabinet Below	BG-453259	575	1,150
				$379,826

COMPUTER LABORATORY/CENTER (Area 12)

	Cables, Wires, Printer Paper to be selected	3,000	3,000
1	100 MB, 16 BIT Hard Disk Computer Compatible with System Acquired for Administration	15,000	15,000
30	512 RAM Micro Computers - Compatible with Dual Disk Drives	1,500	45,000
2	20' x 4' White Board (Not Chalk Board)	400	800
1	Video Projector - High Resolution	800	800
1	27" Color TV Monitor	400	400
1	1/2" VHS Format Recorder and Player	700	700
1	Daisy Wheel Printer	2,500	2,500
1	Network Connections for Micro Computers to Hard Disk	1,000	1,000
1	Power Line Filter or 1 Lay Unit to Accomodate Computer Above	1,000	1,000
1	Dot Matrix with Customize Type Styles	1,750	1,750
5	48"L x 48"D x 30"H Wood Table	250	1,250
18	96"L x 30"D x 27"H Wood Tables	200	3,600
30	Student Chairs, Wood	125	3,750
1	Professor Chair, Wood (Same as Student Above)	125	125
9	96"L x 30"D x 30"H, Wood Counter with Wood or Plastic Counter Top and Lockable Cabinets Below with 2 Adjustable Wood Shelves, Cabinets should not exceed 36" wide with Double Doors	1,100	9,900
8	48"W x 30"D x 96"H Wood Cabinets, with Wood Lockable Double Doors and 5 Adjustable Wood Shelves	1,500	12,000
		Total	$102,575

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
24	Universal Laboratory Sets	ELE 57905-1	650	15,600
1	Instructor Demonstration Padle	BG-465027	2,500	2,500
1	Counter Top, Cabinet and Hood Unit		3,000	3,000
1	Wall Cabinet and Counter Units		4,000	4,000
2	Chemical Analysis Sets	ELE 52500/1	4,000	8,000
60	Non Poisonous Insect Kill Jars	Nasco 5139387P	2	120
1	Instructor Lab. Stool		220	220
1	Student Lab. Table Units		4,500	4,500
24	Stools, Student, Adjustable	AmSci L5111-11	100	2,400
1	Wash Cabinets with Sinks		3,000	3,000
12	Microscopes	AmSci M 3000	900	10,800
4	Microscopes, Trinocular	AmSci H100TUA	2,490	9,960
24	Riker Insect Mounts	Nasco SA441P	2	48
24	Riker Insect Mounts	Nasco SA4444P	6	144
15	Chemistry Kit, Organic	AmSci C4530	311	4,665
15	Chemistry Kit, Organic	AmSci C4532	350	5,250
30	Clamp, Extension, Small, Round	AmSci C5997-1	8	240
30	Clamp, Extension Medium, Round	AmSci C5997-2	8	240
30	S/P Clamp, Nester Extension	AmSci C6008	16	480
30	Clamp, Holder	AmSci C6012-1	4	120
30	Clamp, Holder	AmSci C6012-2	7	210
30	Support, Buret, Double	AmSci C6051-1	44	1,320
15	Support, Buret, Polyethylene	AmSci C6083-25	48	720
1	Tubing Clamp 8 mm, (Case)	AmSci C6083-3	63	63
1	Tubing Clamp 12 mm, (Case)	AmSci C6083-4	84	84
8	Clamp, Test Tube, (Pkg. of 10)	AmSci C6115-1	2	16
4	Detergent, Laboratory (Case)	AmSci C6286-1	76	304
10	Disinfectant, Laboratory, Sterilizing	AmSci C6290-1	21	210
10	Wipers, Disposable, (Case)	AmSci C63951-A	78	780
1	Cleaner, Ultrasonic	AmSci C6450-55	997	997
6	Stop Watch, Electronic	AmSci C6548-1	50	300
2	Cabinet, Desiccating, Stainless Steel	AmSci D1420-1	550	1,100
30	Dissecting Kit, Intermediate	AmSci D2505	43	1,290
1	Pretreatment Kit, Glass Still	AmSci D4052-1	295	295
20	Pretreatment Kit Cartridge	AmSci D4052-2	42	840
1	Water Deionization Filter System	AmSci D3988-3	1,888	1,888
1	Tank, 100 Liter with Pump Protector for Deionization System	AmSci D3986-26	918	918
1	Still, Automatic, Electric	AmSci D4000-2A	1,650	1,650
6	Storage Bottle, Pure Water Kit	AmSci D4052-8	210	1,260
1	Furnace, Box	AmSci F8402-3	1,165	1,165
2	Gloves, Long Service, Latex	AmSci G7154-80	94	188
2	Gloves, Long Service, Latex	AmSci G7154-10	114	228
3	Gloves, Pair, High Temperature, Case	AmSci G7207-12	277	831

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
30	Gloves, Pkg., Leather Palm	AmSci G7300-121	14	420
24	Face Shields, Polyethylene	AmSci G7510-21	7	168
12	Heater, Flask	AmSci H1550-5	120	1,440
10	Tube Block, Combination Holes	AmSci H2029-BLOK	34	340
6	Hot Plate, Laboratory	AmSci H2156-1	99	594
5	Labels, Pressure Sensitive, 5/8" x 1"	AmSci L1515-1	10	50
5	Labels, Pressure Sensitive, 5/8" x 2"	AmSci L1515-2	23	115
5	Labels, Date	AmSci L1515-1-SP	3	15
2	Labler, Plastic	AmSci L1565-2	24	48
70	Tape, Label, 3/8 (10 Rolls of each of following: L-1567-3; L1567-4; L1567-5; L1568-1; L1568-4)	AmSci L1567-1; L1567-2;	2	140
10	Post-it-Tile Message Center	AmSci L1645-20	200	2,000
2	Tape, Filament, 3/4"W	AmSci L1619-3	236	472
1	Cabinet, Laminar Flow, Tissue Culture	AmSci L5341-1	6,195	6,195
4	Absorbent Paper, Roll	AmSci L5615-1	73	292
6	Liner, Shelf, Drawer, Polyethylene	AmSci L5622-12	101	606
12	Magnifiers, Lens Protected, 1" Focus	AmSci M1005-2	39	468
2	Refrigerator, Explosion Proof, 2 Door Compartment, 13 Cuft	AmSci R4035-12	995	1,990
4	First Aid Kit, Industrial	AmSci S1312-2	140	560
2	Spill Absorbent Pillows, Case	AmSci S1325-1	29	58
6	Can, Oily Waste (6 gal.)	AmSci S1342-6	39	234
1	Cabinet, Hazardous Waste, 65"H x 43"W x 18"D	AmSci 1347-22	810	810
6	Hard-Hat, Jet-Cap (Case)	AmSci S1390-2	55	330
4	Shower, Safety, Single Head, Drench	AmSci S1395-10	450	1,800
25	Test Tube Supports	AmSci S9245-1	11	275
25	Test Tube Racks	AmSci S9237-1	20	500
2	Microbiology, Nematology and Entomology, Set	ELE 53500-1	2,500	5,000
8	Plant Physiology Sets	ELE 54005	1,775	14,200
1	Water Sampler, 250 ml., 20 meter Depth	ELE EL520-200	250	250
1	Current Flow Meter, .03-7 meters/sec.	ELE EL520-260	1,000	1,000
1	Surface Irrigation Field Trial Unit, Kit	ELE EL586-220/04	3,500	3,500
1	Trickle Irrigation Field Trial Unit, Kit	ELE EL586-250/04	3,500	3,500
				$206,091

INFIRMARY (Area 13)

QUANT.	DESCRIPTION	UNIT COST	TOTAL
6	Hospital Beds, Dual Tilt	4,000	24,000
6	Hospital Bed Accessories, Oxygen, Clamps, etc.	1,000	6,000
6	Side Tables, Medical	300	1,800
6	Side Chairs	150	900
6	Curtains, Bed Privacy	200	1,200
1	Wheel Chair	750	750
3	Crutches	100	300
1	Walker	450	450
1	Dentist Chair	6,000	6,000
1	Dentist X-Ray Unit and Developer	12,000	12,000
1	Doctor's Desk 72"L x 48"W x 30"H	2,000	2,000
1	Doctor's Chair, Tilting, Leather	1,000	1,000
1	512K Micro Computer with Daisy Wheel Printer	2,800	2,800
1	512K Micro Computer with Color Monitor and Daisy Wheel Printer	2,600	2,600
1	Examine Table	2,000	2,000
1	Side Table	500	500
1	Refrigerator	1,000	1,000
1	Oven	1,000	1,000
1	White Blood Cell Computer	6,000	6,000
1	Anesthesia Machine	10,000	10,000
1	Oxygen Unit	8,500	8,500
1	Nurse's Desk, 60"L x 36"W x 30"H	1,500	1,500
1	Nurse's Chair	500	500
1	Sec. Desk, 60"L x 36"W x 30"H	900	900
			93,700

LIBRARY (Area 14)

1	Secretary Chair	150	150
20	Library Tables, 96"L x 48"W x 30"H	500	10,000
60	Reader Stations, 30"L x 30"W x 30"H, with 24" Privacy Side Walls around 3 Sides of Top	500	30,000
600	Feet, Linear, Library Stack Shelving, 96"H x 12"W, Steel or Wood	10	6,000
200	Feet, Linear, Library Stack Shelving, 96"H x 18"W, Steel or Wood	10	2,000
2	Map Storage Case	1,500	3,000
2	Micro Fiche Reader with Printer	2,000	4,000
1	Micro Fiche Camera	3,000	3,000
6	Data Display Terminals	800	4,800

QUANT.	DESCRIPTION	UNIT COST	TOTAL
1	Librarian Desk, 60"L x 36"W x 30"H	1,500	1,500
1	Chair, Librarian	500	500
1	Desk, Secretary, 60"L x 36"W x 30"H	900	900
1	Chair, Secretary	150	150
8	Cabinets, Wood, 96"H x 48"W x 24"D Lockable, with 5 adj. Shelves Each for Library and Infirmary	1,000	8,000
16	Closed Shelving, Steel/Wood, 96"H x 48"W x 16"D	800	12,800
1	Library Book Security Control System	4,000	4,000
1	Copy Machine, Coin Operated	3,000	3,000
3	Filstri Cassette Players	550	1,650
	Slides and Transparancies Equipment		6,350
	Moving Projectors and Video Playback and Reception Equipment		11,100
	Auditory Equipment		2,950
	Carrels		7,900
	Computer		5,700
	Miscellaneous		4,000
			$133,450

SCIENCE LABORATORY AND PREPARATION ROOM (Area 15)

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
12	Cabinets, Closed, 96"H x 24"D x 48"W		1,200	14,400
10	Shelving, Wood/Metal, 96"H x 18"D x 48"W		695	6,950
6	Bench, Non Corrosive Top, 5'W x 8" x 36"H, Cabinets Below, Lockable		2,500	15,000
6	Bench, Non Corrosive Top, 2 Sinks 30"W x 36"H x 96"L		2,000	12,000
4	Cabinets, Wall, 48"H x 72"W x 18"D, Glass Door with 3 Adjustable Shelves, Lockable		1,500	6,000
1	Desk, 60"L x 36"W x 30"H		900	900
1	Chair, Swivel		300	300
1	File Cabinet, 5 Drawer		458	450
1	Scale, Balance, 0-30 and 0-600 g.	AmSci B1422-10	1,995	1,995
1	Environmental Chamber	Nasco Z 8500-P	1,613	1,613
1	Incubator, American S/P	AmSci 51425-40	1,421	1,421
12	Alcohol Lamps	Nasco 74-102P	4	48
12	Timer, 0-120 Min.	Nasco C5940-P	40	480
4	Stereo/200M Microscope	AmSci 561B1	903	3,612
2	Incubator	AmSci J1612	290	580

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
	DINING ROOM (Area 16)			
50	Dining Tables, 96"L x 30"W x 30"H, Plastic Top		150	7,500
450	Dining Room Chairs, Wood/Metal		75	33,750
10	Staff Dining Tables, 4' Round x 30"H, Plastic Top		25	250
4	Institutional Gas Oven		5,000	20,000
1	Icemaker, 5 Ton		2,500	2,500
2	Institutional Food Mixers		2,500	5,000
2	Microwave 2 ft^3		800	1,600
1	Institutional Dish Washer		4,500	4,500
4	Institutional Cooking Vats		2,500	10,000
2	Cooking Ranges, 4 Burners, gas/elec.		1,500	3,000
1	Cooking Grill 24"W x 96"L		1,000	1,000
1	Walk-in Food Freezer		20,000	20,000
1	Walk-in Food Refrigerator		15,000	15,000
2	Garbage Disposals		500	1,000
6	Garbage Cans		20	120
2	100 Cup Coffee Maker		50	100
1	500 Cup Coffee Maker		300	300
1	Pastry Refrigerator/Display Case		1,500	1,500
4	Steel Cabinets, 96"H x 48"W x 30"D		300	1,200
8	Shelving, Steel, Closed, 96"H x 48"W x 18"D		125	1,000
1	Desk, 60"L x 36"W x 30"H		1,500	1,500
1	Chair, Swivel		300	300
1	512K Micro Computer with Daisy Wheel Printer		2,800	2,800
2	Data Terminals		800	1,600
600	Dining Trays		300	1,800
600	Dishes, Complete Set, Cup, Saucers, Salad, Plate, Soup Bowl, Glasses		25	15,000
Asst.	Pots, Pans, Cooking Utensils		10,000	10,000
				$162,320
	COLLEGE STORE (Area 17)			
1	Cash Register, Computerized		3,000	3,000
1	Upright Freezer, Display 96"H x 48"W		7,000	7,000
2	Upright Refrigerator, Display, 96" x 48"W		6,000	12,000

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
1	Produce Display Bench, 8' Long		6,000	6,000
1	Ice Cream Chest Freezer, 48"W x 60"L x 30"H		6,000	6,000
20	Display/Sale/Merchandising Shelving, 60"H x 4 shelves x 10', Plastic Surface		2,000	40,000
1	Desk, 60"L x 36"W x 30"H		1,000	1,000
1	Chair, Swivel		500	500
1	Sales Counter, 36"H x 30"W x 60"L		2,000	2,000
1	Sales Scale, 30" Cap.		1,500	1,500
				79,000

STUDENT RESIDENCES (Area 18, 19, 20, 21)

100	Student Beds and Matresses		500	50,000
100	Student Desks, 48"L x 30"W x 30"H		500	50,000
100	Side Chairs		150	15,000
100	Student Book Cases, 48" x 12" x 72" 400 with 5 Adjustable Shelves		400	40,000
100	Tables, Wood, 24"L x 18"W x 30"H		75	7,500
4	Heavy Duty Divans for Rec. Room, 8' 1,000		4,000	4,000
6	Easy Chairs for Rec. Room		400	2,400
5	27" Color TV		1,000	5,000
10	Heavy Duty Clothes Washers		700	7,000
10	Heavy Duty Clothes Dryers		600	6,000
				$186,900

FIRE AND SECURITY (Area 22)

1	Firetruck, 4-wheel drive, diesel, 15,000 gallon cap.		45,000	45,000
3	Desks, 60"L x 36"W x 30"H		900	2,700
2	Chairs, padded, fabric, swivel		300	600
1	Secretary Chair		150	150
3	Side chairs, padded		150	450
2	File cabinets, lockable, 5-drawer		450	900
2	4' x 4' Bulletin Board		70	140
1	512K Micro Computer and Daisy Wheel Printer		2,800	5,600
1	Land Rover type vehicle for Fire Chief		22,000	22,000
2	Beds, single, wood/metal		500	1,000
2	Side chairs, padded		150	300

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
2	Student Desks, 48"L x 30"W x 30"H, pedestal		500	1,000
2	Bookcases, 48" x 12" x 72" with 5 adjustable shelves, green		400	800
4	Tables, wood, 24"L x 18"W x 30"H		75	300
2	Land Rover type vehicles for security officers		22,000	44,000
5	48" x 96" wood storage cabinets with 5 adjustable shelves, lockable		1,000	5,000
				$129,940

ADMINISTRATION AND FACULTY (Area 23)

6	Multi-user data terminal; Controller; Business Manager; Library; Registrar; Director of Business Affairs; Director of College		600	3,600
1	Video tex and office information system with multiplexer, software and manuals		15,000	15,000
12	Data display terminals		800	9,600
2	Daisy wheel printers; 150 lines per minute capacity		4,000	8,000
8	Typewriter, IBM Selectric or equal		5,000	40,000
8	Typewriter stands, metal		125	1,000
24	Cabinets, wood/metal, clothes and storage, 48"W x 24"D x 72"H		450	10,800
1	4-wheel drive, sedan/station wagon - transport 8, also double as ambulance, diesel		16,000	16,000
2	Folding table cart, 96" table	BG-469039	195	390
20	Folding tables, 96 x 30 hardboard top	BG-468980	111	2,220
200	Folding chairs, steel	BG-469295	18	3,600
4	Kaddy for folding chairs	BG-224603	181	724
1	Trophy Case, 60"W x 7"D x 48"H	BG-229780	923	923
1	Sprint master duplicator		750	750
1	Transparency maker		400	400
8	4' x 4' bulletin boards	BG-229293	70	560
8	Green surfaced chalkboards, 36"L x 15' - Mount 2 in each room		150	1,200
2	Front/rear projection 35mm slide projector, sound, slide		450	900
2	16 mm movie projector		600	1,200
3	Presentation easel with extra paper	9-424-P and 9-425-P	101	303

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
1	Desk top photo copier		2,000	2,000
1	Computer, 16/32 bit; 15MB hard disk with 1.25 MB 8 " floppy disk; and 4 external hard disks for total storage of 1.4 MB. System should be similar to purchased for computer laboratory.		10,000	10,000
1	Portable voice amplifier	Nasco C9686P	248	248
1	Head liner kit	BG-154955	364	364
5	Kalograph tape 5/8"	BG-154999	12	60
2	Kalograph tubes	BG-155004	7	14
1	Head liner case	BG-326914	53	53
1	Photo disc case	BG-154966	47	47
1	Photo disc case	BG-154977	47	47
1	Photo disc case	BG-169056	47	47
1	Photo disc case	BG-169067	47	47
1	Photo disc case	BG-169045	47	47
1	Photo disc case	BG-169078	47	47
1	Photo disc case	BG-169089	47	47
1	Strong arm stapler	BG-360321	54	54
5	1/2" staples	BG-409392	10	50
30	Advanced drawing kits	BG-328730	30	900
1	Oxygen Kit	AMSci S1370-2	143	143
10	17 lb. multiple use dry chemical fire extinguishers	AmSci S1365-10	69	690
10	5 lb. CO_2 fire extinguishers	AmSci S1365-1	102	1,020
4	5 gal. safety gas cans with funnel	BG-333638 and BG-333649	64	256
10	First aid kits	BG-261962	87	870
4	4-wheel carts for projector units	Nasco SA4809P	125	500
4	Rear projection unit, portable		500	2,000
10	Cieling mount projection 8' x 6'	BG-418553	125	1,250
10	Overhead projectors		250	2,500
9*	40 Desks, 60"L x 36"W x 30"H		900	36,000
9*	40 Swivel chairs, padded fabric covered		300	12,000
9*	40 5-drawer file cabinet, lockable		450	18,000
9*	40 Side chairs, padded		150	6,000
18*	40 Table, wood, 24"L x 18"W x 30"H		75	3,000
9*	40 4' x 4' bulletin boards		70	2,800
9*	40 4' x 4' chalkless white boards		125	5,000
9*	40 18" x 18" bulletin board -		50	2,000
9*	40 512K micro computer and dot matrix printer with with color monitor		2,200	88,000
2	Rector and Provost desk, wood, 48" x 96"		3,000	6,000

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
2	Rector and Provost chair, leather, swivel		1,000	2,000
2	Divan, corner unit, leather		1,500	3,000
6	Side chairs, in leather		750	4,500
2	30" round wood coffee table		250	500
4	Book cases, wood, 48"W x 72"T x 18"D		500	2,000
1	Conference table, wood, 22' x 6'		6,588	6,588
16	Conference chairs, with arms		800	12,800
1	Chalkless white board 40" x 8'		300	300
7	Secretary desks		900	6,300
7	Secretary chairs		150	1,050
7	File cabinets, lockable		450	3,150
5	File cabinets, fire proof		1,500	7,500
1	Safe, fire proof		10,000	10,000
1	Divan, sectional, 30' with 2 end sections - Reception area		3,500	3,500
3	Desks, wood, 84"L x 40"W x 30"H		2,500	7,500
3	Chairs, leather, Asst. Director		1,000	3,000
3	Divans, 60", Asst. Director		800	2,400
3	Coffee tables, 24" x 48"		200	600
3	Side chairs		200	600
3	Book cases, wood, 48"W x 72"H x 18"D 500		1,500	4,500
3	File cabinets, lockable, fireproof		1,500	4,500
12	Storage cabinets, wood, 48" x 96" x 24" with 5 adj. shelves each, lockable		1,000	12,000
10	Side chairs, padded		150	1,500
2	36" x 96" outdoor tables, patio, wood		600	1,200
2	48" round patio tables, glass top		800	1,600
24	Patio chairs		300	7,200
2	Wood cabinets - mail sorting		1,500	3,000
6	60" wood/metal tables		800	4,800
1	Counter, 48"H x 24"W x 16'L, plastic top		5,000	5,000
1	Centrex phone system		10,000	10,000
1	Dish, satellite, TV		7,000	7,000
3	Video recorder/playback, 1/2" UHS format with camera		2,000	6,000
4	Monitor, 27", color TV		800	3,200
				$468,059

CAMPUS BUILDINGS AND GROUND MAINTENANCE (Area 24)

24	Shelving, steel closed, 96"H x 48"L x 12"W, with 6 adj. shelves per section		225	5,400

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
12	Shelving, steel, open, 96"H x 48"L x 30"D , with 6 adj. shelves per section		125	1,500
10	Tables, wood/metal, 96"L x 36"W x 30"H		250	2,500
8	Desks, 60"L x 36"W x 30"H		900	7,200
7	Chairs, padded, swivel		300	2,100
8	File cabinets, 5-drawer, lockable		450	3,600
1	512K micro computer and daisy wheel printer		2,800	2,800
4	Side chairs, padded		150	600
8	Tables, wood, 24"L x 18"W x 30"H		75	600
1	Radial arm saw, 12" auto brake 230V single phase	BG-110323	1,219	1,219
2	Work tables without lockers		1,000	2,000
1	Portable power jointer		125	125
1	Portable skill saw 7 1/4 blade		125	125
1	3/4" portable drill		114	114
1	Finishing sander		135	135
1	Wood bit set	BG-100371	80	80
1	Brace and Bit 12"	BG-231181	42	42
1	Soldering bar kit	BG-126191	44	44
1	Plane set	BG-195595	218	218
1	Hand saw set	BG-291410	160	160
2	Curved claw, hammer	BG-227690	14	28
2	Ripping claw, hammer	BG-227729	15	30
1	Carpenters level	BG-215687	22	22
1	Farming square	BG-227042	24	24
1	Tri square	BG-472946	11	11
2	Tape rules	BG-226503	7	14
1	100' tape rule	BG-579519	37	37
2	Lawn mower, 20", rotary, 3.5HP		450	900
1	Power edger		350	350
1	Electronic maintenance tools, audio visual and computer, set		4,000	4,000
2	Pick up, 4-wheel drive, diesel, 8' bed, canopy top		20,000	40,000
				$ 75,978

CROPS FIELD UNIT (Area 25)

1	Desk, 60"L x 36"W x 30"H	900	900
1	Chair, seivel	300	300
1	Side Chair	150	150
2	Beds, student	500	1,000
2	Side chairs	150	300
2	Student desks	500	1,000

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
3	Book cases		400	1,200
4	Tables, wood, 24"L x 18"W x 30"H		75	300
	Crop processing equipment		75,000	75,000
1	Walk-in cooler, 15'W x 37'L x 8'H		25,000	25,000
13	Shelving, steel open, 96"H x 48"W x 30"D		250	250
1	File cabinet, 5-drawer, lockable		450	450
3	4' x 4' bulletin board		70	210
3	4' x 4' chalk board		125	375
				$106,435

FOOD/NUTRITION/MEATS (Area 26)

2	Projection screen, 8' x 6'	BG-418553	125	250
6	4' x 4' bulletin board		70	420
2	Demonstration tables, glass, mirror 4,500 above, plastic top, stainless steel sinks		9,000	9,000
2	Cabinet, 96"L x 36"H x 36"D, with stainless sink		2,000	4,000
	Foods/nutrition lab. equipment		125,000	125,000
	Meats lab. equipment		50,000	50,000
1	Cooler, walk-in, 8' x 8' x 18'		18,000	18,000
1	Freezer, walk-in, 8' x 8' x 15'		15,000	15,000
1	Meat smoker		10,000	10,000
				$231,390

ABBITOIR (Area 27)

	Red meat processing		25,000	25,000
	Poultry processing		45,000	45,000
				$ 70,000

SWINE PRODUCTION UNIT (Area 28)

2	Student beds		500	1,000
2	Student desks		500	1,000
2	Student chairs		150	300
2	Book cases		400	800
1	Desk, 60"L x 36"W x 30"H		900	900
1	Chair, swivel		300	300

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QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
1	Side chair		150	150
4	Tables, wood, 24"L x 18"W x 30"H		75	300
3	4' x 4' bulletin boards		70	210
3	4' x 4' chalk boards		125	375
1	5-drawer file cabinet, lockable		450	450
1	Pig scale		2,900	2,900
4	Grow feeder, 8'		600	2,400
4	Weaning feeders, 8'		600	2,400
2	Farrowing crates		1,500	3,000
12	Sow/boar feeders		300	3,600
7	Shelving, steel, closed with metal doors, lockable, 96"H x 48"W x 18"D		800	5,600
				$ 25,685

POULTRY PRODUCTION UNIT (Area 29)

1	Desk, 60"L x 36"W x 30"H		900	900
1	Chair, swivel		300	300
1	Side Chair		150	150
2	Beds, student		500	1,000
2	Chairs, student		150	300
2	Student desks		500	1,000
3	Book cases		400	1,200
4	Tables, wood, 24"L x 18"W x 30"H		75	300
	Egg processing equipment		25,000	25,000
1	Reach in wall cooler, 72" x 30' x 40"D		15,000	15,000
15	Shelving, open, steel, 96"H x 48"W x 24"D		250	3,750
40	Baby chick feeders		25	1,000
40	Grow feeders		35	1,400
40	Finish feeders		50	2,000
12	Hen feeders with legs, 8'		100	1,200
25	Poultry water cups, automatic		25	625
20	Baby chick waters		15	300
30	10"W x 24"L x 3"D galenized pans step in disinfectant		14	420
				$ 55,845

BEEF PRODUCTION AREA (Area 30)

1	Desk, 60"L x 36"W x 30"H		900	900
1	Chair, swivel		300	300
1	Side chair		150	150
2	Beds, student		500	1,000
2	Side chairs		150	300
2	Student desks		500	1,000

QUANT.	DESCRIPTION	SUPPLIER	UNIT COST	TOTAL
4	Tables, 24"L x 18"W x 30"H		75	300
3	Bood cases		400	1,200
1	Cattle squeeze		1,500	1,500
1	Cattle scale, single animal		6,000	6,000
1	1/2 ton pick up truck, flat bed diesel, 4-wheel drive		20,000	20,000
4	Feed carts		500	2,000
1	Platform scale, 500 lb. capacity		1,500	1,500
				$36,150

FORESTRY FIELD UNIT (Area 31)

1	Desk, 60"L x 36"W x 30"H		900	900
1	Chair, swivel		300	300
1	Side chair		150	150
2	Beds, student		500	1,000
2	Desks, student		500	1,000
2	Chairs, student		150	300
4	Tables, 24"W x 18"L x 30"H		75	300
3	Book cases		400	1,200
12	Shelving, closed, steel, 90"H x 46"W x 24"D		250	3,000
1	Pickup, 4-wheel drive, flat bed, 1/2 ton, diesel		20,000	20,000
1	Forest product processing equipment		47,000	47,000
				$75,150

TEXT AND REFERENCE BOOK SUMMARY - YEAR 1 - 4

1. See attached for detail.
2. Assumes college provides all necessary books for 75 students.
3. Recommend that College bookstore be opened by start of Semester 3 to stock personal need items as well as supplementary books and supplies.

YEAR	REQUIRED TEXT	REFERENCE BOOKS	TOTAL $
1	$ 26,625	$ 8,850	$ 35,475
2	35,198	16,475	51,673
3	35,651	17,500	53,151
4	35,443	10,650	46,093
Total Class*	$132,917	$53,475	$186,392
Cost/Student	$ 1,772	$ 713	$ 2,485

* Estimates based on 75 students.
* Adjustments to be made as class sizes increase.
* Reference Books = Library; may be single or multiple copies of a title. Recommend selection by subject matter specialists.

TEXT AND REFERENCE BOOKS — YEAR 1

FIRST NEED			QUANTITY		PRICE	VALUE		
Year	Sem.	SUBJECT	Text	Ref.		Text	Ref.	Total
1	1	Vegetable Crops	75	30	20	1,500	600	2,100
1	1	Vegetable Laboratory	75		15	1,125		1,125
1	1	Ag. Mechanics	75	10	25	1,875	250	2,125
1	1	English	75	75	20	1,500	1,500	3,000
1	1	Ag. Mathematics	75		20	1,500		1,500
1	1	Library/Computer	75	10	15	1,125	150	1,275
1	1	Ag. Project	150		5	750		750
1	2	Soils	75	10	25	1,875	250	2,125
1	2	Ag. Equipment	75	10	25	1,875	250	2,125
1	2	English	75	75	20	1,500	1,500	3,000
1	2	Algebra	75		20	1,500		1,500
1	2	Biology	75	30	25	1,875	750	2,625
1	3	Nut Tree	75	15	25	1,875	375	2,250
1	3	Water and Drainage	75	15	25	1,875	375	2,250
1	3	English	75	75	20	1,500	1,500	3,000
1	3	Geometry	75		20	1,500		1,500
1	3	Botany	75	30	25	1,875	750	2,625
		Periodical Subscription		30	20		600	600
		Total				$26,625	$8,850	$35,475

TEXT AND REFERENCE BOOKS — YEAR 2

FIRST NEED			QUANTITY		PRICE	VALUE		
Year	Sem.	SUBJECT	Text	Ref.		Text	Ref.	Total
10% replacement of first year texts						3,548		3,548
2	1	Agricultural Projects	150		3.5	525		525
2	1	Plant Propagation	75	30	25	1,875	750	2,625
2	1	Surveying	75	10	25	1,875	250	2,125
2	1	English	75	75	20	1,500	1,500	3,000
2	1	Chemistry	75	20	40	3,000	800	3,800
2	1	Political Science	75	75	20	1,500	1,500	3,000
2	2	Soil Fertility	75	30	25	1,875	750	2,625
2	2	Farm Buildings	75	15	25	1,875	375	2,250
2	2	English	75	75	20	1,500	1,500	3,000
2	2	Organic Chemistry	75	20	50	3,750	1,000	4,750
2	2	History	75	75	20	1,500	1,500	3,000
3	3	Fruit Tree	75	30	25	1,875	750	2,625
3	3	Irrigation	75	30	25	1,875	750	2,625
3	3	English	75	75	20	1,500	1,500	3,000
3	3	Bio Chemistry	75	30	50	3,750	1,500	5,250
3	3	Elective	75	50	25	1,875	1,250	3,125
		Periodical Subscription	40		20		800	800
		Total				$35,198	16,475	51,673

TEXT AND REFERENCE BOOKS — YEAR 3

FIRST NEED Year	Sem.	SUBJECT	QUANTITY Text	Ref.	PRICE	VALUE Text	Ref.	Total
10% replacement first year texts						3,548		3,548
10% replacement second year texts						5,168		5,168
3	1	Agricultural Projects	150		5	750		750
3	1	Citrus Production	75	30	25	1,875	750	2,625
3	1	Farm Record	75	15	25	1,875	3,75	2,250
3	1	English	75	75	20	1,500	1,500	3,000
3	1	Genetics	75	50	30	2,250	1,500	3,750
3	1	Entomology	75	50	30	2,250	1,500	3,750
3	2	Ag. Computers	75	50	30	2,250	1,500	3,750
3	2	Farm Management	75	30	25	1,875	750	2,625
3	2	English	75	75	20	1,500	1,500	3,000
3	2	Plant Pest Control	75	50	30	2,250	1,500	3,750
3	2	Plant Physiology	75	50	30	2,250	1,500	3,750
3	2	Foods/Nutrition	75	75	30	2,250	2,250	4,500
3	3	Internship	62		5	310		310
3	3	Electives	150	75	25	3,720	1,875	5,625
		Periodical Subscriptions		50	20		1,000	1,000
		Total				$35,651	17,500	53,151

TEXT AND REFERENCE BOOKS — YEAR 4

FIRST NEED Year	Sem.	SUBJECT	QUANTITY Text	Ref.	PRICE	VALUE Text	Ref.	Total
10% replacement first year texts						3,548		3,548
10% replacement second year texts						5,168		5,168
10% replacement third year texts						5,315		5,315
4	1	Agricultural Projects	150		5	750		750
4	1	Cocoa and Palm Prod.	75	30	25	1,875	750	2,625
4	1	Agricultural Marketing	75	30	25	1,875	750	2,625
4	1	Accounting	75	25	25	1,875	625	2,500
4	1	Internship	41		7	287		287
4	2	Post Harvest Processing	75	30	30	2,250	900	3,150
4	2	Agric. Communications	75	30	25	1,875	750	2,625
4	2	Forestry	75	30	30	2,250	900	3,150
4	2	Food Preservation	75	75	25	1,875	1,875	3,750
4	3	Senior Project	75		5	375		375
4	2	Agric Finance	75	30	25	1,875	750	2,625
4	3	Forest Management	75	30	30	2,250	900	3,150
4	3	Elective	150		25	3,750		3,750
		Periodical Subscription		25	28		700	700
		Total				$37,193	8,900	46,093

CURRICULUM AND STUDENT SELECTION

CURRICULUM

The initiation of a curriculum which achieves the objectives of "learn by doing" involves the implementation of unique educational theory and practice. It is not the intent to detail here those special concepts, rather what follows are recommendations, which if followed and supported by subsequent administrative decisions and implemented by pragmatic faculty and staff, will yield a "learn by doing" curricular pattern and achievement of the purpose of the new college: "To produce a professional human resource base with practical and educational experience needed to address the agricultural production problems of the lowland tropics".

Recommendations:

1. The college will begin with a first year enrollment of 75 students. A process will be developed which will admit the best qualified students in keeping with the special mission of the college.

2. The faculty ratio of 10 students per teacher should provide for instruction in the breadth of the curriculum as well as the level of sophistication expected of a high quality baccularеate degree granting college. For effective instruction, class size will not exceed 30 students. It is planned to have a minimum of 15 and a maximum of 30 students/class depending on the nature of the instruction to be provided.

3. In concert with the Task Force recommendations, the initial curriculum will be directed toward producing a General Agriculture graduate. It is planned to have a rather rigid curricular pattern for the freshman and sophmore years with some electives available at the junior and senior years. Additional academic majors will be developed as the college matures and as student demand and graduate employment opportunities become better known.

4. Each student will enroll for at least 14 units of formal coursework plus 3 units of supervised work experience involving a planned student occupational experience program. Additionally, each student will assist in the operation of the college including the farm by supplying his/her personal labor in the amount of 20-25 hours or more per month.

5. The Task Force recommendation for the college year is to run from mid-January to mid-December organized in three semesters of 15 weeks including time for examinations appears functional for the initiation of the new college. Additionally, a 5 1/2 day week has been planned. In order to fulfill the assignment of providing an annual budget for equipment, it was necessary to make some initial assignment of the teaching calendar. It is vital that instruction be provided in harmony with the natural growing or production cycles indigenous to the local. To attempt otherwise is to invite failure as well as surely destroy opportunities for extending the instruction of the college into the nearby community.

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/Computer....2
Senior Proj.....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.

CLASS TITLE BY SEMETER

Year 1

1		2		3	
Title	Units	Title	Units	Title	Units
Veg. Crops	4	Soils	4	Nat. Trees	4
Ag. Mech.	2	Ag. Equip.	2	Water/Drainage	2
English	3	English	3	English	3
Ag. Math.	3	Algebra	3	Geometry	3
Lib/Computer	2	Biology	4	Botany	4
Ag. Proj.	2	Ag. Proj.	2	Ag.Proj.	2
Work Exp.	1	Work Exp.	1	Work. Exp.	1
Total	17	Total	19	Total	19

Year 2

4		5		6	
Title	Units	Title	Units	Title	Units
Plant Prop.	4	Soil Fert.	4	Fruit Tree	4
Surveying	2	Farm Bldg.	2	Irrigation	3
English	3	English	3	English	3
Chemistry	4	Org. Chemistry	4	Bio. Chemistry	3
Pol. Sience	3	History	3	Accounting	3
Ag. Project	2	Ag. Project	2	Ag. Project	2
Work Exp.	1	Work Exp.	1	Work Exp.	1
Total	19		19		19

Year 3

7		8		9	
Title	Units	Title	Units	Title	Units
Citrus	4	Ag. Computers	3	Internship	15
Farm Record	3	Farm Mgt.	3	Seminar	3
English	3	English	3		
Genetics	3	Plant Pest	3	Electives to be	
Entomology	4	Food Nutrition	3	available for students	
		Plant Phys.	3	not on internship.	
Ag. Proj.	2	Ag. Proj.	2	Ag. Project	2
Work Exp.	1	Work Exp.	1	Work Exp.	1
Total	20	Total	21	Total	21

Year 4

10		11		12	
Title	Units	Title	Units	Title	Units
Cacao/Palm	4	Post Harvest	4	Senior Project	2
Food Preserv.	3	Ag. Communic.	3	Ag. Finance	3
Accounting	3	Forestry	3	Forest Mgt.	4
Internship for 12 students		Elective	3	Elective	3
		Elective	3	Elective	5
Elective	3	Ag. Project	2	Ag. Proj.	2
Work Proj.	3	Work Exp.	1	Work Exp.	1
Total	19	Total	19	Total	20

Electives to be available year 3

Poultry	3	Meat Production	3	Beef Production	3
Feeds/Feeding	3	Swine Production	3	Teaching/Extension Method.	3

CLASS SCHEDULE SEMESTER 1

Hour	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
06:00	Breakfast	Breakfast	Breakfast	Break.	Breakfast	Breakfast
07:00	Math. A1 English C2	Math. B1 English A2	Math. A1 English C2	Math. B1 Eng. A2	Math. A1 English C2	Math. B1 English A2
08:00	Math. C1 English B2	Ag. Mech C2 Comp. A6 Veg. B1	Math. C1 English B2	Comp. C6 Lib. A7 Veg. B1	Math. C1 English B2	Library C7 Ag. Mech. A2 Veg. B1
09:00	Veg. A1 Lib. B7	Veg. B1 Comp. A6	Veg. A1 Comp. B6	Comp A1 Lib. A7	Veg. A1 Ag. Mech. B2	
10:00	Veg. C1 Lib. B7	Veg. C3 Ag Mech. C4	Comp. B6 Veg. C1	College hour	Veg. C1	Ag. Mech. C4
11:00		Veg. C3 Ag Mech. B4		Veg. A3	Ag. Mech. A4	Ag. Mech. C4
12:00	Work ABC	Veg. C3 Ag Mech. B4 Work A	Veg. B3	Veg. A3 Work BC	Ag. Mech. A4	Ag. Mech. C4
13:00	Work ABC	Work A	Veg. B3	Work BC Veg. A3	Ag. Mech. A4	
14:00	Work ABC	Work A	Veg. B3	Work BC	Ag. Mech. A4	
15:00						
16:00	Intramurals	Free	Intramurals	Free	Intramurals	
18:00	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner

NOTE: A-B-C = Groups of 25 students.
1-2...7...8 = Facility/Room/Area.

CLASS SCHEDULE - SEMESTER 2

Hour	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
06:00	Breakfast		Breakfast		Breakfast		Break.		Breakfast		Breakfast	
7:00	Alg. English	C1 B2	Alg. English	B1 C2	Alg. English	C1 B2	Alg. Eng.	B1 C2	Alg. English	C1 B2	Alg. English	B1 C2
08:00	AE	C1	AE	A1	Biology	B1	Bio.	A1	Biology	B1	Biology	A1
09:00	Alg. Soil	A1 C2	English AE	A2 B1	Alg. Soil	A1 C2	Eng. Bio.	A2 C1	Algebra Soil	A1 C2	English Biology	A2 C1
10:00	Biology Soil	A8 C3	Biology Soils AE	B8 A3 C4	Soil	B3	College hour		Biology	C8	AE	B4
11:00	Soil Biology	C3 A8	Biology Soil AE	B8 A3 C4	Soil	B3			Biology Re	C8 A4	AE	B4
12:00	Soil Work Biology	C3 B A8	Biology Soil AE	B8 A3 C5	Soil Work	B3 AC	Work ABC		Biology AE	C8 A4		
13:00	Work	B			Work	AC	Work ABC					
14:00	Work	B			Work	AC	Work ABC					
15:00	Work	B			Work	AC	Work ABC					
16:00	Intramural		Free		Intramural		Free		Intramural			
18:00	Dinner		Dinner		Dinner		Dinner		Dinner		Dinner	

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CLASS SCHEDULE - SEMESTER 3

Hour	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
06:00	Breakfast		Breakfast		Breakfast		Break.		Breakfast		Breakfast	
07:00	Math	A1	Math	B1	Math	A1	Math	B1	Math	A1	Math	B1
08:00	English Botany N. Tree	C2 A1 C2	English Water N. Tree	A2 A1 A2	English Botany N. Tree	C2 A1 C2	Eng Bot. N T.	A2 B1 A2	English Water N. Tree	C2 A1 C2	English Botany N. Tree	A2 B1 A2
09:00	Math English	C1 B2	Water N. Tree	C1 B2	Math English	C1 B2	Bot N. T.	C1 B2	Math. English	C1 B2	Botany N. Tree	C1 B2
10:00	Botany N. Tree	B8 C3	Botany Water	A8 C4	N. Tree	B3	College hour		Botany Water	C8 B4	N. Tree	A3
11:00	Botany N. Tree	B8 C3	Botany Water	A8 C4	N. Tree	B3	Water	A4	Botany Water	C8 B4	N. Tree	A3
12:00	Bot. N. Tree Work	B8 C3 A	Botany Water Work	A8 C4 B	N. Tree Work	B3 AC	Water Work	A4 BC	Botany Water	C8 B4	N. Tree	A3
13:00	Work	A	Work	B	Work	AC	Water Work	A4 BC				
14:00	Work	A	Work	B	Work	AC	Work	BC				
15:00	Work	A	Work	B	Work	AC	Work	BC				
16:00	Intramural		Free		Intramural		Free		Intramural			
18:00	Dinner		Dinner		Dinner		Dinner		Dinner		Dinner	

Curriculum Development

1. General Objectives and Guidelines

Certain objectives and guidelines that stem from the main educational principles of the College 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 College combines: 1) high levels of excellence in teaching and learning; 2) the build-up of responsible professional leadership and self-reliance among its graduates; 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 vice versa.

b. Beneficiaries

The products of the College (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 College 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 College 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 outside the College.

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 routine work for the College 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 College 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 and 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 College will be the task of a specialized team comprising agronomists of different branches, as well as educators, both from the College and from experienced institutions, led by the Dean of Academic and Student 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 College, 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 after 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 weeds, 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 was presented earlier in this section. The following considerations guided the preparation of the model:

1) Traditional course sequence is maintained only when essential for the learning process (as in chained basic sciences). In other instances it is better to take an applied course before taking a 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 throughout; 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 College 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 trimester 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 internship outside the College 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 College will be decided by the Curriculum Design Team. The following organization is suggested:

a. Timing of the academic year: start in mid 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 suggested, e.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
	Other credit-earning activities		
m.	Field Practice	11	11
n.	Instructorship	1	3
o.	In-farm intership	1	1

Student Selection

No shortage of applicants for the College will exist and every effort will be made to attract and select the best on the basis of fair, objective, efficient, and uniform criteria and procedures. Everything else being equal, priority will be given to rural youth.

1. Numbers and Priorities

The College will admit about 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. Developing countries 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 prove 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 too young or too old 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.

FACULTY STAFFING PATTERN

Full term faculty (FTEF) 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 co-curricular activities, student academic and personal advisement, and other duties as assigned. The small number of initial students (75) and the necessity to provide a broad base college level curriculum, results in an early year wtu/FTEF of about 10. Faculty will be assigned these other 2 wtu (16% of the time) for tasks related to the establishment of the new college. Professors who provide leadership for the production units on the farm will receive special time assignment. Faculty will be responsible to the college for at least 40 hours per week. Additional personnel policies will need to be developed as the administration and faculty assume their positions at the college.

The first year faculty will be selected in concert with the Task Force recommendations with particular emphasis on the prior agricultural experience of each person. Whenever possible, the Masters Degree should be expected. Initially, individuals with the PhD will not be pursued at length, unless they have had the expected practical experience and applied orientation.

Staffing Formulas

1) Weighted Teaching Unit (wtu) = Number of Meetings per Weeks per Factor

Instructional Mode	Factor
Lecture	1.00
Seminar/Activity	1.25
Laboratory	1.50
Supervisor:	
Sr. Project/Intern	.33/student
Ag. Project	.33/student
Work Experience	.1/student

2) Student Contact Hours (scu) = Number of Students x Number of Hours

3) Student Contact Hours per Full Term Faculty (scu/FTEF) = A pre set ratio by discipline with consideration to intensity of instruction and necessary class preparation time for faculty and student.

4) Number of Faculty Generated = scu per scu/FTEF

Staffing Patterns:

CLASS	wtu	scu	scu/FTEF	No. FACULTY
Year 1				
Semester No. 1				
Vegetables	13.5	300	150	2.00
Ag. Mech.	7.5	150	150	1.00
English	9.0	225	300	.75
Math.	9.0	225	300	.75
Lib./Comp.	7.5	150	300	.50
Ag. Proj.	22.5	150	150	1.00
Work Exp.	7.5	75	150	.50
Total				6.50
Semester No. 2				
Soils	13.5	300	150	2.00
Ag. Equip.	7.5	150	150	1.00
English	9.0	225	300	.75
Algebra	9.0	225	300	.75
Biology	10.5	225	150	1.50
Ag. Proj.	22.5	150	150	1.00
Work Exp.	7.5	75	150	.50
Total				7.50
Semester No. 3				
Nut tree	13.5	300	150	2.00
Water	7.5	150	150	1.00
English	9.0	225	300	.75
Geometry	9.0	225	300	.75
Botany	10.5	225	150	1.50
Ag. Proj.	22.5	150	150	1.00
Work Exp.	7.5	75	150	.50
				7.50

CLASS	wtu	scu	scu/FTEF	No. FACULTY
Year 2				
Semester No. 4				
Plant Prop.	13.5	300	150	2.00
Survey	7.5	150	150	1.00
English	9.0	225	300	.75
Chemistry	13.5	300	150	2.00
Pol. Sci.	9.0	225	300	.75
Ag. Project	22.5	150	150	1.00
Work Exp.	7.5	75	150	.50
				8.00
Semester No. 5				
Soil Fert.	13.5	300	150	2.00
Farm Bldg.	7.5	150	150	1.00
English	9.0	225	800	.75
Org. Chem.	13.5	300	150	2.00
History	9.0	225	300	.75
Ag. Project	22.5	150	150	1.00
Work Exp.	7.5	75	150	.50
Total				8.00
Semester No. 6				
Fruit	13.5	300	150	2.00
Irrigation	7.5	150	150	1.00
English	9.0	225	300	.75
Bio. Chem.	13.5	300	150	2.00
Elective	9.0	225	225	1.00
Ag. Project	45.0	150	150	1.00
Work Exp.	7.5	75	150	.50
				8.25

CLASS	wtu	scu	scu/FTEF	No. FACULTY
Year 3				
Semester No. 7				
Citrus	13.5	300	150	2.00
Farm Records	9.8	225	225	1.00
English	9.0	225	300	.75
Entomology	13.5	300	150	2.00
Genetics	9.0	225	300	.75
Ag. Project	22.5	150	150	1.00
Work Exp.	7.5	75	150	.50
Total				8.00
SEMESTER No. 8				
Ag. Comp.	9.8	225	225	1.50
Farm Mgt.	9.8	225	225	1.50
Plant Pest	9.0	225	300	.75
Plant Phys.	9.8	225	225	1.00
English	9.0	225	300	.75
Accounting	9.0	225	150	1.50
Ag. Project	22.5	150	150	1.00
Work Exp.	7.5	75	150	.50
Total				8.50
Semester No. 9				
Intern	18.8	930	225	4.10
Seminar	9.0	186	225	.80
Elective	31.5	675	150	4.50
Total				9.40

CLASS	wtu	scu	scu/FTEF	No. FACULTY
Year 4				
Semester No. 10				
Crops	13.5	300	150	2.00
Ag. Mkt.	9.0	225	225	1.00
Elective	10.5	225	150	1.50
Internship	3.8	187	225	.80
Seminar	3.0	36	225	.16
Elective	10.5	225	150	1.50
Ag. Proj.	22.5	150	150	1.00
Work	7.5	75	150	.50
Total				8.46
Semester No. 11				
Post Harvest	13.5	300	150	2.00
Ag. Comm.	9.0	225	225	1.00
Forestry	10.5	225	150	1.50
Elective	24.0	525	150	3.50
Ag. Proj.	22.5	150	150	1.00
Work	7.5	75	150	.50
Total				9.50
Semester No. 12				
Forestry	13.5	300	150	2.00
Senior Project	7.5	150	225	.66
Ag. Finance	9.0	225	225	1.00
Elective	12.0	450	150	3.00
Ag. Proj.	22.5	150	150	1.00
Work	7.5	75	150	.50
Total				8.16

REGIONAL AGRICULTURAL COLLEGE-Engineering and Construction Review

The new campus is a 3,000 hectare site located in the District of Pocora and Mercedes, Cantón de Guácimo, Province of Limón, with geographic coordinates of 10° 12' latitude North and 83° 36' longitude West, about 80 Kms Northeast of San Jose, along the new World Bank financed road to Limón.

Preliminary visits to the site indicate the core area can be developed on a 400 hectare plot, with rolling topography, higher than surrounding land, and good surface water runoff. A preliminary cost estimate has been developed identifying the respective buildings and related components. These will comprise the college, together with an indication of the proposed phasing. Phases I, II, III and IV, for accomplishing the construction within the respective calendar years 1986, 1987, 1988 and 1989 of the planned project implementation schedule.

The design firm Reynolds, Smith and Hills from Jacksonville, Florida, has been contracted to prepare the Master Plan for this project. The Master Plan will be the basis for a Costa Rican A & E firm to carry out the architectural and engineering design.

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 accommodate the incoming student body, faculty and operations/maintenance staff.

The campus will be developed to provide the facilities for practical, hands-on, educational 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 frames, concrete-block filler walls, steel roof trusses and roof joists, and 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.

The simple nature of the proposed college 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, seven soil samples were taken with auger, and it can be concluded it is good soil for construction with good drainage. Existing farm roads are in good condition all year around.

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 design. 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 individual 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 the area by means of a connection to the 34.5 Kv. line of ICE.

1. Construction Cost Estimates

The construction cost estimates have been based on recent labor/material cost experiences in the San José area, together with projected allowances for application, as considered appropriate to the isolated lowland/humid 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 large 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 (Guípiles 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 require payment from foreign exchange. Current experience indicates that this will approximate 15 percent of the construction cost.

2. Inflation

Discussions and reviews with construction and engineering principals indicate a need for an inflationary allowance in developing projected construction costs. A review of most recent date shows inflationary influences 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 cots presented herein reflect this probable inflationary influence for the construction beginning in 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 inflationary allowances of 45% and 60% over the costs estimated as of June 1985.

3. 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 1986 with construction programmed to begin in early 1986 and to be completed in late 1986 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 I lists these various components together with the proposed scheduling, by phases and breakdown

4. Construction Cost

Construction costs are based on consultant and contractors evaluations and reviews of recent building construction work as of June 1985. This cost estimate further reflects a 25% added site location factor (for labor, per diem, transportation, hauling of materials, mobilization), and as presented can be considered reasonable firm, realistic, and indicative of current practice in Costa Rica.

In addition, the 15% foreign exchange component assigned to the construction cost has resulted from the results of evaluations and reviews of recent building construction work, including that of the new INCAE campus buildings. Similarly, the inflation allowances have been evaluated and developed from reviews by the consultant and construction community of the recently constructed INCAE campus cost data.

The total cost for construction has been estimated at $22.36 million. Table I, 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 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 refers to the use of trucks, vehicles, bull dozers, rock crushers, road graders, power shovels, pipe, pumps, electric 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% or 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 stage.

5. Planning and Design

Planning and design will be performed by an architectural and engineering firm to be retained by the college administration. 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. Local construction contractors will be pre-qualified and will be bid for in open competiton among the prequalified firms.

An engineer who will be the liason between the college administration and the consultant and contractor will be retained by the college authorities.

Upon completion of the construction, this engineer will administer and be responsible for the operation and maintenance of the college facility. He will collaborate closely with all participants, the college administration, the consultant and the contractor. He will continually follow and monitor progress to assure adherence to the implementation schedule and will recommend preventive measures, as circumstances may indicate, for overcoming potential influences.

6. Construction

The 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 José; an on-site field camp is 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 (80 Kms) is scheduled for completion in early 1986, and projects to be initiated earlier can be influenced by the round about currently available routing through Turrialba and Cartago to San José, some 120 Kms. over a winding and generally narrow roadway.

7. Potential Implementation Problems

The isolation of the site development 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 Limón is opened in 1986, 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 have already occurred, and the work progress during the short time it was observed, did not appear to reflect a potential 1986 completion. Thus, Phase 1 of the school construction may experience possible delaying effects of the round about routing from San José.

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 to persist during the first few years following its completion.

In the construction work, particularly that of the earth movement for the infrastructure elements, excessive rainfall can create implementation delays. In the 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.

REGIONAL AGRICULTURAL COLLEGE
HUMID TROPICAL REGION

CONSTRUCTION COST ESTIMATE
(Unit U.S. $1,000)

		PHASE I XII-1986	PHASE II XII-1987	PHASE III 1988	PHASE IV 1989	TOTAL	
1.	INFRASTRUCTURE	50%	25%	15%	10%		4,428
1.1	Clearing/grubbing and earth movement	79	54	38	28	199	
1.2	Streets and parking	882	594	424	321	2,221	
1.3	Storm drainage	71	48	34	26	179	
1.4	Water	199	134	95	73	501	
1.5	Sewerage	103	69	49	37	258	
1.6	Power/Electricity	281	190	144	102	717	
1.7	Telephone	99	67	48	36	250	
1.8	Landscape	41	27	20	15	103	
2.	ACADEMIC UNIT - STUDENT SERVICE						2,749
2.1	Administration/Faculty	232	234	279	0	745	
2.2	Classroom Buildings	108	146	173	196	623	
2.3	Computer Laboratory	0	0	131	0	131	
2.4	Crops/Soils/Forestry Science Laboratory	145	0	0	0	145	
2.5	Food/Nutrition Laboratory	0	130	0	0	130	
2.6	Agricultural Mechanical Shop	0	0	122	0	122	
2.7	Crops Field Unit	0	118	140	0	258	
2.8	Library/Infirmary	130	174	0	0	304	
2.9	Student Dining/Storage	227	0	0	0	227	
2.10	Covered Walkways	25	0	39	0	64	
3.	ACADEMIC UNIT - FIELD						1,01[illegible]
3.1	Crops field unit	0	149	0	0	149	
3.2	Forestry Field Unit	0	0	0	168	168	
3.3	Poultry Production Unit	0	0	159	0	159	
3.4	Swine Production Unit	0	0	167	0	167	
3.5	Beef Production	0	0	0	176	176	
3.6	Abattoir Facility	0	0	106	0	106	
3.7	Cattle-show	0	0	0	91	91	

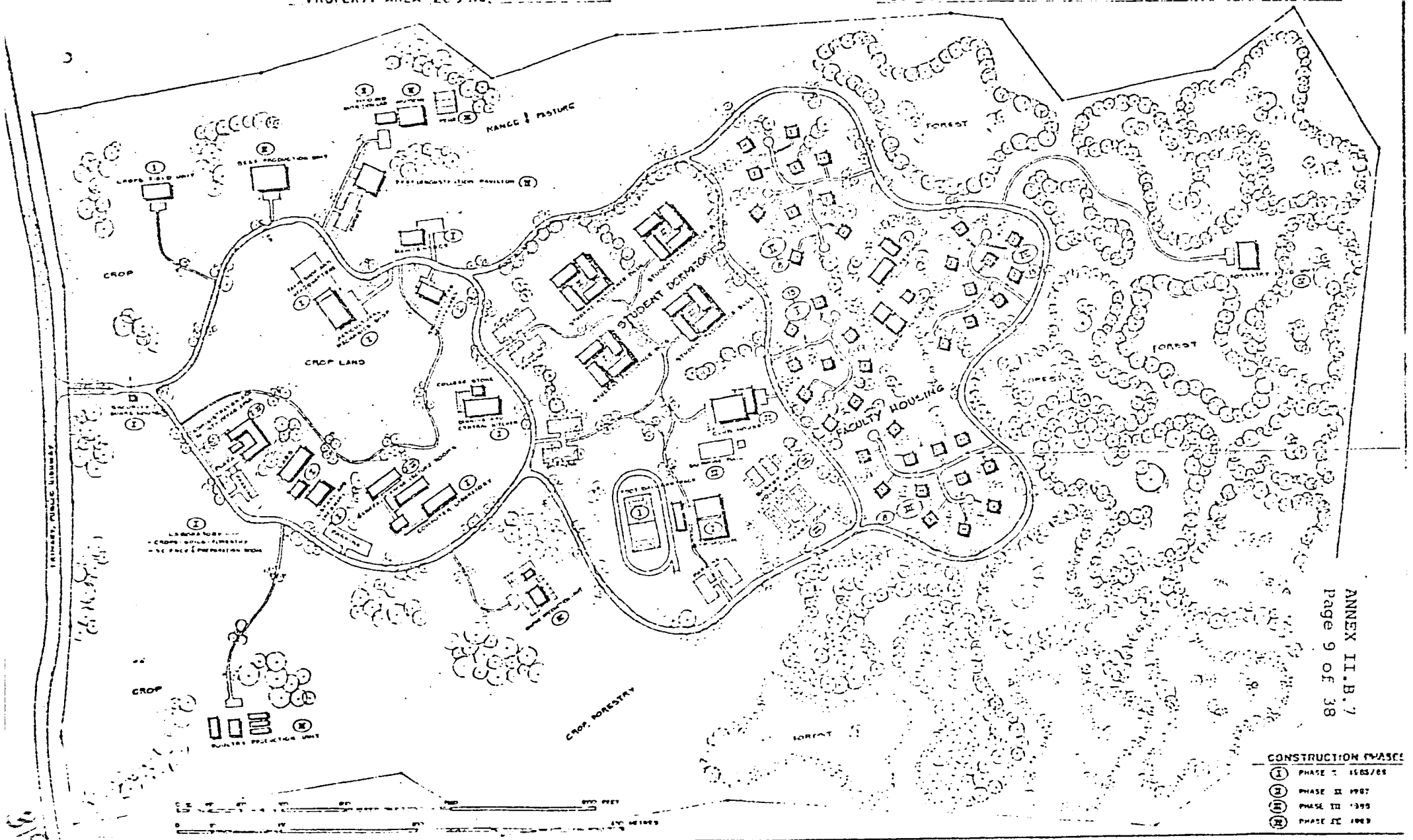
4.	GENERAL SERVICE					139
4.1	Entrance Gate Control	11	0	0	0	11
4.2	Security/Fire Station	37	0	0	0	37
4.3	Maintenance Facility	0	0	91	0	91
5.	STUDENT RESIDENCE					3,832
5.1	Student Dormitory	667	893	1,063	1,209	3,832
6.	FACULTY HOUSING					4,470
6.1	Houses	1,011	998	1,079	1,225	4,313
6.2	Elementary School	87	0	0	0	87
6.3	Community Center	0	70	0	0	70
7.	RECREATION AND SPORTS					1,044
7.1	Gymnasium Facilities	0	0	0	577	577
7.2	Swimming Facilities	0	0	77	0	77
7.3	Soccer/Running Track	0	65	0	0	65
7.4	Tenis Facility	0	0	52	0	52
7.5	Basketball	0	11	0	0	11
7.6	Vollyball	0	0	94	0	94
7.7	Club House	0	0	0	163	163
7.8	Baseball	0	0	5	0	5
	Sub-Total	4,435	4,171	4,629	4,443	17,678
	A & E Services (10%)	444	417	463	444	1,768
	Construction Cost	4,879	4,588	5,092	4,887	19,446
	Contingencies (15%)	732	688	764	733	2,917
	TOTAL CONSTRUCTION BUDGET	5,611	5,276	5,856	5,620	22,363
	Local Currency Budget (85%) (Colones needed)	4,769	4,485	4,978	4,777	19,009
	Foreign Exchange Budget (15%) (U.S. Dollars needed)	842	791	878	843	3,354

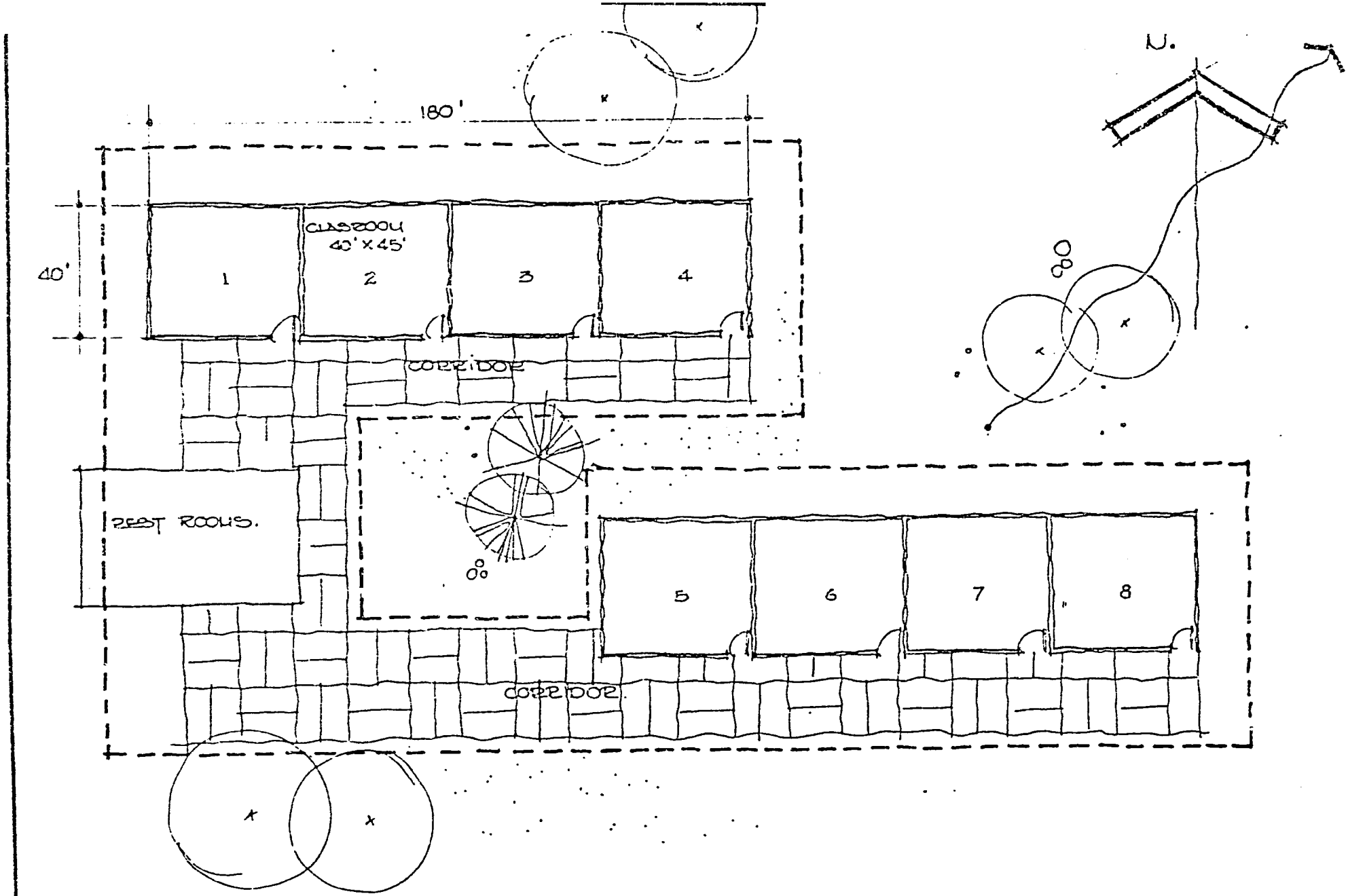
GUAPILES, COSTA RICA

PROPERTY AREA 200 Ha.

SAMPLE CAMPUS MASTER PLAN

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





GENERAL PURPOSE LECTURE ROOMS

EARTH... GUAPILES, COSTA RICA.

II - 12 - 85.

SCALE. 1" = 40'

AID - AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT "EARTH"

AGRICULTURAL SCHOOL AT THE ATLANTIC WATERSHED

REVISED ESTIMATE OF CONSTRUCTION COST

(June, 1985)

I. INTRODUCTION

The AID Mission to Costa Rica has asked the CONSULTECNICA-DYPSA Consortium to make preliminary studies on the possible construction costs of the infrastructure work and buildings required for a project to build an Agricultural School at the Atlantic Watershed.

In February, 1985, DYPSA cooperated with Engineer Ch. Stevens and Dr. Kretchmer in the preliminary quantification and estimate of construction costs even though a specific site for locating the school had not been determined as yet. The building area and the characteristics of the buildings were obtained from the study made by Dr. L. Rathbum, in accordance with the report by Experience, Inc., submitted to AID in the month of February. The cost of the infrastructure works was estimated on an overall basis, since the actual site and the relative location of the buildings and facilities were not known, and it was based on the development of a gross area in the order of 80 hectares adjacent to a highway or public thoroughfare where potable water, electric power and telephone services would be available.

The cost estimate of February, 1985, has now been revised, taking into account that the school would be located on the property of Hacienda Bremen, S.A. (Farms Nos. 3, 4 and 5), located in the Districts of Pocora and Mercedes, Cantón de Guácimo, Province of Limón. (See Figures No. 1 and No. 2). For this purpose, the professionals of CONSULTECNICA and DYPSA visited Hacienda Bremen on June 20th and 21st, 1985, and made certain preliminary inquiries with appropriate agencies (ICE, SENARA, ICAA) in regard to present and future public service facilities. (See Attachments No. 1 and No. 2).

On the basis of the result of the visit to the site and of the inquiries made, a tentative location has been assumed for the works on the campus and the necessary infrastructure works have been identified and quantified on a preliminary basis.

2. ASSUMPTIONS FOR ESTIMATING COST

The construction cost estimate herein contained is based on the following assumptions:

2.1 Campus Location

It has been assumed that the principal works on the campus will be located in the areas to the north and northeast of the northern end of the existing landing strip.

This means that said grouping of the works will be located close to the centroid of the farm, approximately 5 Km. from the Guápiles-Siquirres Highway.

2.2 Access Road

A new access road to the farm has been considered, which would cut across Hacienda Las Mercedes, parallel to the Dos Novillos River, and it would border the houses and other existing structures in Hacienda Bremen along the East, for an approximate length of 1.0 Km. up to the main road of the Hacienda. (See section 4.3 of Attachment No. 1).

2.3 Internal Infrastructure (Also see description of works in the Breakdown of Cost Estimate).

- Roads and Drainage: It has been assumed that all of the streets and roads existing on the farm will be utilized. However, it is planned to build approximately 7 Km. of new main roads, to improve approximately 6 Km. of existing road to make it a main road, around 3 Km. of new subsidiary roads and a minimal improvement of existing roads that will provide access for field production units. It is also planned to build several parking lots with an overall area of approximately 1.3 hectares.

  Also included are two small bridges 7.5 meters wide with a span of 8 meters across the Dos Novillos River branch, and several major and minor culverts for main and subsidiary roads.

  Rainwater drainage will be accomplished along the lines of the present system on the farm (surface drainage) and, insofar as possible, the concentration of waters requiring costly conduction and drainage methods will be avoided.

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Potable Water: According to information obtained from SENARA (Servicio Nacional de Aguas Subterráneas, Riego y Avenamiento - National Ground Water, Irrigation and Drainage Service) the Bremen area has an adequate supply of ground water of suitable quality for the project, which could be tapped by means of wells.

It has been assumed that two main wells will be built and equipped, providing 7.5 liters per second (they will be 55 m. deep). Secondary wells will be built close to isolated field production units.

It is planned to build an elevated storage tank with a capacity of 150 to 200 cubic meters, and the distribution system will be made of PVC pipes.

For a total population of 900 to 1,000 persons and institutional use, an average daily demand of 7.5 liters per second has been assumed. It is not intended to use potable water for irrigation or agricultural uses.

Sewage: The collecting and treatment of sewage would be done by means of a sewer system in PVC and oxidation ponds for the academic nucleus, student lodging, recreation and other such uses. Independent treatment is also being considered for meat production units.

Sewage from professors' houses and other isolated services will be treated individually by means of septic tanks and drainage.

Electricity: On the basis of information obtained at ICE, it has been assumed that electric power will be tapped from the 34.5 Kv, 30 line located along the railroad line (at the southern end of the farm).

Primary power feed will be high-voltage (34.5 Kv, 3-phase), by overhead conductors on concrete poles, cross-country, and an effort will be made to shortcut distances and have the lines as unobtrusive as possible, up to the transformation points, as follows:

34.5 Kv three-phase: for the main nucleus and livestock

34.5 Kv single-phase: for professors' houses, hogs, poultry and forest unit.

From the transformation points, the house connections and distribution system will be underground.

It is also planned to have public lighting in streets, parking lots and plazas with underground distribution.

Telephones: The two telephone lines of ICE now being used at Hacienda Bremen will be carried on the same high-voltage line poles up to the telephone exchange at the administrative nucleus.

Two carrier-wave units will be installed at the telephone exchange, each of which will have a capacity for 12 trunk lines. The capacity of the internal exchange has been planned for 200 lines.

The telephone distribution system at the main nucleus at the professors' residential section will be underground.

For outlying nuclei, the telephone distribution system will be overhead, using the same poles as the electric system.

2.4 Buildings

For the purpose of estimating the revised cost of buildings and other works, no information in addition to what was furnished by AID in February, 1985, has been available. Notwithstanding the above, some items which are considered necessary have now been included. They were not mentioned in Dr. L. Rathbun's study or were not included in the previous cost estimate. These items include watchmen's booths, covered passageways or other structures joining buildings, professors' lounge, students' club house, etc.

Good construction quality has been planned for all of the buildings, and the climate and other features of the area will be taken into consideration. It is not intended to use expensive materials or sophisticated facilities (see descriptions under Section 5: Breakdown of Estimate).

Certain doubts still persist in connection with the specific characteristics of some of the buildings, particularly those intended for classrooms, laboratories and some production units, and for this reason, the assumptions made in February, 1985, have been maintained.

The construction cost estimate does not include furniture, decoration, equipping or installation of equipment for industrial process, education, research and other systems.

2.5 Preliminary Nature of this Work

It must be pointed out, as we mentioned in our offer of June 11th, 1985, that the work and studies done by the Consortium are of a very limited and preliminary nature, based on very little information, the purpose being for AID to have preliminary cost estimates that have taken into account, in some way, the specific location, conditions and characteristics of the site chosen. Assumptions had to be made as to the location and characteristics of the campus, which could cause significant changes between the results herein set forth and the final project, which will have to be based on broader and more detailed studies.

3. UNIT PRICES, STAGES AND ESCALATION

3.1 Unit Prices

In order to estimate construction cost, the usual unit prices for this type of work as of June 1985, have been used.

The unit prices for the San José metropolitan area were increased by 25% (average) in order to take into account the location and the characteristics of the project area.

This percentage was the result of an analysis of labor costs (zone, transportation, labor market, per diems, etc.), hauling materials and travelling expenses or temporary facilities for the contractor or contractors.

3.2 Construction Stages

In general the division of work into four stages of construction, as set forth in the report by Experience, Inc., has been observed. While the stages have been set up in terms of the academic requirements during the first four years of operation, it will be necessary to make adjustments in order to make the best possible use of the resources that the contractor or contractors may have available at a given time or stage. This would have an important bearing on costs and would also depend on the availability of funds by AID.

The construction stages, for the purposes of price escalation in Colones, have been tentatively scheduled as follows:

STAGE I:	April 1986 to June 1987
STAGE II:	April 1986 to March 1988
STAGE III:	1988
STAGE IV:	1989

3.3 Criteria for Price Escalation

On the basis of the performance of construction price indexes during the last two years, it has been assumed that there will be a 15% increase per year for the various construction stages, as of the cost estimate based on prices in June 1985.

		QUANTITY	ESTIMATED COST (Thousands of Colones) UNIT	TOTAL ITEM	TOTAL JOB
1.	INFRASTRUCTURE				
1.1	Clearing and dirt moving:				
	Clearing consisting of eliminating vegetation, uprooting trunks and burning residues	45 Ha.	15.00	675.00	
	Dirt moving, terracing for buildings, mostly excavating	60,000 cu.m.	0.15	9,000.00	
					9,675.00
1.2	Streets and Parking lots:				
	Primary street: 24 m. right of way, 6 m. of paved roadway with a 4 cm. asphalt sheeting and a 40 cm. granular base, 1.5 m. shoulders on either side made of granular material, 2 m., grass-covered gutters on either side, and 5 m. grass-covered strip on either side, including terracing	6,800 m.	7.50	51,000.00	
	Reconstruction of primary streets, characteristics similar to primary streets except that the existing granular base is 30 cm.	5,900 m	5.50	32,450.00	
	Secondary street: 16 m. right of way, 6 m. of paved roadway with 4 cm. sheet asphalt and 30 cm. granular base, 1.0 m. shoulders on either side made of granular material	3,100 m.	3.50	10,850.00	
	Improving gravel roads: minor widening to bring the width of the granular base to 6 m., construction of the lateral gutters.	4,300 m.	0.50	2,150.00	
	Parking lots: paved with 4 cm. thick sheet asphalt and 20 cm. thick granular base, rainwater collectors and sewer, perimeter sidewalks, traffic signals.	12,800 sq. m.	0.80	10,240.00	
	Bridges: 2 multi-beam bridges, 8 m. span for HS 20 load built with T-beams, in pairs, and the upper slab poured on the site, banisters made of pipes of H.G. bastions, 6 m. roadway plus two 0.75 m. sidewalks	120 sq.m.	12.5	1,500.00	
					108,190.00

1.3	Rainwater drainage:			
	Main sewers: with one or more concret pipes 91 cm. in diameter, inlet and outlet heads, protective works.	7 u	400.00	2,800.00
	Secondary sewers: characteristics similar to the above, except that pipes will have a diameter of 76 cm.	6 u	160.00	960.00
	Reinforced concrete pipes joined with rubber packing, including ditching and compacting		overall	500.00
	Main canals with a cross-section of approximately 4 sq.m. some protection against erosion	3,000 m	0.80	2,400.00
	Rectifying and fixing existing canals	4,000 m.	0.40	1,600.00
			Overall	500.00
				8,760.00
1.4	Potable Water Supply:			
	Wells: 20 cm. diameter, with 15 cm. diameter lining with a length of 55 m., including pumps and controls, PVC grills	3 u	845.00	2,535.00
	Conduction from the effluent at the pumping site to the tank, PVC SDR 17 - 10 ϕ	600 m	1.30	780.00
	Elevated storage tank, 200 cu. m. capacity		overall	3,200.00
	Associated works, such as chlorinators, booths, etc.		overall	1,495.00
	Distribution system in PVC SDR 17, various diameters, includes valves and accessories, hydrants.	9,600 m	1.50	16,343.00
				24,353.00
1.5	Collecting and Treatment of Sewage:			
	Collecting system in C 13 concrete pipes, various diameters, mainly 20 cm. ϕ, including excavation and filling of ditches, wells.	3,000 m	2.00	6,000.00

Treatment works: 5 oxidation ponds of various depths, bottom and dikes covered with 4 mil thick polyethylene, including inlet works	3,500 sq. m.	1.00	3,500.00	
Final conduction: Outlet pipes, C 14, 25 cm. diameter, associated works	900 m	2.2	1,980.00	
Other treatment works: septic tanks, settlers, drainage		overall	1,060.00	
				12,540.00
1.6 Electrical feeding and distribution:				
High-voltage lines: including poles, cables and accessories.	13.8 Km.	760.00	10,488.00	
Transformers: includes both the initial step-down transformers and the distribution transformers		overall	4,800.00	
Underground distribution lines: includes cables, accessories, pipes and inspection boxes, panels	6.2 Km.	2,800.00	17,360.00	
Lighting: includes pipes, cables, accessories and lamps.	13 Km.	140.00	1,820.00	
				34,468.00
1.7 Telephone System:				
Connection to the National Telephone System: includes the necessary equipment for connecting to the public system, poles and wiring.		overall	5,190.00	
Telephone exchange with capacity for 200 lines		overall	3,720.00	
Underground telephone system: includes pipes, cables, inspection boxes and associated works	7.90 Km.	420.00	3,318.00	
				12,228.00
1.8 Landscaping:				
Lawns, reforestation, esthetic improvement works		overall	5,000.00	
				5,000.00

2. ACADEMIC UNIT - SERVICES TO STUDENTS

2.1 Administrative/Faculty Building:

Structure made up of reinforced concrete rigid framework, floor structure made of pre-stressed beams and blocks, roof with metal framework covered with double galvanized iron sheets with stereofoam intermediate filling, cement and vynil tile floors, moisture-resistant acoustic ceilings with some wood molding, plastered concrete walls, plywood or fibrolit partitions filled with stereofoam, top-quality hardware and installations, 3 coats of tropicalized paint, central air conditioning in 65% of the area.	1,350 sq. m.	25.00	33,750.00	
Ornamental plaza area with concrete tile floor, benches and flower pots, flagpoles and lighting	900 sq. m.	2.00	1,800.00	
				35,550.00

2.2 Classroom Building:

Structure made up of plastered concrete block walls, cement tile floors, moisture-resistant acoustic ceilings, metal framework roof covered with double galvanized iron enamelled sheets, with stereofoam filling, top-quality hardware and installations, three coats of tropicalized paint, forced ventilation. Includes 8 classrooms, corridors, toilets, office and storeroom.	1,890 sq. m.	14.00	26,460.00	
				26,460.00

2.3 Computer Laboratory:

Characteristics similar to the above, except that the floor will be a concrete fill with a false, elevated floor, central air conditioning throughout the area	200 sq. m.	25.00	5,000.00	
				5,000.00

2.4 Science and Crop-Soil Silviculture Laboratory:

Area for two experimentation rooms with characteristics similar to item 2.2 Classroom Building, except that ceilings will be made of fibrolit and without forced ventilation.	410 sq. m.	12.50	5,125.00	

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	Area for two preparation rooms with characteristics similar to item 2.3 Computer Laboratory, except that the floors will be of cement tile.	150 sq. m.	25.00	3,750.00
				2,875.00
2.5	Food and Nutrition Laboratory:			
	Area for experimentation room, with characteristics similar to item 2.2. Classroom Building, except that the ceilings, which will be made of fribrolit and without any forced ventilation, with finished in accordance with standards of Ministry of Public Health.	170 sq. m.	15.00	2,550.00
	Area for a preparation room with characteristics similar to item 2.3, Computer except that the floors and the finish will conform to the standards of the Ministry of Public Health	60 sq. m.	25.00	1,500.00
	Area for cattle slaughtering, with characteristics similar to item 2.2., Classroom Building, except that the floors and concrete tables will be lined with acid-resisting glazed tiles, overhead rails for conveying carcasses, forced ventilation, following standards of the Ministry of Public Health	150 sq. m.	17.00	2,550.00
				6,600.00
2.6	Agricultural Machine Shop:			
	Metal structure on concrete columns, covered with white enameled galvanized-iron, walls of concrete, glue-coated, and of ornamental blocks, 5 m. high, floors of reinforced concrete, open-wiring electrical installation, three coats of tropicalized paint	550 sq. m.	8.50	4,675.00
				4,675.00
2.7	Agricultural Center and Shop:			
	Central area intended for shop and store-rooms, characteristics similar to item 2.6, Agricultural Machine Shop.	480 sq. m.	6.50	3,120.00
	Covered area, with light metal structure, covered with white enameled galvanized iron, gravel floor, without any walls	740 sq. m.	5.50	4,070.00

Uncovered yeard area, gravel floor with rainwater collecting and disposal works.	1,400 sq. m.	2.50	3,500.00	
				10,690.00
2.8 Library and Infirmary:				
Area intended for book storeroom, with characteristics similar to item 2.2 Classroom Building, except that instead of forced ventilation, it will have a humidity-control system.	190 sq. m.	20.00	3,800.00	
Area intended for reading rooms, with characteristics similar to item 2.2, Classroom Building, except that it will have air conditioning.	190 sq. m.	23.00	4,370.00	
Area intended for administration office and library cataloguing, similar to item 2.1, Administration Building	90 sq. m.	25.00	2,250.00	
Area intended for infirmary, with characteristics similar to item 2.1, Administration Building, except that it includes the necessary facilities for its specialized use.	220 sq. m.	25.00	5,500.00	
				15,920.00
2.9 Dining Rooms and Store:				
Area for dining rooms, structure made up of plastered concrete block walls, cement tile floors, fibrolit ceilings with some wood molding, roof with metal trusses lined with wood where exposed and covered with white enameled galvanized iron, top quality hardware and installations, forced ventilation.	610 sq. m.	14.00	8,540.00	
Area intended for a store, with characteristics similar to those of the dining rooms, except that it will not have forced ventilation.	300 sq. m.	12.50	3,750.00	
Area intended for kitchens with characteristics similar to those of the dining rooms; in addition, the finish and floors will conform to the standards of the Ministry of Public Health, as well as the facilities required by its specialized use.	90 sq. m.	18.00	1,620.00	
				13,910.00

3. ACADEMIC UNIT - FIELD

3.1 Harvest Unit:

Area intended for office, warehouses, processing and dormitories, structure made up of glue-coated concrete block walls, roofs of light metal trusses covered with white enameled galvanized iron, good quality finishes and installations, concrete floors and fribrolit ceilings in some area.	350 sq. m.	10.00	3,500.00	
Area intended for storing crops, roof of light metal trusses, covered with white enameled galvanized iron, gravel floor, with only the exterior wall made of glue-coated concrete blocks.	440 sq. m.	6.00	2,640.00	
Open yard area, gravel floor with rainwater collection and disposal works	250 sq. m.	2.50	625.00	
				6,765.00

3.2 Silviculture Unit:

Area for offices dormitory and storeroom similar to areas for the same purpose in item 3.1, Harvest Unit.	90 sq. m.	10.00	900.00	
Area intended for demonstrations, roof with light metal trusses covered with white enameled galvanized iron, concrete floor, no walls, good electrical installation	790 sq. m.	6.00	4,740.00	
				5,640.00

.3 Poultry Farm:

Area intended for chickens: roof with wood trusses covered with white enameled galvanized iron, perimeter wall base made of concrete blocks and upper portion with screen, dirt floor, good quality electro-mechanical installations	600 sq. m.	5.00	3,000.00	
Area for offices, storerooms, dormitories, packing, with characteristics similar to the area for the same purpose in item 3.1, Harvest Unit.	310 m.	10.00	3,100.00	
				6,100.00

3.4	Hog Production:			
	Area for office, storerooms and dormitories, with characteristics similar to areas for the same purpose in item 3.1, Harvest Unit.	240 sq. m.	10.00	2,400.00
	Area intended for hogs, roof with light metal trusses covered with white enameled galvanized iron, polished concrete floors, wall bases and partitions of concrete blocks, all of the pens filled with concrete, polished plaster.	430 sq. m.	6.50	2,795.00
	Open area intended for hogs, small fences	1,200 sq. m.	1.00	1,200.00
				6,395.00
3.5	Beef Production:			
	Area for offices, storerooms and dormitories, with characteristics similar to area for the same purpose in item 3.1, Harvest Unit	180 sq. m.	10.00	1,800.00
	Area for cattle, with characteristics similar to those intended for hogs in item 3.4, Hog Production	450 sq. m.	6.50	2,925.00
	Open areas intended for cattle, major fences	1,150	1.00	1,150.00
				5,875.00
3.6	Slaughterhouse:			
	Area intended for slaughtering: structure made of concrete block walls, roof with metal trusses covered with two sheets of enameled galvanized iron, with internal stereofoam filling, floors and walls lined with ceramics, finishes and installations in accordance with standards of the Ministry of Public Health, forced ventilation.	230 sq. m.	17.00	3,910.00
	Open areas intended for cattle, major fences	150 sq. m.	1.00	150.00
				4,060.00

3.7	Cattle Demonstration:			
	Metal structure with white enameled galvanized iron roof, external enclosure with wire mesh, gravel floor, good quality electrical installation, stands seating 100 persons			
		470 sq. m.	5.50	2,585.00
		530 sq. m.	1.00	530.00
				3,115.00
TOTAL ACADEMIC-FIELD UNIT				37,950.00

4. GENERAL SERVICE UNIT

4.1 Entry Control House:

Structure made of plastered concrete block walls, roof with wood trusses covered with white enameled galvanized iron, "internit" ceilings, cement tile floors, good quality installations.	30 sq. m.	15.00	450.00	
Gates and other entry control works		overall	250.00	
				700.00

4.2 Firemen and Security Station:

Area for offices, storerooms and dormitories with characteristics similar to areas intended for the same use in item 3.1, Harvest Unit	80 sq. m.	10.00	800.00	
Area intended for stations, with characteristics similar to item 2.6 Agricultural Machine Shop; recommendations made by the National Insurance Institute will be taken into consideration	170 sq. m.	8.50	1,445.00	
				2,245.00

4.3 Maintenance Unit:

Area for offices and storerooms, characteristics similar to areas intended for the same use in item 3.1, Harvest Unit	240 sq. m.	10.00	2,400.00	
Walkways with metal structure roof made of white enameled galvanized iron, reinforced concrete floor	220 sq. m.	5.00	1,100.00	
				3,500.00

TOTAL GENERAL SERVICE UNIT	6,445.00

5. STUDENT RESIDENCE UNIT

Structure made of reinforced concrete rigid frames and plastered concrete block walls, floor structure made of pre-stressed beams and blocks, cement tile floor, fribrolit ceilings, roofs with metal trusses covered with enameled galvanized iron, with internal filling of stereofoam, high-quality, heavy-duty installations and finishes, baths with ceramic lined walls, all of the windows with jalousies protected with mosquito screens, including closets and desk partitions. Includes lodging for 400 students, in dormitories for two, with bathroom and toilets grouped for every 25 students, laundry section, admission office, apartment for superintendent and entertainment halls for every 100 students.	10,840 sq. m.	15.00	162,600.00
TOTAL STUDENT RESIDENCE UNIT			162,600.00

6. PROFESSOR LODGING UNIT

6.1 Houses for Lodging Professors - Type A:

Structure made of plastered concrete blocks, floors of clay tile, paneled or ribbed wood roofs, wood ceilings, galvanized iron convering and colonial-style tiles, windows with wooden frames and jalousie areas protected with mosquito screens, high-quality hardware and installations, three coats of tropicalized paint. Window-type air conditioning in two bedrooms. Septic tank and individual drainage. Includes closets and kitchen furniture. Each house has a carport, terrace, living-dining room, kitchen three bedrooms one bathroom, one laundry room with an area of 178 sq. m.	24 u x 178 sq.m. ea. 4,270 sq. m.	16.50	70,455.00	70,455.00

6.2 Houses for Lodging Professors - Type B:

Characteristics similar to those of item 6.1				
Houses for Lodging Professors - Type A. Each house has a carport, living-dining room, kitchen, three bedrooms, two bathrooms and a laundry room, with an area of 158 sq.m.	22 u. x 158 sq.m ea. 3,480 sq. m.	16.50	57,420.00	57,420.00

6.3 School and Day Nursery:

Characteristics similar to those of item 2.2, Classroom Building. Includes 8 classrooms, corridors, toilets, office and storeroom.	440 sq. m.	12.00	5,280.00	5,280.00

6.4 Community Hall:

Area for meetings, with characteristics similar to the area intended for dining rooms in item 2.9, Dining Room and Store	240 sq. m.	12.00	2,880.00	
Area for kitchen with characteristics similar to those of the area intended for the same use in item 2.9, Dining room and Store	10 sq. m	15.00	300.00	3,180.00

TOTAL PROFESSOR LODGING UNIT	136,335.00

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7.4	Tennis Courts (2 units):				
	Concrete floors, poles for net, mesh and drainage.	2	1,000.00	2,000.00	2,000.00
7.5	Basketball Court:				
	Concrete floor, structure for baskets, drainage.	420 sq. m.	1.20	504.00	504.00
7.6	Volley-ball Court				
	Concrete floors, poles for net, drainage	330 sq. m.	1.00	330.00	330.00
7.7	Clubhouse:				
	Areas for meetings, office, sanitary facilities with characteristics similar to those of the area intended for dining rooms in item 7.2, Dining Room and Store.	420 sq.m.	12.00	5,040.00	
	Areas for kitchen with characteristics similar to those of the area intended for the same use in item 2.9, Dining Room and Store.	30 sq. m.	15.00	450.00	5,490.00

ATTACHMENT No. 1

NOTES ON THE VISIT TO HACIENDA BREMEN

In Pocora, Guácimo, Limón

1. PURPOSE

Visit for a preliminary survey in order that the CONSULTECNICA-DYPSA Consortium can, together with additional information and consultation in San José, adjust the preliminary estimate of the cost of the project in regard to infrastructure (made in February 1985, without a definite site) to the specific conditions of Hacienda Bremen.

- Also see offer of the Consortium to AID of June 11, 1985.

2. PARTICIPANTS

For the Consortium:

Architect Manuel Trejos A.	-	CONSULTECNICA
Engineer Enrique Blair	-	CONSULTECNICA
Engineer Rodolfo Castro A.	-	DYPSA
Engineer Oscar Carboni M.	-	DYPSA

For AID:

Dr. Paul Kretchmer (only Thursday)

3. PROGRAM CARRIED OUT

Thursday, June 20th, 1985

6:30 - 10:00 a.m.:	Trip San José-Pocora (MTA, RCA, OCM)
10:30 - 12:00 noon:	Bremen offices, meeting with J. Rojas and F. Rojas (MTA, RCA, OCM)
12:00 - 14:30 p.m.:	visit to the farm with P. Kretchmer (MTA, RCA, OCM)
16:00 - 18:00 p.m.:	Bremen office, meeting with J. Rojas and F. Rojas (MTA, RCA, OCM, EB)

Friday, June 21st, 1985

8:30 - 13:30 p.m.:	Detailed tour of the farm with F. Rojas, making 7 performations with auger at 4 main sites, sources of material and survey of possible access routes.

It is important to mention that during the night of June 19th and the morning of the following day there were torrential rains in the Atlantic region. This caused considerable run-off and extraordinary rises in the rivers of the area and made it possible to observe the farm in the morning of the 20th in a condition that occurs only once or twice every 10 years.

4. DATE AND OBSERVATIONS

4.1 Characteristics of Farm and Surrounding Areas:

The farm is located in the districts of Pocora and Mercedes, cantón of Guácimo, province of Limón, at geographical coordinates 10° 12' North latitude and 83° 36' west longitude, Republic of Costa Rica.

The area of the farm is 2899 Ha. and the present use of the land is as follows:

pasture	2,330 Ha. (80.7%)
bananas	323 Ha. (11.1%)
forest	236 Ha. (8.2%)

The shape of the farm is irregular, with its maximum dimension, from the Southwest to the Northeast, of 10 Km. and an average of 3 Km. It borders on the South with the Siquirres-Guápiles railroad track, for a distance of 380 m; on the West and on the North with other property owners and the Parismina River, and on the East with the Dos Novillos and Destierro Rivers.

Some of the existing works of buildings on the farm include: approximately 40 Km. of gravel roads, landing strip, 3 fairly good houses, offices, a swimming pool, a tennis court, a small school, a banana packing plant, shops and garages for agricultural equipment, a small sawmill, close to 10 houses for employees, a football field, horse stable and a corral for cattle.

The town of Pocora is located 300 m. East and a hamlet called Iroquois is approximately 2 Km. West.

4.2 Acquisition of other Properties

It is recommended that Mr. Henry Stone's farm be acquired, because it is enclaved in Bremen. Its area is approximately 50 Ha. and it has more than 3000 m. of fences that could be replaced by no more than 700 m.

As an alternative, the possibility could be studied of an exchange of area that would simplify the boundary.

On the eastern part of the farm there are 4 parcels belonging to IDA, on the left bank of Destierro River, which it would be advisable to exchange or acquire in order to prevent problems of interference by these neighbors, and to straighten out or "clear" the boundary of the farm along said river.

It might also be required to acquire a strip of land of Hacienda Las Mercedes for the construction of a new access road from the Siquirres-Guápiles highway.

4.3 Access Alternatives

The Siquirres-Guápiles highway runs parallel to the railroad track, approximately 300 m. toward the southwest. The present access road, through Hacienda Las Merecedes is narrow and the route it follows is irregular. It also has the disadvantage that it leads into the most congested corner of Hacienda Bremen, where, in addition there exist private houses, a commissary, a bar and a store of the CNP; the crossing of the railroad track is at an angle and visibility is poor.

It is considered very advisable to build a new access road, cutting across Hacienda Las Mercedes, parallel to Dos Novillos River, which would be approximately 1.0 Km. long and would border, along the East, the houses and other buildings at Bremen up to the point where it would connect with the main street of the Hacienda.

Other access alternatives would turn out to be more expensive because they would be longer and would have to cross other neighboring properties.

4.4 Alternatives for Locating Campous Works

There is a concurrence of opinion of other consultants or advisers of AID who have visited the farm and the opinion of CONSULTECNICA - DYPSA regarding the fact that the principal works of the campus should be located in the vicinity of the landing strip and toward the West of Dos Novillos River. At that point there is an available area of at least 400 Ha. with approximate dimension of 2,500 m parallel to the landing field and the main street, and no less than 1,500 m. perpendicular thereto.

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The gross area required for the works is approximately 100 Ha., so there would be considerable flexibility in locating the works wherever it is preferred.

If the campus is located at the Northern section of the preferred zone, the following advantrages would be obtained: utilization of pastures with rolling terrain and a higher elevation than the adjacent land, better conditions for drainage, view, landscaping and breeze (particularly in the Northwestern sector).

The disadvantages are: greater length of the main access road and electric lines, more dirt movement for buildings, loss in absolute elevation with regard to the Southern section. If the campus is located in the Southern section, the above advantages and disadvantages are reversed.

The difference in length of the main access road between the North and the South alternatives within the prefered zone is estimated at 2 Km.

Another factor that must be taken into account in locating and designing the site for the campus is the foot traffic of students, professors and employees between the various areas or components of the campus (administration-education, services, lodging and sports-recreation).

4.5 Terrain and Soils

Terrain:

A map of the farm is available, according to a survey made by Topographer Claudio Gallardo A., in September 1984, for the purpose of rectifying the dimensions. According to the new survey, the total area of the farm (farms No. 3, 4 and 5) is 2,889.0 Ha., while the area of record is 2,327.65 Ha. On said map are shown the buildings, roads, fences, crops and some internal drainage routes.

There is no available information regarding levels, other than what is shown on the Guácimo map of the National Geographic Institute at a scale of 1:50.000. According to said map, the elevation of the farm runs from 95.00 m. on the Southern side (railroad) to 10.00 m. at the banks of the Parismina and Destierro Rivers at the Northern and Northeastern section of the farm.

A contour map should be prepared as soon as possible of the preferred zones, for the location of the works.

Soils

A report is available on a soil survey of Hacienda Bremen done by Agronomical Engineer Marco A. Ugalde M. in April, 1985. This is an agronomical survey. During the visit to the farm, seven perforations were made with an auger at four principal sites where the campus works will possibly be located. The results were obtained as follows:

P1A: (East side of the main street, approximately 500 m. South of the airport).

0 to 20 cm.:	silty organic with small round pebbles
20 to 45 cm.:	silty sandy with clay and small round pebbles
45 to 62 cm.:	silty with course sand or fine gravel. The auger does not gather the material (fine gravel in water) deeper than 60 cm.

Ground water level appeared at 55 cm. depth and tends to rise. The walls of the hole crumble beyond ± 30 cm. Sample M No. 2 was taken.

P2A and P2B: (High area ± 1 m. above level of water in a nearby drainage canal, West side of main street, Southwest of the airport).

0 to 30-35 cm.:	silty-organic
35 to 85 cm.:	silty-clayey with little sand (fine), some roots, no rocks
85 to 120 cm.:	silty-clayey, more humid, with small rocks

Ground water appeared at 95 cm. depth and rose up to 80 cm. after 12 minutes.

At P2B, large rocks appeared at 1.20 depth. Sample M No. 3 at P2A was taken at a depth of 70 cm.

P3A and P3B: (Area between Dos Novillos River and creek, approximately 500 m. South of the corral).

0 to 40 cm.:	organic silt
40 to 65 cm.:	sandy silt (clayey silt lens at P3B
65 to 70 cm.:	sandy silt (coarse sand) and round rocks at P3A. Auger did not penetrate beyond 70 cm.
70 to 120 cm.:	sandy silt and sand (black sand)

Ground water appeared at 120 cm. depth at P3B.

Samples were taken. M No. 4 was taken at P3A. M5 and M6 at PeB.

P4: (At a high pasture Northwest of the garbage dump, approximately 500 m. North of the corral).

0 to 100 cm.:	brown color silty clay; material very uniform throughout the entire depth; no organic surface soil was detected. No ground water appeared. Resistance to penetration by auger.

Three samples were taken (M No. 7, M No. 8, and M No. 9) at various depths.

In conclusion it may be stated that the soils have good consistency for construction and that they drain well. This is evidenced by the very good performance and condition of the roads inside the farm, which only have a 30 cm. base of granular material.

The ground water levels found are probably maximum due to the strong rains and floods of June 20th. In general, they coincide with the water level in nearby drainage canals or rivers.

4.6 Water, Drainage and Waste Disposal

The farm has abundant water, both surface and underground. At the same time, it is well drained by means of rivers or creeks that cross it or border it. Drainage is also aided by the good permeability of the soils in almost the entire area of the farm.

The places that are susceptible to river overflowing and flooding are located in the Northern section of the farm around the Northern banana plantation (bank of Dos Novillos River close to the corral and bank of the Parismina River to the North and Northeast of that banana plantation). This was observed on June 20th and it is easy to avoid locating works in those areas.

Due to the considerable area to be developed and the possible distance between the various buildings, and taking into account the moderate amount of potable water required, it would seem advisable to build two or three wells and one or two storage tanks for supplying potable water to the campus.

The present surface drainage is adequate but it will be necessary to build gutters, canals and some culverts or some small bridges for drainage of waters in the building areas, streets or other new works. The design of drainage works must be adapted to the present natural conditions and affect them as little as possible.

In regard to the treatment and final disposal of sewage, it is considered advisable and feasible to use septic tanks and independent drainage for the faculty houses and other isolated buildings and a collection network and centralized treatment (possibly an oxidation pond) for the students' lodgings and other academic or service buildings located close together. The treatment and final disposal of waters from the slaughterhouse, hog pens, etc., will possibly require special consideration. The final disposal of solid wastes (trash) will possibly be accomplished by means of sanitary fills and could require the installation of an incinerators.

4.7 Electricity and Telephones

See the results of inquiries made with ICE in a separate document.

4.8 Roads and Landing Field

The condition of the gravel roads inside the farm is very good and it will only be necessary to give periodic maintenance to the upper layer (fine granular material with silt susceptible to washouts that Bremen must keep very smooth and uniform in order not to harm the bananas that are transported by ox carts).

The existing roads have been built with a layer of granular material (subbase-base) no more than 30 cm. thick, placed and compacted on natural ground.

The landing field is in good condition, in spite of the fact that it has no granular base, but it is not being used, even for agricultural spraying operations.

4.9 Materials on Site and in the Area

At several points of the Parismina River and at others of the Destierro River, there are abundant granular materials (gravel and sand) that have been used for the construction of roads on the Hacienda and even on a large scale and only a short time ago, for the construction of the Siquirres-Guápiles highway.

It may be assumed that, with some treatment (screening and crushing) these sources of granular material will meet all of the construction requirements of the project insofar as the building of roads and streets, drainage works and preparing concrete. The most usual timber, which is available in the area, are laurel, surá, gavilán and cola de pavo; there are also soft woods available for temporary works (shoring, falsework, forms for concrete work). The price of the better woods, in logs, placed at the sawmill, is in the order of Colones 6.50/inch and the price of the soft woods is in the order of Colones 4.50/inch. There is a large sawmill at Guácimo.

4.10 Labor Availability

At present, there is abundant, unskilled labor in the area due to the growth of surrounding towns and to the decrease in banana activity in the area. Wages for peons and unskilled local labor are in the order of Colones 250.00 to 300.00 per day for an 8-hour day. The Hacienda only has internal transportation.

There is a shortage of skilled construction labor and it is expected that it will be necessary to use personnel from outside the area during the construction period.

4.11 Archeological Potential

Traditionally, in this area and particularly at Hacienda Las Mercedes, large quantities of archelogical items have been discovered and extracted. There continues to be a clandestine activity of so-called "huaqueros" (diggers for such items) in certain parts of Hacienda Bremen (the higher banks of the Parismina River, the vicinity of the Southeast banana plantation and the banks of the Dos Novillos River), Hacienda Las Mercedes and the property of H. Stone.

It would be advisable to take steps and obtain help to make an archelogical survey of the farm.

ATTACHMENT No. 2

MEMO: Electric and Telephone Inquiries with ICE, Project EARTH/AID, Hacienda Bremen, Pocora, Limón.

TO: Engineer Rodolfo Castro - DYPSA

Electrification:

Engineer Armando Gutiérrez C. met at ICE with Engineer José Manual Fernández, Chief of Distribution Systems, and Engineer Alfredo Povedano, on June 11th, 1985. The following points were established at that meeting:

1. ICE has a high-voltage line, 34.5 KV, which runs parallel to the Pocora-Guápiles road and said line has the capacity to supply the 1,200 KVA that it is estimated the EARTH project will require.

2. On the basis of costs for contracting for high-voltage lines, which ICE has received recently, the unit costs for the main feeder at Hacienda Bremen were estimated.

Telephones:

Engineer Carlos Meneses C. met at ICE with Engineer Kenneth Phillips, Chief of Rural Telephones, on June 13th, 1985. At said meeting the following points were established:

1. ICE has a rural telephone exchange at Pocora. The capacity of that exchange is exhausted.

2. Hacienda Bremen has two trunk lines from the above exchange.

3. ICE recommends carrying these two trunk lines up to the internal exchange of the project and there install two, 12-channel carrier-wave apparatus, which would give the project a total of 24 outside lines.

4. The total cost of the carrier-wave apparatus and the charge for connecting the 24 trunk lines, is estimated by ICE at Colones 1,320,625.00, tax included.

REGIONAL AGRICULTURAL COLLEGE

SUPPORT UNIVERSITY COMPONENT

I. DESIGN/PLANNING PHASE

A. BACKGROUND

USAID/Costa Rica and ROCAP are in the process of preparing a project for the Regional Agricultural Higher Education Project. The goal of this ten year project is to increase the agricultural productivity of the humid tropics in Central America thereby enhancing rural economic growth and employment opportunities. The project's purpose 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 project consists of two components: 1) The creation of an Inter-American agricultural college; and 2) the strengthening of the graduate training program at the Tropical Agriculture Research and Training Center (CATIE).

The Inter-American College will be a private four-year institution with a course of study leading to a Bachelor of Science degree in agriculture. The College will be built in the lowland tropics of Costa Rica and will provide "hands on" practical training in lowland humid tropical agriculture to approximately 400 students.

B. OBJECTIVE

The objective of work performed under this PIO/T is to provide professional assistance to USAID/Costa Rica in planning for the College of Agriculture for the Humid Tropical Region (EARTH).

C. SCOPE OF WORK

1. Conduct a personnel recruitment and screening process for the nomination of candidates for the positions of: College Rector, Provost, Director of Business Affairs, Director of Academic and Student Affairs, Assistant Director of Finance and Controller, Farm Manager, Resident Engineer.

a. Develop position descriptions for review and approval of Board of Trustees and/or Board of Directors.

b. Mail approved position announcements to all U.S. Universitites, International Agricultural Research Centers, and other points as directed by USAID/Costa Rica.

c. Receive and acknowledge each nomination and application.

d. Develop screening criteria for Board of Trustees, Board of Directors and USAID/Costa Rica approval using the W.K. Kellogg Foundation Task Force report as a guide.

e. Evaluate each application, including contact of references as appropriate, in relation to the screening criteria, and rank the candidates in order of priority.

f. Conduct personal interviews of the top 2-5 candidates for each position.

g. Submit a final ranking of the top 3 and recommendation for each position to the Board of Trustees, Board of Directors and USAID/Costa Rica.

h. Assist Board(s) with scheduling the final interview(s) as directed by the Chair of the Board and/or the USAID/Costa Rica.

2. Develop suggested purchase specifications for new equipment:

a. Using the existing recommended equipment list, review and confirm the appropriateness of the equipment in relation to the projected use.

b. Using commercially available catalogs, write suggested purchase specifications for use by USAID purchasing officers.

c. Determine the availability of equipment in Costa Rica, analyze the procurement possibilities and conduct price comparisons to purchasing equipment in the U.S.

3. Provide recommendations and assistance in the establishment of the new college library.

a. Using the curriculum plan for the college, identify and write purchase specifications for appropriate text and reference books and periodicals.

b. Provide advice on the selection of an automated data retrieval system compatible with professional standards and in harmony with the systems presently used at CATIE and University of Costa Rica.

c. Provide advice on the most effective design of the new library to assure safe storage of mterials in a dry and secure, yet easily-used environment.

4. Provide assistance in college planning and design.

a. Provide advice on the plan and design of the new college using technical agriculture professionals and other professionals from the campus such as engineers, architects, and city and regional planners.

b. Conduct an ecosystem and forest resource analysis to provide planners with information on the environmental aspects of the college construction and development.

5. Provide management and supervision for the activities identified above.

a. Provide a Project Director at half time to manage and coordinate the above activities.

b. Provide supporting clerical and communications, including necessary supplies and materials.

c. Provide for the fringe benefits on applicable personnel.

d. Provide a system of fiscal management and control.

D. REPORT REQUIREMENT

Five copies of the final report, in English, discussing all points as described in the scope of work will be submitted to USAID/Costa Rica. The report must be accepted by USAID/Costa Rica.

E. LOGISTIC SUPPORT

The contractor will work in the United States and in Costa Rica or elsewhere as directed by the AID Liaison Official. USAID/Costa Rica will provide office space and secretarial support as available.

F. ESTIMATED LEVEL OF EFFORT

The estimated level of effort is the following:

	Person days
Faculty Associates to assist with screening	25
Librarian	30
Equipment Specialists	40
Agronomic and Natural Resource Specialists	45
Site Planners	25
Architect	30
Director	60
Total	255

Technical specialists will be expected to work a six-day work week while in Costa Rica.

G. PERIOD OF PERFORMANCE

The design/planning portion of the collaborative assistance effort should be completed within a five-month calendar period after award of the contract.

II. LONG TERM IMPLEMENTATION PHASE

A. GENERAL

The following description is a general outline of the intended implementation of this project. The specific scope of work to be included in the implementation contract will be a product of collaboration between the design contractor and USAID/Costa Rica.

B. BACKGROUND AND SCOPE

USAID/Costa Rica is supporting the establishment of a new College of Agriculture for the humid tropics to be located northeast of San José, Costa Rica. The college seeks to develop a professional agricultural human resource capable of managing the fragile lands of the humid tropics through agriculturally efficient and ecologically sound practices which will develop and improve the potential of those resources to help provide the food and employment needs of Latin America. Graduates of the college will be prepared to assume positions of responsibility in the private and public sectors. The college of 400 students will be a private, teaching institution composed of an international faculty and student body dedicated to academic and career excellence based on the principle of "learn by doing".

The planning and development of a new higher educational institution is complex, difficult and challenging. Part of the difficulty is in the fact that recruiting the right people in the appropriate sequence is virtually impossible. Thus, when it is vital to have a given plan or to make a significant decision important to the development of the institution, competent people may not be available to do the necessary staff work for wise or sound action.

Another problem is in the fact that many uncertainties and unanticipated realities occur, and create anxieties and emotional stress for initial staff members.

Both of these considerations, and others, will require a support system that can make available expertise when it is needed and can offer a stabilizing influence to help deal with the numerous "ups and downs" that will inevitably occur during the developmental and formative years of the College.

It is highly desirable, therefore, to locate an interested and competent university in the United States that has an educational philosophy similar to that anticipated for the School and contract with it, as a lead institution, with the cooperation of several other institutions, to provide the necessary support system for at least the first 10 years of development.

The functions of this support system include:

(1) Providing technical and professional expertise where needed and in a timely manner to analyze situations or problem areas, so as to provide staff work for sounder planning and decision making.

(2) Assisting in faculty, staff and student recruitment.

(3) Where regular staff with the appropriate abilities and characteristics cannot be employed, providing staff for periods of a year, two years or even more to help perform the necessary functions for the development of the institution.

(4) Where regular staff or potential staff can be found, but are deficient in certain areas of background, providing additional training and upgrading.

(5) Providing exchanges of staff for the purpose of expanding the backgrounds and abilities of the employees of all institutions involved.

(6) Providing student exchanges to enhance the learning and experience of students at both the new and support institutions.

(7) Developing arrangements to make it possible for the more highly motivated and academically competent students to continue their studies toward Masters or PhD degrees.

(8) Offering general support for the times when something goes wrong or awry, as will inevitably happen; providing a support base to fall back upon, to consult or to offer emergency help as needed.

Based upon the recommendation of the Task Force which assisted in designing the project, a single or lead institution will be contracted to carry the responsibilities enumerated above. That institution will be permitted to develop arrangements with one or more other universities, if desired, to provide support.

It is the Mission's position that it will be important to involve U.S. Universities that have a strong commitment to the concept of "learning by doing" and/or a significant commitment to the development of studies in tropical agriculture on their own campii.

C. ESTIMATED LEVEL OF EFFORT

1. College Administration and Faculty

A total of 10 person years of full time assistance to the College is anticipated. Two persons each year beginning in 1987 through 1990 and one person for years 1991 and 1992 each are anticipated. This will include both administrative staff and faculty to fill gaps in the staffing of the College or to provide experienced individuals in key areas during the early years of development.

2. Consultants

Six months of consulting are anticipated for each of the 10 years beginning in 1985 and ending 1994.

3. Educational Upgrading of International Staff

Beginning in year 4 (1988) it is anticipated that special opportunities and training will be needed for the College's international staff. This training will be in the form of short courses in teaching and/or agricultural experiences. It is anticipated that a total of 8 years of training will be necessary.

The training can occur at the support institution or any other university or international center.

II. SELECTION CRITERIA AND METHOD OF SELECTION

	Maximum Points
A. Selection Criteria	
1. Institutional Considerations	50
- A clearly defined and well-established philosophy, method and practice of "learning by doing"	
- A significant agriculture college/department offering at least a Baccalaureate degree	
- A research program geared to the solution of practical problems, primarily as a support for teaching	
- General awareness and experience within its staff of Latin American cultures, and agricultural problems in tropical areas	
- A significant demonstrable commitment to overseas development	
- A clear unequivocal policy of giving credit toward career goals to professional staff who will work at the new college	
2. Responsiveness of Technical Proposal	10
- Demonstrated understanding of the dimensions of the problems to be addressed	
- Presentation of a clear and complete strategy supplying the requirements of this RFI	
3. Personnel	40
- Education experience and training ability of proposed specialists	
- Relevant work experience, particularly in an LDC setting, of proposed specialists	
- Demonstrated successful administrative and managerial capability of proposed in-country Chief-of-Party	
- Demonstrated managerial capability of proposed campus backstopping	
Total	100

B. Method of Selection

The selection process will be carried out in accordance with A.I.D. procedures established for contracting under the collaborative assistance selection mode. As set forth in AIDAR Subpart 715.613-71, an Evaluation Committee consisting of representatives from the Host Government and A.I.D. will be responsible for evaluating and selecting an institution to implement the project. After completion of the evaluation, the proposals will be ranked in descending order according to scores. The results of the scoring will be submitted to the Contracting Officer for concurrence. If the Contracting Officer concurs, he shall commence negotiations with the top ranked institution which will be requested to submit cost, pricing and other necessary data. If a satisfactory contract cannot be obtained, the Evaluation Committee shall be advised and may recommend alternative source(s). The high ranked institution may be requested to send representative(s) to Costa Rica to negotiate the cost, terms and conditions of the contract. The costs involved in negotiation are not directly reimbursable by AID regardless of the outcome of the negotiations.

YEARLY EXPENDITURES FOR AGRICULTURAL COLLEGE SUPPORT INSTITUTION COMPONENT ($000)

	1986		1987		1988		1989		1990		1991		1992		1993		1994		1995		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
1. Faculty & Admin. 1/																						
Number			2		2		2		2		1		1								10	
Salaries			76		84		92		101		56		61								470	
75% FX			57		63		69		76		42		46								352	
25% LC				19		21		23		25		14		15								117
Fringe Benefits (25%)			19		21		23		25		14		15								117	
Relocation 2/																						
Number			2				4				3		1		1						11	
Costs			10				20				15		5		5						55	
2. Consultants 3/																						
Number	0.5		0.5		0.5		0.5		0.5		0.5		0.5		0.5		0.5		0.5		5	
Cost	30	3	33	3.3	36	4	40	4	44	4	48	5	53	5	58	6	64	6	71	7	478	48
3. Educ. Upgrading for Staff					15		17		18		20		22		24		27		29		172	
4. Backstopping Costs	20		22		24		27		29		32		35		39		43		47		319	
5. Overhead (30%)	15		42		48		59		58		51		53		38		40		44		448	
6. Total	65	3	183	22	207	25	254	27	250	30	223	19	230	21	164	6	174	6	191	7	1941	165

1/ $38,000 used as salary estimate in 1987
2/ $5,000 in and $5,000 out per family, each position is replaced every two years
3/ $6,000/month, $1,000 LC for RT ticket, $1,000 LC for per diem

ENDOWMENT SENSITIVITY ANALYSIS

Dollar Endowment

The cash flow of the dollar endowment which is presented in the narrative section of the project paper and considered the most realistic and conservative by the Mission is presented in this section as scenario 1. Scenario 1 assumes that the GOCR in counterpart contributions provides $10 million in equal installments of $2.5 million for four years beginning in year 1986, see page 6 of annex 1.E for details. Scenario 1 also estimates a level of matriculation fees beginning in year 1987 of $276,000 leveling off at $1.4 million in 1994 and then increasing by 3% per year. Three percent per year is considered low since faculty members will be receiving salary increases of six percent and the normal procedure is to have matriculation fee increases equal faculty salary increases. Fund raising will begin in year 1988 and for this analysis a low of $500,000 per year will be assumed. This is considered low because Zamorano in Honduras is able to obtain approximately $500,000/year without even a fund raising program. Since most of the export crops are tree crops farm production is not expected to begin until year 1992 thus providing $300,000 of income and increasing to $323,000 per year due to the increase in expected sale prices (2.5%/year). In year 1996 it is expected there will be sufficient production to provide for 25% of the operating costs. Presently Zamorano provides for 80% of its operating costs from farm production on less land area than the College will have available for production. Therefore, the Mission felt that an assumption of only 25% is very conservative. From this scenario it can be seen that the endowment capitalizes through year twenty and is expected to continue on into the future, enabling the College to be financially independent.

To determine the vulnerability of the endowment an analysis of the cash flow by varying the income sources was conducted, see following tables. If all income sources are kept equal as presented in scenario 1, except for an increase in farm production, the endowment will capitalize at a greater rate. Scenario 2 presents this concept with farm production covering only 50% of the operating costs, 30% less than what Zamorano can accomplish. The result is an increase in capitalization and an ending balance after 20 years of $51.8 million.

If all income sources are kept equal as presented in scenario 1, except for increasing the annual matriculation fees by 6% instead of 3%, the endowment will also capitalize at a greater rate. Scenario 3 presents this concept, a 6% annual increase which equals the annual salary increases granted the faculty and staff. The analysis shows that the endowment continues to capitalize through year 2005 with an ending balance of $42.7 million.

Scenario 4 presents the case where farm production covers 50% of the operating costs and matriculation fees are increased by 6% annually. The endowment continues to capitalize and has an ending balance of $56.2 million.

Scenarios 1-4 show extensively that the College will be financially independent and able to cover its operating costs for 20 years and more.

Also presented in this analysis are 4 scenarios which are considered the worst cases. For instance if the GOCR for some unforeseen reason does not provide the $10 million for the endowment but only provides $5 million there could be serious problems with the cash flow of the endowment. However, Scenario 5 shows how the endowment cash flow is affected if this should occur and matriculation fees remain 6% annually and farm production covers only 25% of the costs. Scenario 6 uses the same assumptions except that farm production covers 50% of the costs. In both cases capitalization still occurs to year 20, however at a slower rate and the ending balance for scenario 5 would be $31.9 million and scenario 6, $45.4 million.

Scenarios 7 and 8 present those cases where fund raising does not reach the anticipated levels. Scenario 7 presents the cash flow of the endowment with only $250,000 instead of $500,000 per year raised from outside sources. If the other assumptions remain equal, matriculation fees at 6% and farm production covering 25% of the costs, the endowment still capitalizes and has an ending balance of $35.7 million.

The worst case expected is presented in scenario 8 where the initial host country contribution is only $5 million instead of $10 million and fund raising is only $250,000 per year. Capitalization still occurs through year twenty and the ending balance is $24.5.

From the analysis it is shown that even at the worst anticipated case, the endowment will be sufficient to [illegible] dollar operating costs for 20 years and more. This will provide th[illegible] with sufficient funds to be financially independent and therefore wil[illegible]eed further resources from AID.

Local Currency Endowment

The local currency endowment which is presented in the narrative section of the project paper and considered by the Mission to be the most conservative is presented in this section as scenario 9.

The major income source to the local currency endowment is from farm production. Zamorano in Honduras, with less land than the College will have available, is able to produce sufficient income from farm production to cover 80% of all their operating costs. The College needs to provide only 45% of the local currency operating costs to have continued capitalization of the endowment, see scenario 9.. In this scenario capitalization occurs through the nineteenth year and a small amount of decapitalization occurs in year twenty with an ending balance of $61.3 million. The Mission considers this to be the worst and most conservative case.

Scenario 10 and 11 present the cash flow of the local currency endowment when farm production covers 60% and 80% of the operating costs, respectively. In both cases capitalization occurs at an increased rate when compared to

scenario 9. Both cases show capitalization occuring through year twenty and obviously will continue far into the future. The ending balance when farm production covers 60% of the costs is $75.4 million and when it covers 80% of the costs the balance is $94.1 million.

There exists the possibility with the local currency endowment that the real interest rate will be less than 4.5%, as estimated by the Mission economists. Scenario 12 and 13 present the local currency endowment cash flow if the real interest is 3.5% and farm production covers 60% of the costs (scenario 12), and 80% of the costs (scenario 13). Scenario 12 shows that if farm production provides enough income for 60% of the operating costs capitalization will occur through twenty years with an ending balance of $58.2 million. Scenario 13 shows that if the farm produces sufficient income to cover 80% of the operating costs, equal to Zamorano, the ending balance would be $75.4 million.

From this analysis the Mission has concluded that there will be sufficient local currency to cover all local currency costs of the College for twenty years and more.

TWENTY YEAR CASH FLOW PROJECTIONS OF DOLLAR ENDOWMENT FOR AGRICULTURAL COLLEGE

SCENARIO 1: a) LC to $ 10 million, b) farm prod. covers 25% of costs from yr 1996 c) fund raising, 500,000/yr, d) mat. fees increase by 3%/yr in year 1995

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	EOP 1995	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. LC to dollars by GOCR	2500	2500	2500	2500																
2. Farm production							300	307	315	323	815	864	916	971	1029	1091	1156	1226	1299	1377
3. Matriculation fees		276	524	773	1021	1111	1194	1277	1360	1401	1443	1486	1530	1576	1624	1672	1723	1774	1827	1882
4. Fundraising and other			500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
5. Total income sources	2500	2776	3524	3773	1521	1611	1994	2084	2175	2224	2758	2850	2946	3047	3153	3263	3379	3500	3627	3759
6. Beginning balance	2500	5388	9155	13340	15462	17769	20563	23572	26808	30238	34356	35492	36579	37609	38570	39453	40244	40929	41495	41925
7. Real interest at 4.5%	112	242	412	600	696	800	925	1061	1206	1361	1546	1597	1646	1692	1736	1775	1811	1842	1867	1887
8. Balance	2612	5631	9567	13940	16157	18568	21488	24633	28014	31599	35902	37089	38225	39301	40306	41228	42055	42771	43362	43812
9. Recurrent cost after EOP											3261	3456	3664	3883	4116	4353	4625	4903	5197	5509
10. Ending balance	2612	5631	9567	13940	16157	18568	21488	24633	28014	31599	32642	33633	34562	35418	36190	36865	37430	37869	38166	38303

SCENARIO 2: a) LC to $ 10 million, b) farm prod. covers 50% of costs from yr 1996 c) fund raising, $500,000/yr, d) mat. fees increase by 3%/yr in year 1995

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. LC to dollars by GOCR	2500	2500	2500	2500																
2. Farm production							300	307	315	323	1630	1728	1832	1942	2058	2182	2313	2451	2598	2754
3. Matriculation fees		276	524	773	1021	1111	1194	1277	1360	1401	1443	1486	1530	1576	1624	1672	1723	1774	1827	1882
4. Fundraising and other			500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
5. Total income sources	2500	2776	3524	3773	1521	1611	1994	2084	2175	2224	3573	3714	3862	4016	4182	4354	4535	4726	4926	5137
6. Beginning balance	2500	5388	9155	13340	15462	17769	20563	23572	26808	30238	35172	37208	39288	41410	43572	45771	48002	50263	52548	54852
7. Real interest at 4.5%	112	242	412	600	696	800	925	1061	1206	1361	1583	1674	1768	1863	1951	2060	2160	2262	2365	2468
8. Balance	2612	5631	9567	13940	16157	18568	21488	24633	28014	31599	36754	38882	41056	43274	45533	47830	50162	52524	54912	57320
9. Recurrent cost after EOP											3261	3456	3664	3883	4116	4353	4625	4903	5197	5509
10. Ending balance	2612	5631	9567	13940	16157	18568	21488	24633	28014	31599	33494	35426	37392	39391	41417	43467	45537	47622	49715	51812

TWENTY YEAR CASH FLOW PROJECTIONS OF DOLLAR ENDOWMENT FOR AGRICULTURAL COLLEGE

SCENARIO 3: a) LC to $ 10 million, b) farm prod. covers 25% of costs from yr 1996 c) fund raising, 500,000/yr, d) mat. fees increase by 6%/yr in year 1995

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 EOP	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. LC to dollars by GOCR	2500	2500	2500	2500																
2. Farm production							300	307	315	323	815	864	916	971	1029	1091	1156	1226	1299	1377
3. Matriculation fees		276	524	773	1021	1111	1194	1277	1360	1441	1528	1619	1717	1820	1929	2045	2167	2297	2435	2581
4. Fund raising and other			500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
5. Total income sources	2500	2776	3524	3773	1521	1611	1994	2084	2175	2264	2843	2984	3133	3291	3458	3635	3824	4023	4234	4458
6. Beginning balance	2500	5388	9155	13340	15462	17769	20563	23572	26808	30279	34484	35759	37045	38339	39638	40941	42244	43542	44834	46113
7. Real interest at 4.5%	112	242	412	600	696	800	925	1061	1206	1363	1552	1609	1667	1725	1784	1842	1901	1959	2018	2075
8. Balance	2612	5631	9567	13940	16157	18568	21488	24633	28014	31641	35036	37358	39712	40064	41422	42784	44145	45502	46851	48188
9. Recurrent cost after EOP											3261	3456	3654	3883	4116	4363	4625	4903	5197	5509
10. Ending balance	2612	5631	9567	13940	16157	18568	21488	24633	28014	31641	32776	33912	35048	36180	37306	38420	39519	40599	41654	42679

SCENARIO 4: a) LC to $ 10 million, b) farm prod. covers 50% of costs from yr 1996 c) fund raising, $500,000/yr, d) mat. fees increase by 6%/yr in year 1995

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. LC to dollars by GOCR	2500	2500	2500	2500																
2. Farm production							300	307	315	323	1630	1728	1832	1942	2058	2182	2313	2451	2598	2754
3. Matriculation fees		276	524	773	1021	1111	1194	1277	1360	1441	1528	1619	1717	1820	1929	2045	2167	2297	2435	2581
4. Fund raising and other			500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
5. Total income sources	2500	2776	3524	3773	1521	1611	1994	2084	2175	2264	3658	3848	4048	4261	4487	4725	4980	5249	5534	5836
6. Beginning balance	2500	5388	9155	13340	15462	17769	20563	23572	26808	30279	35299	37475	39754	42140	44640	47259	50002	52876	55886	59040
7. Real interest at 4.5%	112	242	412	600	696	800	925	1061	1206	1363	1588	1686	1789	1896	2009	2127	2250	2379	2515	2657
8. Balance	2612	5631	9567	13940	16157	18568	21488	24633	28014	31641	35888	39161	41543	44037	46649	49386	52252	55255	58401	61696
9. Recurrent cost after EOP											3261	3456	3654	3883	4116	4363	4625	4903	5197	5509
10. Ending balance	2612	5631	9567	13940	16157	18568	21488	24633	28014	31641	33627	35705	37879	40153	42533	45022	47627	50352	53204	56188

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TWENTY YEAR CASH FLOW PROJECTIONS OF DOLLAR ENDOWMENT FOR AGRICULTURAL COLLEGE

SCENARIO 5: a) LC to $ 5 million, b) farm prod. covers 25% of costs from yr 1995 c) fund raising, 500,000/yr, d) mat. fees increase by 6%/yr in year 1995

	1986	1987	1988	1989	1990	1991	1992	1993	1994	EOP 1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. LC to dollars by GOCR	2500	2500	0	0																
2. Farm production							300	307	315	323	815	864	916	971	1029	1091	1156	1226	1299	1377
3. Matriculation fees		276	524	773	1021	1111	1194	1277	1360	1441	1528	1619	1717	1820	1929	2045	2167	2297	2435	2581
4. Fund raising and other			500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
5. Total income sources	2500	2776	1024	1273	1521	1611	1994	2084	2175	2264	2843	2984	3133	3291	3458	3635	3824	4023	4234	4458
6. Beginning balance	2500	5388	6655	8228	10119	12186	14728	17476	20437	23621	27527	28489	29447	30399	31342	32271	33183	34074	34939	35773
7. Real interest at 4.5%	112	242	299	370	455	548	663	786	920	1063	1239	1282	1325	1368	1410	1452	1493	1533	1572	1610
8. Balance	2612	5631	6955	8598	10574	12734	15391	18262	21357	24684	28766	29771	30772	31767	32752	33723	34677	35608	36512	37383
9. Recurrent cost after EOP											3261	3456	3664	3883	4116	4363	4625	4903	5197	5509
10. Ending balance	2612	5631	6955	8598	10574	12734	15391	18262	21357	24684	25505	26314	27109	27884	28636	29360	30051	30705	31315	31874

SCENARIO 6: a) LC to $ 5 million, b) farm prod. covers 50% of costs from yr 1996 c) fund raising, $500,000/yr, d) mat. fees increase by 6%/yr in year 1996

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. LC to dollars by GOCR	2500	2500	0	0																
2. Farm production							300	307	315	323	1630	1728	1832	1942	2058	2182	2313	2451	2598	2754
3. Matriculation fees		276	524	773	1021	1111	1194	1277	1360	1441	1528	1619	1717	1820	1929	2045	2167	2297	2435	2581
4. Fund raising and other			500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
5. Total income sources	2500	2776	1024	1273	1521	1611	1994	2084	2175	2264	3658	3848	4048	4261	4487	4726	4980	5249	5534	5836
6. Beginning balance	2500	5388	6655	8228	10119	12186	14728	17476	20437	23621	28342	30205	32156	34201	36343	38589	40942	43408	45992	48700
7. Real interest at 4.5%	112	242	299	370	455	548	663	786	920	1063	1275	1359	1447	1539	1635	1736	1842	1953	2070	2192
8. Balance	2612	5631	6955	8598	10574	12734	15391	18262	21357	24684	29617	31564	33603	35740	37979	40325	42784	45361	48061	50892
9. Recurrent cost after EOP											3261	3456	3664	3883	4116	4363	4625	4903	5197	5509
10. Ending balance	2612	5631	6955	8598	10574	12734	15391	18262	21357	24684	26357	28108	29939	31856	33863	35962	38159	40458	42865	45383

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TWENTY YEAR CASH FLOW PROJECTIONS OF DOLLAR ENDOWMENT FOR AGRICULTURAL COLLEGE

SCENARIO 7: a) LC to $ 10 million, b) farm prod. covers 25% of costs from yr 1995 c) fund raising, 250,000/yr, d) mat. fees increase by 6%/yr in year 1995

	1985	1987	1988	1989	1990	1991	1992	1993	1994	1995 EOP	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. LC to dollars by GOCR	2500	2500	2500	2500																
2. Farm production							300	307	315	323	815	864	916	971	1029	1091	1156	1226	1299	1377
3. Matriculation fees		276	524	773	1021	1111	1194	1277	1360	1441	1528	1619	1717	1820	1929	2045	2167	2297	2435	2581
4. Fund raising and other			250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
5. Total income sources	2500	2776	3274	3523	1271	1361	1744	1834	1925	2014	2593	2734	2883	3041	3208	3385	3574	3773	3984	4208
6. Beginning balance	2500	5388	8905	12829	14677	16699	19195	21893	24803	27934	31784	32687	33584	34473	35348	36208	37048	37863	38648	39399
7. Real interest at 45%	112	242	401	577	660	751	864	985	1116	1257	1430	1471	1511	1551	1591	1629	1667	1704	1739	1773
8. Balance	2612	5631	9306	13406	15338	17451	20059	22878	25919	29191	33214	34158	35095	36024	36939	37838	38715	39566	40387	41172
9. Recurrent cost after EOP											3261	3456	3664	3883	4116	4363	4625	4903	5197	5509
10. Ending balance	2612	5631	9306	13406	15338	17451	20059	22878	25919	29191	29954	30702	31432	32140	32823	33474	34090	34664	35190	35663

SCENARIO 8: a) LC to $ 5 million, b) farm prod. covers 25% of costs from yr 1996 c) fund raising, $250,000/yr, d) mat. fees increase by 6%/yr in year 1995

	1985	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. LC to dollars by GOCR	2500	2500	0	0																
2. Farm production							300	307	315	323	815	864	916	971	1029	1091	1156	1226	1299	1377
3. Matriculation fees		276	524	773	1021	1111	1194	1277	1360	1441	1528	1619	1717	1820	1929	2045	2167	2297	2435	2581
4. Fund raising and other			250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
5. Total income sources	2500	2776	774	1023	1271	1361	1744	1834	1925	2014	2593	2734	2883	3041	3208	3385	3574	3773	3984	4208
6. Beginning balance	2500	5388	6405	7716	9355	11116	13361	15796	18432	21276	24326	25417	25987	26533	27052	27538	27987	28395	28754	29059
7. Real interest at 45%	112	242	288	347	420	500	601	711	829	957	1117	1144	1169	1194	1217	1239	1259	1278	1294	1308
8. Balance	2612	5631	6694	8064	9755	11617	13962	16507	19262	22233	25944	26560	27156	27727	28269	28777	29247	29672	30048	30367
9. Recurrent cost after EOP											3261	3456	3664	3883	4116	4363	4625	4903	5197	5509
10. Ending balance	2612	5631	6694	8064	9755	11617	13962	16507	19262	22233	22683	23104	23493	23844	24153	24414	24622	24770	24851	24858

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TWENTY YEAR CASH FLOW PROJECTIONS OF LOCAL CURRENCY ENDOWMENT FOR AGRICULTURAL COLLEGE

SCENARIO 9: farm production covers only 45% of operating costs

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	EOP 1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Beginning Balance	25000	50772	52489	54051	55441	56650	57730	58789	59823	60294	60862	61390	61876	62315	62704	63037	63311	63521	63661	63725
2. Real Interest at 4.5%	1125	2285	2362	2432	2495	2549	2600	2646	2683	2713	2739	2763	2784	2804	2822	2837	2849	2858	2865	2868
3. Expenses	643	1032	1454	1894	2339	2580	2893	3293	3558	3902	4019	4140	4264	4392	4524	4659	4799	4943	5091	5244
4. Farm Production	289	454	554	652	1053	1181	1302	1482	1645	1756	1809	1863	1919	1976	2036	2097	2160	2224	2291	2360
5. Ending Balance	25482	52024	53396	54589	55597	56519	57487	58141	58643	59106	59581	60013	60395	60727	61002	61215	61361	61436	61434	61349

SCENARIO 10: farm production covers only 60% of operating costs

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Beginning Balance	25000	50886	52744	54536	56232	57827	59398	60913	62337	63679	64984	66300	67628	68966	70313	71667	73029	74395	75766	77139
2. Real Interest at 4.5%	1125	2289	2373	2454	2530	2602	2673	2741	2805	2866	2924	2984	3043	3103	3164	3225	3285	3346	3409	3471
3. Expenses	643	1032	1454	1894	2339	2580	2893	3293	3558	3902	4019	4140	4264	4392	4524	4659	4799	4943	5091	5244
4. Farm Production	386	619	672	1137	1403	1548	1736	1976	2195	2341	2411	2484	2558	2635	2714	2796	2879	2965	3055	3146
5. Ending Balance	25482	52125	53664	55006	56424	57850	59177	60361	61484	62643	63889	65144	66408	67678	68953	70233	71516	72800	74084	75365

SCENARIO 11: farm production covers 80% of operating costs

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Beginning Balance	25000	50998	53085	55183	57287	59397	61554	63746	65956	68192	70430	72848	75298	77834	80456	83174	85985	88894	91906	95024
2. Real Interest at 4.5%	1125	2295	2389	2483	2578	2673	2770	2869	2968	3069	3172	3278	3388	3503	3521	3743	3869	4000	4136	4276
3. Expenses	643	1032	1454	1894	2339	2580	2893	3293	3558	3902	4019	4140	4264	4392	4524	4659	4799	4943	5091	5244
4. Farm Production	514	826	1163	1515	1871	2064	2314	2635	2926	3122	3215	3312	3411	3513	3619	3727	3839	3954	4073	4195
5. Ending Balance	25482	52259	54020	55772	57526	59490	61431	63321	65266	67359	69633	71987	74423	76945	79555	82258	85055	87952	90951	94056

TWENTY YEAR CASH FLOW PROJECTIONS OF LOCAL CURRENCY ENDOWMENT FOR AGRICULTURAL COLLEGE

SCENARIO 12: farm production covers only 60% of operating costs and real interest is 3.5%

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (EOP)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Beginning Balance	25000	50518	51977	53214	54319	55285	56188	56997	57675	58236	58707	59154	59569	59948	60290	60591	60848	61058	61217	61324
2. Real Interest at 3.5%	875	1772	1819	1862	1901	1935	1967	1995	2019	2038	2055	2070	2085	2098	2110	2121	2130	2137	2143	2146
3. Expenses	643	1032	1454	1894	2339	2580	2893	3293	3658	3902	4019	4140	4264	4392	4524	4659	4799	4943	5091	5244
4. Farm Production	386	819	872	1157	1403	1548	1736	1976	2195	2341	2411	2484	2558	2635	2714	2795	2879	2966	3055	3146
5. Ending Balance	25232	51357	52342	53183	53981	54640	55261	55699	56035	56306	56743	57085	57390	57655	57877	58052	58178	58252	58269	58225

SCENARIO 13: farm production covers 80% of operating costs and real interest is 3.5%

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Beginning Balance	25000	50746	52316	53556	55353	56552	58305	59765	61201	62611	64022	65459	66922	68412	69928	71471	73040	74637	76261	77912
2. Real Interest at 3.5%	875	1776	1831	1875	1938	1979	2041	2092	2142	2191	2241	2291	2342	2394	2447	2501	2556	2612	2669	2727
3. Expenses	643	1032	1454	1894	2339	2580	2893	3293	3658	3902	4019	4140	4264	4392	4524	4659	4799	4943	5091	5244
4. Farm Production	514	826	1153	1515	1871	2064	2314	2635	2926	3122	3215	3312	3411	3513	3619	3727	3839	3954	4073	4195
5. Ending Balance	25232	51491	52693	53847	54961	56242	57455	58566	59685	60901	62244	63511	65001	66415	67852	69313	70798	72306	73839	75395

SOCIAL SOUNDNESS ANALYSIS

1. Role of Agriculture

Agriculture has long been a major source of wealth and employment in Central America. 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 upon 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 CAP population, which is projected to increase from 24.5 million in 1984 to 60.3 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 I

PROJECTED POPULATION GROWTH 1984 - 2020

COUNTRY	MID 1984 POPULATION (Millions)	PERCENT OF REGION	PROJECTED POPULATION IN 2020	PERCENT OF REGION	INCREASE FROM 1984 NUMBER	2020 PERCEN
Costa Rica	2.5	10.2	4.7	7.8	2.2	88.
El Salvador	4.8	19.6	12.3	20.4	7.5	156.
Guatemala	8.0	32.7	19.3	32.0	11.3	141.
Honduras	4.2	17.1	12.0	19.9	7.8	185.
Nicaragua	2.9	11.8	8.2	13.6	5.3	182.
Panama	2.1	8.6	3.8	6.3	1.7	81.
Region	24.5	100.0	60.3	100.0	35.8	146.

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 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.

Annual rates of CA/P population growth are substantially higher in 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 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.

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

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 to females enrolled in primary school is 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 proportions enrolled in secondary and higher education in industrial market economies (90 percent and 37 percent) are substantially higher.

Rural Agrarian Sector

The CA/P 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	Agriculture As a Percent of GDP c
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	--
Industrial Market Economics	11,070	22	6	114	3

a/ Dollars, 1982. Gross National Product.
b/ Based on each country's definition of rural, 1982.
c/ 1981 Gross Domestic Product.

Source: World Bank, World Development Report, 1984, Tables 1, 3, 6, 21 and 22.

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 Regional 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 humid 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 college will have 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 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.

The Regional Agricultural College and CATIE will be a prime resource for the spread of agricultural innovations which will enchance 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 College 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 new institutions will be qualified to occupy positions 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 the opportunity to study the requisite subjects and basic sciences with emphasis on:

(a) relevant theoretical and practical applications of agricultural trainings;
(b) practical field experience and exposure;
(c) market mechanisms and workable farm management techniques; and
(d) the ecological niche in which training will be applied.

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ECONOMIC ANALYSIS

To simplify the presentation of the economic analysis , the project has been separated into two parts. The research element (CATIE) is analyzed first and dispatched rather quickly. The second element, the regional, four year undergraduate agricultural college, is analyzed in some detail. Least cost alternatives are discussed and an internal rate of return analysis is performed on this latter element.

Research Element: CATIE

The type of research the project will support for CATIE, and described in detail elsewhere in the PP, is similar to that conducted in many other agricultural research institutions. The research carried out by these institutions has been shown to produce rates of return ranging from 46% to 71%. At CATIE, such crops as rice, corn and beans are likely candidates for research. With other similar regions of the world currently producing substantially higher yields for these crops, the research by CATIE is likely to lead to dramatic productivity increases for the CA/P region.

The review of the impact of agricultural research presented in the next few paragraphs demonstrates the kinds of return anticipated under this portion of the project.

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 captures 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.

Data from on-going agricultural research in the tropics suggests the scale of increases in yields that are likely to occur from the application of research findings:

- CIMMYT's work on corn in lowland tropical areas indicates that early maturity, varietal selection and breeding for disease resistance can increase yields per hectare 2 to 3 times over actual yield.

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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 & Posado	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.

- 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.

- Finally, 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.

Based on the comparison of the CATIE element with similar institutions, and on the review of the rates of return for these projects, it is estimated that the CATIE element of the project will produce an internal rate of return substantially greater than 15%.

Agricultural Undergraduate College Element

Introduction

A thorough economic analysis of a project should include a least cost examination of possible alternative ways of providing the same output. Once that test is completed, and the least cost alternative is selected, a rate of return analysis, such as Benefit/Cost or Internal Rate of Return (IRR), needs to be performed to determine whether the least cost (and possibly only) alternative produces an acceptable rate of return. The following sections present the results of analyzing the Regional Agricultural Higher Education Project.

Analysis of Least Cost Alternatives

As discussed in more detail elsewhere in the PP, the Regional Agriculture College will offer a B.S. degree program which emphsizes applied, practical training. Graduates of the program will have both the skills and level of training demanded by private and quasi-private sector employers (see discussion of demand for

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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agriculturalists under the section X). It is predicted that over the next few decades population growth and the expansion of agricultural operations will place greater demands on the fragile lands of the humid lowland tropics (HLT). Therefore, agricultural skills attuned to the special conditions of HLT areas are needed. Several potential alternatives were originally considered and ultimately rejected because, upon close examination, the alternatives did not produce the necessary outputs, or were not able to produce it any cheaper than the Regional Agricultural Higher Education Project.

For example, the posssibility of expanding Zamorano was rejected because, although minimum facilities might be built in the HLT, it would provide only a few months' hands-on farming experience with HLT conditions each year. Daily, not ocassional, hands-on experience is necessary in order to develop and acquire skills appropriate for HLT agriculture. Any cost savings that might be realized from this "occasional" approach are offset by the fact that such training would produce agriculturalists much like the graduates of existing agricultural colleges. The possibility of upgrading existing agricultural colleges in Central America was rejected for the above reasons as well as for organizational and political reasons.

The cost of an agricultural education in the US has been estimated to be about $24,000 per year (see Table 3). While it is difficult to make precise comparisons, Table 4 reveals that cost per student at the new college is about equivalent to US schools, or slightly more expensive. For example, if we disregard the time value of money, column 2 reveals that the cost per student at the end of 20 years would range between $34,000 and $65,000, depending on the assumption of students utilizing the facility. If we more properly take into account the time value of money and discount the net cost stream at 10% and 15%, the cost per student based on just full-time students (the Student A case in Table 4) would range between $25,100 and $32,700, or between $13,200 and $16,600 if we make an adjustment to include all students using the facility (the Student B case). The average cost per student at Zamorano is expected to reach $11,000 in the next year.

The designers argue that if it were possible to quantify the difference in the student produced by a US school (or any other school) and that produced by the new college, it would be possible to demonstrate that the hands-on experience in the HLT more than compensates for any extra cost. One point does become very clear from analysing Table 4 : without the inclusion of the part-time or

TABLE 3

ANNUAL INITIAL, RECURRING AND TOTAL COSTS

PER FULL TIME M.S. STUDENT

COST COMPONENTS	CATIE	U. S. UNIVERSITY
	(dollars)	
Recurrent		
Pre-departure	0	900
Post-arrival	0	3,000
Administration	5,000[1)]	3,300[3)]
Institutional	11,400[2)]	6,800[4)]
Maintenance		9,000
Sub-total	16,400	23,000[5)]
Initial Investment		
Depreciation (40 yrs.)	2,600	0
Interest (10%	5,200	0
Sub-total	7,800	0
Total	24,200	23,000

1) At CATIE for maintenance, administration, operating costs, etc.
2) At CATIE for personnel.
3) Selection, placement, monitoring, evaluation, etc.
4) Tuition, fees, etc.
5) This is underestimated if selected U.S. universities must increase investments in order to sharply focus on the humid tropics.

TABLE 4

ESTIMATING THE PRESENT VALUE COST PER STUDENT FOR THE AG. COLLEGE

YEAR	NET COSTS		PRESENT VALUE NET COSTS 5% DIS.FAC	PRESENT VALUE NET COSTS 10% DIS.FAC	PRESENT VALUE NET COSTS 15% DIS.FAC	PRESENT VALUE NET COSTS 20% DIS.FAC
1986	18733000					
1987	4451709		71813951	52826374	41822069	34883361
1988	6554478					
1989	6794783					
1990	2948038		COST PER STUDENT	COST PER STUDENT	COST PER STUDENT	COST PER STUDENT
1991	3067424					
1992	3516780					
1993	3928600	A	43106	31709	25103	20938
1994	5100420	B	22683	16686	13210	11018
1995	4788240					
1996	4788240					
1997	4788240					
1998	4788240					
1999	4788240					
2000	4788240					
2001	4788240					
2002	4788240					
2003	4788240					
2004	4788240					
2005	4788240					
TOTAL	107765922					
PER STUDENT A	64685					
STUDENT B	34039					

NET COSTS EQUAL TOTAL COSTS LESS MATRICULATION, FARM, AND FUND RAISING INCOMES.
AT YEAR 2005 WE ASSUME THE SALVAGE VALUE OF THE SCHOOL IS $23,430,500.
COST PER STUDENT A: ASSUMES THAT 1666 FULL TIME STUDENTS WILL HAVE GRADUATED BY 2005.
COST PER STUDENT B: ASSUMES THAT IN ADDITION TO THE 1666 THERE HAVE BEEN AN ADDITIONAL 100 EQUIVALENT FULL TIME STUDENTS YEARLY SINCE 1991, IN SPECIAL PROGRAMS, THUS, BRINGING THE TOTAL TO 3,166 STUDENTS.

WITHOUT TAKING THE TIME VALUE OF MONEY INTO ACCOUNT, THE COST PER STUDENT AFTER THE 20 YEAR PERIOD WOULD BE $64,685 ASSUMING 1666 STUDENTS, AND $34,039 ASSUMING 3166. AT A 5% DISCOUNT FACTOR, THE PRESENT VALUE COST OF A STUDENT IS $43,106. AT 10% THE VALUE IS $31,709, AND SO ON.

special programs to take advantage of the existing plant, equipment, and faculty, the new college would appear to be considerably more expensive than the US schools and Zamorano. However, with the costs per student anticipated to be roughly equivalent as a result of the special programs, and with the expectation that the new full-time student will have a much greater impact on the economy than any graduate could from any other existing school or its hybrid, alternatives to the Regional Agriculture College were rejected as not viable or not offering a more cost-effective solution. Similarly, the possibility of developing the necessary training programs in vocational or other technical schools was dismissed because the sophistication of the skills needed for HLT agriculture require higher levels of education.

In summary, there does not appear to be a more cost-effective alternative than that represented by the new Regional Agricultural College.

Internal Rate of Return Analysis

Introduction

Education projects such as this one pose a dilemma for economists because the benefits of expanded educational training are not easily quantified. The preferred method to judge whether this project produces an acceptable rate of return would be to quantify the increases in production and productivity, as well as the effect of reduced environmental degradation, anticipated in the agricultural sector. While the link between the graduates from the Regional Agriculture College and the agricultural sector is quite real, economic effects on the sector are indirect and diffuse. Most of the graduates are expected to work in the private sector, in a wide range of agriculturally related jobs, from extension to merchandizing to banking. Therefore, it is very difficult to quantify, with any sense of reasonable accuracy, the direct effects these graduates may have on production and productivity of the agricultural sector.

As an alternative procedure for measuring the benefits of the project and capturing the impact of these new graduates, salary differentials were used to estimate the major benefits in the internal rate of return (IRR) analysis of the project.

To overcome the problem of benefit measurement for training projects, economists estimate the increase in salary that is likely to result from the increased training, on the assumption that the "salary differential" will approximate the change in real output of an economy. In a perfectly competitive market economy such a salary difference can be shown to measure the increase in value added to

the economy. While no country, and especially no LDC, fits the perfectly competitive model, Psacharopoulos has shown that in long run, the salary differential is a good indicator or measure of the income change to any economy resulting from increased skills through training (George Psacharopoulos, The Economics of Higher Education in Developing Countries, World Bank Reprint Series: Number 225).

Although the lack of good quality data and the usual ex-ante nature of some of the assumptions and estimates preclude a definitive answer on the precise return the economy may expect from this project, the exercise is still quite useful because it provides a sense of the "order of magnitude" of the project. For a project of this size, this "sense of magnitude" is extremely important. Eventhough the proposed Agricultural College may have been shown to be the least costly (or the only alternative) to alleviate the human resource constraint, its costs may still be so large, relative to the anticipated benefits, that the project may not be acceptable, given other alternative uses for the money. The internal rate of return analysis provides that test.

In addition to the benefits resulting from salary differentials, benefits arising from matriculation, farm income, fund raising, and special programs are estimated. Another category of benefits, termed "external benefits", is included to capture those benefits not included in the salary differential. Each benefit and its calculation is discussed in the following sections.

INTERNAL RATE OF RETURN ANALYSIS

Introduction

We first develop a conservative, "base" case, and then conduct sensitivity analysis as a means of arriving at an estimate of the rate of return for the project. The analysis assumes that there is more than adequate demand for the graduate student, as indicated by the survey.

Benefit and Cost Elements of the Basic Model

Matriculation and Fund Raising Income Benefit

These two items are included as benefits because personnel of the college will be actively engaged in seeking students and donations, and because equipment and materials of the college will be used in the activity. Details of the calculations are found in Annex II.B.3.

Farm Income Benefit

The students of the college will produce farm products for export and for their own comsumption. Based on the Zamorano experience, we estimate that the students will be able to provide 75% of their own needs.

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Benefits From Special Programs

An important addition to the school's program, beginning about the fourth year of the project, will be special short-term seminars, classes, etc., to farmers in Costa Rica and possibly to special groups from other Central American countries. The major impact of these programs is likely to be measured more directly in production increases than in salary changes. It is reasonable to expect these seminars to lead to farm income changes in the range of $500 to $5000 which result from more efficient use of fertilizers and pesticides, and better farm practices in general. At least 200 farmers or agriculturalists beginning in 1991 are expected to receive such training. On the average, the participants will acquire skills which will increase their incomes by at least $800 per year.

Salary Differential Income Benefit

The salary information used in the analysis was obtained from the four country survey discussed in detail in Annex X. Table 5 summarizes the survey findings and presents the salary differentials used in the analysis. Because of the limited size of the sample, the survey results cannot be used to arrive at definite conclusions within specific confidence limits. However, the data do provide a good sense of the minimum and maximum salary differential that is likely to occur. With this information a sense, or "order of magnitude" of the rate of return that can be expected from the project can be established.

Graduates from the Regional Agricultural College will be quite different than graduates of existing agricultural colleges. Greater emphasis will be placed on acquiring practical skills. Combined with B.S. level training, such skills should result in a salary level for the Agriculture College's graduates somewhere between that of existing agriculture colleges and graduate level training. Without any information to the contrary, for the base case it is assumed that the Regional Agriculture College graduate will command a salary half-way between the agricultural graduate and the person with graduate training, as shown in column 2 of Table 5. The salary differential between an Agriculture College graduate and a vocational school graduate is $472/month ($820-$348), or $5700/year.

Implicit in the above calculation is the assumption that all full-time Agricultural College students are graduates of vocational schools. In practice, it may well be that some percentage of the Regional Agriculture College students will come from regular high schools. For these students, it is likely that the salary differential between what they could earn as a high school graduate and as an Agriculture College graduate will be greater than that assumed in the base case. The impact of the possibility is examined in the

sensitivity analysis. It is assumed that all graduates are able to work for a full thirty years and work in the agriculture sector (or if not, that the salary differential will be the same as those who do, and that the impact on the economy will be the same).

TABLE 5

MONTHLY SALARIES BY EDUCATIONAL LEVEL[1]

Ed. Level	Average[1]	Adj. Average[2]
Vocational	$ 348	$ 348
Technical	$ 407	$ 407
Existing Ag. Colleges	$ 616	$ 616
Regional Agriculture College		$ 820
Grad. Training	$1022	$1022

1/ From Survey
2/ Assumes Regional Agriculture College graduate will receive a monthly salary half-way in-betweenan Ag. College graduate and a graduate with graduate school training.

Externality Income Benefit

External benefits have been included in the analysis in order to recognize and account for those additional benefits not captured by the salary differential. External benefits include changes in farm income that result from a) the passing from one farmer to another of skills and information learned at the college in the special programs, b) from the extension work performed by the students and then graduates of the school, and c) the increased income realized by others in the agriculture sector as a result of the increased efficiences provided by this new cadre of graduate. This category also includes those benefits to the economy from the reduced rate of environmental degradation which occurs as a result of the better understanding of the HLT made possible by the school and its graduates. It obviously is impossible to estimate this benefit with any degree of accuracy. No value is given to this benefit category in the base case. However, an assumption of $2,000 per graduate

would seem well within the realm of reasonableness and is used in the first case in the sensitivity analysis.

To clarify the meaning of these benefits, an external benefit of $2,000 per graduate of the college might imply, for example, that a farmer, trained or taught by the graduate passes on this information to another farmer who uses this information to increase his farm income by $2,000 permanently. That is, if this second farmer were earning $10,000 from his farm, he now would be earning $12,000/year; and all other things being equal, each year until his death, he will continue to earn $12,000. Another scenario might be 10 farmers, each realizing a $200 a year change. In the analysis, it is assumed that the external benefit continues through year 2034.

Costs

Two different types of costs are included in the analysis: construction, equipment, land, and operating costs through the year 2005, and the income foregone during the four years a student studies.

RESULTS OF THE BASIC MODEL

The project is analyzed over a 20 year period until the year 2005. The salary differential benefit continues through the year 2034, until the graduating class of 2005 has retired. In 2005, the construction cost is salvaged at 75%, the equipment at 50%, and the land at 100%. The Basic Model assumes no external benefits and that the salary for the Regional Agriculture College graduate will be half-way between that of the agricultural school graduates and those with graduate school training. These are conservative assumptions which establish the minimum value for the IRR that can be expected from the project. As Table 6 shows, the assumptions of the Basic Model produce an IRR of 5.3%. In the following section sensitivity analysis is carried out to determine how much larger the IRR can be expected to be.

Sensitivity Analysis

Twelve sensitivity analyses are included in Table 6. They result from a consideration of four different values for the external benefit and three for the salary differential benefit. The analysis produces a range of IRR values from the conservative 5.3% to the less conservative 13.4 %.with its assumptions of a salary differential benefit of $8100 and an external benefit of $10,000 per graduate.

TABLE 7

IRR RANGES

	$0 External Benefit	$2000 External Benefit	$5000 External Benefit	$10000 External Benefit
Base Case Sal.Dif $5700	5.3%	7.2%	9.4%	12.2%
Sal.Dif $6500	6.6%	7.8%	9.9%	12.64%
Sal.Dif $8100	7.5%	9.0%	10.9%	13.4%

The $6500 salary differential is based on the assumption that the Regional Agriculture College graduate will recieve a monthly salary which is two-thirds of the way between an agricultural college graduate and a graduate with graduate school training. The $8100 differential figure is based on the assumption that the differential is not just between vocational graduates and the new graduate, but also between a regular high school graduate with presumbably less earning potential. In an attempt to capture that possible difference, we have used the difference between the vocational and the graduate training figures ($1022-$348 = $674x12 = $8100. See Table 5). The External Benefit figures are chosen arbitrarily.

The $2000 estimate as an external benefit would appear not to be unreasonable. And, $6500 as a salary differential does not seem to unreasonable either, given the fact that promotions are more rapid for those with degrees than those without, and that, over time, the difference in salary will grow between the vocational and college trained people. If this new graduate fulfills the designers' expectations, the salary levels should be high, and the promotion rates higher than normal. This line of reasoning argues for an IRR in the 7-8% range. This corresponds with Psacharopoulos's estimate for the rate of return of agricultural programs in LDC universities.

If one believes that there will be a "research-like" aspect to the teaching at the college, and if one believes that the $2000 externality figure does not capture the value of the reduced rate of environmental degradation, then there is reason to believe that the IRR will exceed 9%.

Summary

In summary, the indicative evidence implies, that with no externalities, the project is likely to produce a rate of return slightly in excess of 5%. A modest assumption about the level of externalities and the environmental benefits raises the IRR to 7%. A slight increase in the salary differential produces a rate of return nearer 8%. If one believes that the research qualities of the college will produce significant externalities, as in the CATIE case, and if one believes that there will be significant cost savings to the economy as a result of the reduced rate of environmental damage, then an IRR as high as 12% becomes possible.

In light of the above discussion, if it were possible to properly measure all the externalities, the Mission believes it would be possible to demonstrate that the project will produce and IRR in the 8% to 12% range. On that basis, the Mission concludes that the Regional Agriculture College is economically justified.

EXPLANATION OF TABLES USED TO OBTAIN IRR VALUES

1. The following tables were developed as subtables of the IRR tables. That is, when a change is made in one of the following tables, the changes automatically appear in the IRR table.

   a. Matriculation Income
   b. Income From Food Production
   c. Salvage Value
   d. Salary Differential

2. Variables for which data was entered directly were:

   a. Total Costs
   b. Income Special Programs
      $800 x 200 participants
   c. Fund Raising
      $5,000,000

3. The External Benefits variable was obtained by multiplying the "number of graduates working" by either $2,000, $5,000, or $10,000. The number of graduates working came from the Salary Differential Tabe. The $2,000, $5,000, and $10,000 figures were entered directly into the IRR table.

4. The changes in the Salary Differential variable were made by replacing one value with another, i.e., by replacing $5700 with $6500 and $8100 in the table "Calculation of Salary Differential for Full-Time Students".

5. All IRR tables take the same form as the base case (IRRAG0). For all the tables associated with the IRR sensitivity calculations, only the salary differential table would vary since the external benefit values are entered directly into the IRR table. We have not included the rest of the IRR tables since it did not seem necessary. Each IRR case is on a diskette being held by the Mission and AID/W, and is available.

MATRICULATION INCOME

YEAR	NUMBER STUDENT PAYING	STUDENT FEE	MATRICULATION INCOME col 1 x col 2
1986	0	4010	0
1987	60		240600
1988	114		457140
1989	168		673680
1990	222		890220
1991	242		970420
1992	260		1042600
1993	278		1114780
1994	296		1186960
1995	314		1259140
1996	314		1259140
1997	314		1259140
1998	314		1259140
1999	314		1259140
2000	314		1259140
2001	314		1259140
2002	314		1259140
2003	314		1259140
2004	314		1259140
2005	314		1259140

INCOME FROM FOOD PRODUCTION

YEAR	EXPORTS	VALUE CONSUMPTION PER STUDENT	NUMBER OF STUDENTS	INCOME FROM FOOD PRODUCTION
1986		1340		
1987			68	68340
1988			136	136680
1989			226	227130
1990			316	317580
1991			338	339690
1992	100000		360	461800
1993	100000		360	461800
1994	100000		360	461800
1995	100000		360	461800
1996	100000		360	461800
1997	100000		360	461800
1998	100000		360	461800
1999	100000		360	461800
2000	100000		360	461800
2001	100000		360	461800
2002	100000		360	461800
2003	100000		360	461800
2004	100000		360	461800
2005	100000		360	461800

The number of students is taken from the Table, Income Lost While Studying
These numbers vary slightly from those used in the total budget tables.
The student expenditure on food per year, or "Value Consumption per Student"
as stated in the above Table, assumes $4/day for 335 days/year.

SALVAGE VALUE

YEAR	CONSTRUCTION	EQUIPMENT	LAND	TOTAL
1986	7460	2729	7500	17689
1987	2200	694		2894
1988	4430	566		4996
1989	4330	242		4572
TOTAL	18420	4231	7500	30151

SALVAGE VALUE CALCULATION

	PERCENT	ORIG.VALUE	SALVAGE
LAND	100	7500	7500
CONSTRUCT	75	18420	13815
EQUIPMENT	50	4231	2115.5
TOTAL			23430.5

CALCULATION OF SALARY DIFFERENTIAL FOR FULL-TIME STUDENTS

YEAR	NUMBER OF GRADUATES WORKING	NUMBER OF GRADUATES ANNUALLY	YEARLY SALARY DIFFERENTIAL	TOTAL ANNUAL INCREASE IN SALARY ALL GRADUATES
1986		68	5700	
1987		90		
1988				
1989				
1990				
1991	68			387600
1992	136			775200
1993	226			1288200
1994	316			1801200
1995	406			2314200
1996	496			2827200
1997	586			3340200
1998	676			3853200
1999	766			4366200
2000	856			4879200
2001	946			5392200
2002	1036			5905200
2003	1126			6418200
2004	1216			6931200
2005	1306			7444200
2006	1306			7444200
2007	1306			7444200
2008	1306			7444200
2009	1306			7444200
2010	1306			7444200
2011	1306			7444200
2012	1306			7444200
2013	1306			7444200
2014	1306			7444200
2015	1306			7444200
2016	1306			7444200
2017	1306			7444200
2018	1306			7444200
2019	1306			7444200
2020	1306			7444200
2021	1238			7056600
2022	1170			6669000
2023	1080			6156000
2024	990			5643000
2025	900			5130000
2026	810			4617000
2027	720			4104000
2028	630			3591000
2029	540			3078000
2030	450			2565000
2031	360			2052000
2032	270			1539000
2033	180			1026000
2034	90			513000

INCOME LOST WHILE STUDYING

YEAR	STUDENTS ENROLLED	YEARLY CHANGE	YEARLY INCOME FOREGONE WHILE IN SCHOOL	TOTAL INCOME FOREGONE col 1 x col 3
1986	0	68	348	0
1987	68	90		23664
1988	136			47328
1989	226			78648
1990	316			109968
1991	338			117624
1992	360			125280
1993	360			125280
1994	360			125280
1995	360			125280
1996	360			125280
1997	360			125280
1998	360			125280
1999	360			125280
2000	360			125280
2001	360			125280
2002	360			125280
2003	360			125280
2004	360			125280
2005	360			125280

TOTAL COSTS OF PROJECT

YEAR	CONSTRUCTION, OPERATING, LAND&EQUIP	INCOME FOREGONE WHILE STUDYING PER STUDENT	NUMBER OF STUDENTS	TOTAL STUDENTS	TOTAL INCOME FOREGONE STUDENTS	TOTAL COSTS
1986	18733000	348	68			18733000
1987	4740000		90	68	23664	4763664
1988	7607000			136	47328	7654328
1989	8128000			226	78648	8206648
1990	4562000			315	109968	4671968
1991	4778000			336	117624	4895624
1992	5416000			360	125280	5541280
1993	5900000			360	125280	6025280
1994	6644000			360	125280	6769280
1995	6404000			360	125280	6529280
1996	6404000			360	125280	6529280
1997	6404000			360	125280	6529280
1998	6404000			360	125280	6529280
1999	6404000			360	125280	6529280
2000	6404000			360	125280	6529280
2001	6404000			360	125280	6529280
2002	6404000			360	125280	6529280
2003	6404000			360	125280	6529280
2004	6404000			360	125280	6529280
2005	6404000			360	125280	6529280

Total Cost = Construction, Equipment, etc + Total Income Foregone Students

IRRAGO

INTERNAL RATE OF RETURN CALCULATION FOR THE AGRICULTURAL COLLEGE

YEAR	MATRICU INCOME	FARM INCOME	FUND RAISING	SALVAGE VALUE	SALARY DIFFERENTIAL INCOME	INCOME SPECIAL PROGRAMS	EXTERNAL BENEFITS	TOTAL BENEFITS	TOTAL COSTS	NET BENEFITS
1986									18733000	-18733000
1987	240600	68340						308940	4763664	-4454724
1988	457140	136680	500000					1093820	7654328	-6560508
1989	673680	227130	500000					1400810	8206648	-6805838
1990	890220	317580	500000			160000		1867800	4671968	-2804168
1991	976420	339390	500000		387600	160000		2357710	4895624	-2537914
1992	1042600	461800	500000		775200	160000		2939600	5541280	-2601680
1993	1114780	461800	500000		1288200	160000		3524780	6025280	-2500500
1994	1186960	461800			1801200	160000		3609960	6769280	-3159320
1995	1259140	461800			2314200	160000		4195140	6529280	-2334140
1996	1259140	461800			2827200	160000		4708140	6529280	-1821140
1997	1259140	461800			3340200	160000		5221140	6529280	-1308140
1998	1259140	461800			3853200	160000		5734140	6529280	-795140
1999	1259140	461800			4366200	160000		6247140	6529280	-282140
2000	1259140	461800			4879200	160000		6760140	6529280	230860
2001	1259140	461800			5392200	160000		7273140	6529280	743860
2002	1259140	461800			5905200	160000		7786140	6529280	1256860
2003	1259140	461800			6418200	160000		8299140	6529280	1769860
2004	1259140	461800			6931200	160000		8812140	6529280	2282860
2005	1259140	461800		23430500	7444200	160000		32755640	6529280	26226360
2006					7444200			7444200		7444200
2007					7444200			7444200		7444200
2008					7444200			7444200		7444200
2009					7444200			7444200		7444200
2010					7444200			7444200		7444200
2011					7444200			7444200		7444200
2012					7444200			7444200		7444200
2013					7444200			7444200		7444200
2014					7444200			7444200		7444200
2015					7444200			7444200		7444200
2016					7444200			7444200		7444200
2017					7444200			7444200		7444200
2018					7444200			7444200		7444200
2019					7444200			7444200		7444200
2020					7444200			7444200		7444200
2021					7056600			7056600		7056600
2022					6669000			6669000		6669000
2023					6156000			6156000		6156000
2024					5643000			5643000		5643000
2025					5130000			5130000		5130000
2026					4617000			4617000		4617000
2027					4104000			4104000		4104000
2028					3591000			3591000		3591000
2029					3078000			3078000		3078000
2030					2565000			2565000		2565000
2031					2052000			2052000		2052000
2032					1539000			1539000		1539000
2033					1026000			1026000		1026000
2034					513000			513000		513000

IRR = 5.25%

ASSESSMENT OF EMPLOYMENT PATTERNS AND CURRENT AGRICULTURAL TRAINING INSTITUTIONS[1]

1. Employment Patterns

1.1 Recent Hiring Practices

Table 1 presents data obtained from a survey of private and quasi-private sector employers in the Central America and Panama Region (CA/P) concerning the number of agriculturalists hired over the past three years. The data are reported by the job specialization for which the individual was hired.

(see Table 1)

Table 1 shows that hiring of agricultural graduates in the CA/P region over the past three years has been concentrated in the areas of agricultural production, finance and credit, and research and technical assistance. Approximately 76% of all reported hiring occurred in these three areas. The lead employer has been research and technical assistance operations, accounting for 43% of the total number of new hires. Of the 299 hired by research/TA employers, more than half were hired for agricultural extension jobs. On average, nine agricultural graduates were hired by research and TA firms annually, followed by agricultural production employers (4 new hires annually per firm) and finance and credit operations (3 employees annually per firm). Overall, the areas of specialization for which the majority of agriculturalists were hired are by rank order: Extension/TA (27%), crops (19%), and agricultural administration/management (16%). Assuming these patterns continue, the findings suggest that agricultural training programs should be particularly sensitive to a) the needs of the lead employers - (research/TA, agricultural production, and finance/credit), and b) to the training requirements for employment in the areas of crops, extension/TA, and agricultural administration/management.

Table 2 describes the level of agricultural training of individuals hired during the past three years. (Minor discrepancies in category totals between Tables 1 and 2 are due to missing data).

(see Table 2)

The data indicate that the majority of new hires over the past three years have had agricultural training to the B.S. level (54%). Agriculturalists with vocational or technical school educations

1) See Annex X for a description of the data used for this analysis.

TABLE 1

AGRICULTURAL GRADUATES HIRED IN PAST THREE YEARS

BY AREA OF SPECIALIZATION[1]

	TYPE OF OPERATION													
	Agricultural Production		Marketing & Distribution		Finance & Credit		Processing		Agricultural Inputs [2]		Research & Tech. Assist.[3]		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No. of Firms	12		11		12		12		11		11		69	
Specialization														
Crops	36	29	8	11	21	20	15	34	13	25	39	13	132	19
Animals	3	2	4	6	9	9	0	0	1	2	5	2	22	3
Marketing	3	2	28	40	0	0	2	5	0	0	0	0	33	5
Processing	5	4	1	1	0	0	11	25	0	0	1	0	18	3
Sales	0	0	11	16	0	0	1	2	19	36	0	0	31	4
Research	8	6	4	6	0	0	3	7	0	0	62	21	77	11
Extension/TA	7	6	4	6	18	17	1	2	1	2	160	54	191	27
Admin/Mngnt	62	49	8	11	10	10	2	5	9	17	18	6	109	16
Other	2	2	2	3	46	44	9	20	10	19	14	5	83	12
TOTAL	126	100	70	100	104	100	44	100	53	100	299	100	696	100
Average Annual New Hires per Firm	4		2		3		1		2		9		3.4	

1) Specialization refers to the job for which the person was hired.
2) Agricultural inputs includes equipment sales and repairs.
3) Research and Technical Assistance includes extension services.

TABLE 2

NUMBER OF AGRICULTURAL GRADUATES HIRED IN PAST THREE YEARS BY LEVEL OF TRAINING

	TYPE OF OPERATION													
	Agricultural Production		Marketing & Distribution		Finance & Credit		Processing		Agricultural Inputs		Research & Tech. Assist.		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No. of Firms	12		11		12		12		11		11		69	
Vocational	33	26	20	29	5	5	8	19	13	25	83	28	162	26
Technical	16	13	10	14	51	49	11	26	14	26	89	30	191	13
B.S.	69	54	32	46	42	40	20	47	18	34	107	36	288	54
Graduate	9	7	8	11	6	6	4	9	8	15	19	6	54	7
TOTAL	127	100	70	100	104	100	43	100	53	100	298	100	695	100

constituted less than half of reported new hires (39%). The preference for agriculturalists with B.S. level training is evident among employers engaged in agricultural production, marketing, finance, and processing. Agricultural input and research/TA employers reported hiring roughly equivalent proportions of agriculturalists with vocational, technical and college level training. Despite some differences among employers, it is important to recognize that an agricultural training program which offers both technical and B.S. level training would produce the type of graduates which employers have been hiring most frequently - i.e. approximately two-thirds of the total number hired. This is precisely the type of program envisioned for the Regional Agricultural College.

1.2 Utility and Need for Agriculturalists

To obtain a better understanding of the needs of private and quasi-private sector employers, data were collected on a) the types of agricultural training most useful to the employers, b) the areas of specialization for which they expect to hire additional agriculturalists, and c) the level of training necessary to meet their short to medium term staffing needs.

(see Table 3)

Table 3 suggests an ordinal ranking among areas of specialization cited by employers as most useful to their operations. Agricultural training with a specialization in crops, unsurprisingly, was cited by most employers (42 out of 69). However, two business related specializations - marketing and sales - rather than technical agricultural skills were the second most frequently cited specializations employers considered useful to their operations. The remaining specializations were cited more or less equally by the employers.

(see Table 4)

Table 4 reports the number of agriculturalists employers expect to hire over the next several years. Given the limits of the survey methodology, and the difficulty for employers to know exactly how many agriculturalists they will hire in the coming years, the numbers reported should be interpreted as reflecting an ordinal ranking among areas of specialization rather than as reliable estimates of planned hiring. Consistent with the preceding table, the data indicate that a specialization in crops is the area where most hiring is anticipated. The high number of "other" specializations stems from finance and credit operations and probably reflects a need for training specific to banking operations (e.g. accounting, loan management). Research and extension/TA are obviously important to employers in these fields. But it is again

TABLE 3

AGRICULTURAL TRAINING MOST USEFUL BY TYPE OF COMPANY/ORGANIZATION

	TYPE OF OPERATION						
	Agricultural Production	Marketing & Distribution	Finance & Credit	Processing	Agricultural Inputs	Research & Tech. Assist.	TOTAL
	No.	No.	No.	No.	No.	No.	No.
No. of Firms	12	11	12	12	11	11	69
Crops	11	6	6	6	3	10	42
Animals	12	3	6	1	0	2	24
Marketing	12	10	0	2	5	1	30
Processing	3	2	1	8	0	3	17
Sales	12	6	0	2	8	0	28
Research	5	1	0	3	2	7	18
Extension/TA	12	1	2	0	0	5	20
Admin./Mngnt.	3	6	4	1	3	0	17
Other	12	1	4	0	3	2	22

*Note: The table reports the number of employers who cited the specific specialization, e.g. of 13 employers whose principal mode of operation is agricultural production, 12 cited crops, 10 cited animals, etc.

TABLE 4

AGRICULTURALISTS NEEDED IN NEXT 5-10 YEARS BY AREA OF SPECIALIZATION

	TYPE OF OPERATION						
	Agricultural Production	Marketing & Distribution	Finance & Credit	Processing	Agricultural Inputs	Research & Tech. Assist.	TOTAL
Specialization	No.	No.	No.	No.	No.	No.	No.
Crops	38	16	20	11	12	32	129
Animals	0	4	5	6	1	0	16
Marketing	0	30	0	7	4	0	41
Processing	3	2	2	5	7	3	22
Sales	0	12	0	8	19	0	39
Research	11	2	1	0	0	34	48
Extension/TA	0	0	1	2	0	52	55
Admin/Mngnt	1	11	7	3	9	0	31
Other	4	0	41	0	7	9	61
TOTAL	57	77	77	42	59	130	442

worth noting that business related skills - marketing, sales and administration/management - are cited more frequently than other technical agricultural skills.

(see Table 5)

Table 5 presents an important finding regarding the utility of the Regional Agricultural College. Employers clearly indicated their intention to hire more agriculturalists with B.S. level educations than those with vocational, technical or graduate level training in the coming years. Moreover, the plan to offer both technical and B.S. level programs at the Regional Agriculture College will produce precisely the types of graduates employers apparently need and plan to hire.

1.3 Economic Value of Agricultural Training

The importance and utility employers associate with different types of agricultural training is reflected by salary differentials and by career advancement. Salary ranges were obtained from employers to estimate the average market value of different levels of agricultural training. Employers reported the low and high monthly salary paid new employees according to their level of education. Table 6 presents the mean low and high by level of training and the midpoint of the estimated range.

(see Table 6)

Section XXX - Economic Analysis - assesses the economic return to the regional economy that will result from the training to be provided by the Regional Agriculture College. Note that the overall pattern indicated by the data is in the direction one would expect - salaries increase commensurately with level of training. This is important in regard to estimating the value of the training the graduates of the Agriculture College will receive. Unlike current B.S. level training in agriculture, the curriculum of the agriculture college will offer substantially more applied instruction and emphasize a "learning by doing" approach to education. The practical experience gained from such a program combined with sound technical skills should increase the value of graduates of the program to private sector employers (section 1.4 discusses this point more fully). Second, the training offered by the agriculture college will focus on agriculture in humid lowland tropical areas. Given that the majority of employers expect to expand their operations in the HLT (See Section 1.5), training focused on tropical agriculture should also increase the market value of the college's graduates. Third, the facilities and faculty of the agriculture college might also improve the quality of instruction to be offered at the technical level (i.e. non-degree training). In short, the Regional Agriculture College will differ

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TABLE 5

NUMBER OF AGRICULTURALISTS NEEDED BY EMPLOYERS BY LEVEL OF TRAINING

(5 or more Years)

	TYPE OF OPERATION													
	Agricultural Production		Marketing & Distribution		Finance & Credit		Processing		Agricultural Inputs		Research & Tech. Assist.		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Vocational	0	0	18	24	0	0	1	2	0	0	0	0	19	4
Technical	9	16	9	12	28	36	21	50	18	37	55	42	140	33
B.S.	40	69	37	50	49	64	19	45	20	41	51	39	216	50
Graduate	9	16	10	14	0	0	1	2	11	22	24	18	55	13
TOTAL	58	100	74	100	77	100	42	100	49	100	130	100	430	100

TABLE 6

MONTHLY SALARY ESTIMATES (1)

	Low	High	Mid-point
Vocational	$261	$435	$348
Technical	327	486	407
Ag. College	480	751	616
University	733	1,310	1,022

(1) Local currencies were converted to U.S. dollars using the exchange rate published in La Nacion on July 9, 1985. For Guatemala, the pre-devaluation exchange rate of 1 Quetzal = $1 U.S. was used.

For Costa Rica 50 colones = $1 U.S., for Honduras 2.9 Lempiras = $1 U.S.

from other educational institutions in the CA/P region by offering a unique type of training. Due to the combination of practical and technical instruction, it is very likely that the value of B.S. level training provided by the Agriculture College will fall between the estimates for existing agriculture colleges ($616) and graduate level training ($1,022), such as the mid-point ($819) or higher.

Initial salary differentials permit estimating the economic value of agricultural training. But a very static model regarding the effects of education is implicit in this type of analysis. It assumes that the income differences among agriculturalists corresponding to their level of training remains constant over time. However, educational achievement typically contributes to career advancement. To determine whether agricultural training exerts such an effect, employers were asked whether employees with agricultural training receive promotions more frequently than employees who lacked such training.

(see Table 7)

The data indicate that agricultural training contributes to career advancement. Half of the employers reported that those with training did, indeed, receive promotions more frequently than those who lacked such training. Approximately 40% responded that there was no difference in the rate of promotion. However, it is important to interpret what that response means vis a vis the employee's long term career. Table 6 indicated that salary level increases with level of agricultural training. It is fair to assume that salary level is commensurate with the individual's position within the organization. For example, assuming equivalent levels of prior work experience, agriculturalists with a B.S. degree will, in most cases, begin their career at a higher level that someone with vocational or technical training. Typically, a promotion for someone who began at a mid-level managerial position, for instance, will entail a salary increase which will be greater than that associated with promotions for those who began their careers at a lower level in the organization. Consequently, even if the rate of promotion is more or less equivalent among agriculturalists with different levels of training, in time, initial income differentials will probably widen. Data to estimate even approximately what the economic value of this effect might be do not exist. Nonetheless, it is worth recognizing that the effects of higher agricultural education has a dynamic effect on the graduates long term earnings and, at the macro level, on the regional economy.

1.4 Employer's Views Concerning the Adequacy of Agricultural Training

Data concerning the adequacy of current agricultural training suggests that such programs should be targetted more closely on the needs of private and quasi-private sector employers.

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TABLE 7

DO EMPLOYEES WITH AGRICULTURAL TRAINING RECEIVE PROMOTIONS MORE FREQUENTLY THAN OTHERS WHO LACK SUCH TRAINING?

	No.	%
Yes	33	52
No	5	8
Same	25	40
TOTAL	63	100

Six Missing Cases

(see Table 8)

Table 8 indicates that a significant number of recent agricultural graduates hired by private sector employers require additional training beyond normal job orientation. Table 9 indicates that the need for additional training is sufficiently important that the majority of employers provide this training themselves.

(see Table 9)

Employers were asked what the specific weaknesses are that they have detected in recently hired agricultural graduates. A variety of weaknesses were cited, but in general, the responses indicated two fundamental problems: a lack of technical/practical skills and a lack of administrative/business related skills.

(see Table 10)

52 of the 69 employers interviewed reported at least one weakness and some as many as three weaknesses. Note that there was an equivalent number of responses for the two principal weaknesses (39 and 38 respectively). This suggests that both problems are perceived by employers to be of roughly equivalent importance.

The lack of technical and practical skills cited by employers is a serious statement about current agricultural training available in the region. It appears that existing training programs are not sufficiently attuned to the needs of private and quasi-private sector employers. This might reflect the focussed instruction offered by existing vocational schools and agriculture colleges. Vocational schools emphasize applied field work with minimal formal technical training. The reverse situation characterizes agriculture colleges - considerable classroom instruction with minimal applied field work. If the weaknesses reported by employers are in fact due to an over emphasis on one type of instruction, then the balanced approach proposed for the Regional Agriculture College - i.e., an applied field work for practical training combined with formal technical instruction comparable to existing B.S programs - should work towards overcoming this deficiency.

The second major weakness cited by the employers - lack of administrative/business related skills - is further emphasized by the following table.

(see Table 11)

Private and quasi-private sector employers clearly attribute considerable importance to administrative and business related skills. Data from the survey of agriculture schools in the CA/P

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TABLE 8

DO AGRICULTURAL GRADUATES HIRED BY THE ORGANIZATION/FIRM REQUIRE ADDITIONAL TRAINING?

	No.	%
Yes	58	85
No	10	15
TOTAL	68	100

One Missing Case

TABLE 9

DOES THE ORGANIZATION/FIRM

PROVIDE ADDITIONAL TRAINING?

	No.	%
Yes	47	69
No	21	31
TOTAL	68	100

One Missing Case

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TABLE 10

MAJOR TRAINING WEAKNESSES CITED BY EMPLOYERS

	No.	%
Lack of Technical/Practical Agricultural Skills	39	75
Lack of Administrative/Business Related Skills	38	73

Note: Several Employers cited both weaknesses.

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TABLE 11

WOULD BUSINESS TRAINING BE USEFU

FOR AGRICULTURAL GRADUATES

	TOTAL	
	No.	%
Yes	58	84
No	11	16
TOTAL	69	100

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region indicate that 13 out of 19 institutions offer business training courses. Either these courses are inadequate or students are not enrolling in them. Given that a majority of employers responded that such training is useful for the agriculturalists they hire and that the lack of such training is a weakness of current training programs, agricultural administration and other business related skills should be incorporated into the requirements for a B.S. degree from the Regional Agriculture College and probably offered as an area of specialization.

1.5 Operations in Humid Lowland Tropical Areas

The majority of employers interviewed derive a significant proportion of their earnings from operations in tropical lowland areas. A number of them reported that HLT operations generate as much as 100% of their profits. Future expansion in HLT areas will require additional agriculturalists with the appropriate training. Therefore, employers were asked whether such an expansion is likely in the next five years.

(see Table 12)

Overall, 49 out of 69 employers reported that they forsee expanding their operations in humid lowland areas. It is important to note that of the nine employers responding that they are uncertain, five are located in Honduras. It is quite likely that future political developments in the region will influence significatnly the decisions of these employers. Assuming that conditions are favorable, it is likely that several of those who are now uncertain will decide to expand their operations in HLT areas.

Some limited information concerning agricultural training and work experience in HLT areas is available from a survey conducted of graduates of the University of Costa Rica and the Escuela Agropecuaria Panamericana (Zamorano). The survey was limited to just Costa Rica. However, the findings do suggest a need for specialized training focused on tropical lowland agriculture.

(see Tables 13 and 14)

Approximately two-thirds of the UCR and EAP students reported that they have worked in humid lowland tropical agriculture. However, of those responding, the majority of graduates reported that they learned about such work from their own personal experience. To the extent that this is generally true of all agriculturalists working in HLT areas, and combined with the substantial number of employers who intend to expand their operations in these areas, it is reasonable to believe that improved and expanded training in tropical agriculture, as has been proposed for the Regional Agriculture College, is indeed needed.

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TABLE 12

LIKELIHOOD OF EXPANSION INTO HLT AREAS IN NEXT FIVE YEARS

	TYPE OF OPERATION													
	Agricultural Production		Marketing & Distribution		Finance & Credit		Processing		Agricultural Inputs		Research & Tech. Assist.		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	7	58	10	91	10	83	7	58	7	64	8	73	49	71
No	2	17	0	0	2	17	3	25	2	18	2	18	11	16
Uncertain	3	25	1	9	0	0	2	17	2	18	1	9	9	13
TOTAL	12	100	11	100	12	100	12	100	11	100	11	100	69	100

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TABLE 13

NUMBER OF GRADUATES WHO HAVE WORKED IN THE HUMID LOWLAND TROPICS

	UCR		EAP	
	No.	%	No.	%
Yes	30	68	34	62
No	14	32	21	38
Missing Cases	(5)		(1)	

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TABLE 14

HOW GRADUATES LEARNED ABOUT WORK IN THE HUMID LOWLAND TROPICS

	UCR		EAP	
	No.	%	No.	%
Personal Experience	15	53	25	71
Other	17	42	10	29
Missing Cases	(24)		(14)	

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2. Agricultural Training Institutions

2.1 Institutional Comparisons

A survey of agricultural training institutions was conducted to obtain basic information on training available in the CA/P region and to examine general differences among the institutions. Data on operating costs, enrollment, staffing and curriculum were collected from vocational schools, technical schools, and agriculture colleges in Guatemala, Honduras, Costa Rica and Panama. A total of nineteen institutions were included in the survey.

The survey data must be used very conservatively. Time constraints precluded collecting the amount and types of data with sufficient precision needed to construct highly reliable and valid measures of institutional differences. Particularly for budgetary and enrollment data, heavy qualifications must be attached to any estimate or ratio. The major problem with the budgetary data is that agriculture colleges receive government subsidies which are not included in the reported operating and teaching budgets. Consequently, the budget data for the agriculture colleges underestimate total expenses, distorting the expenditure per pupil ratio. To have estimated what these subsidies were for each school would have required a significantly more elaborate data collection effort. Second, enrollment data probably overstate the true full time student populations. That is, some percentage of students registered at the school are carrying less than a full course load each semester. It would be difficult to estimate accurately a full-time equivalent for part-time students within the limited time frame of the survey. This probem distorts both the student - teacher ratio and the expenditure per pupil ratio. In short, the estimates contained in the following table should be treated as indicating the general pattern of differences among institutions, rather than accurately measuring the exact magnitude of those differences.

(see Table 15)

The differences between the agriculture colleges, the technical schools and EAP suggested in Table 15 offer some insight into how the Regional Agriculture College will compare to the other agricultural training institutions in the region. Agriculture colleges reported the largest total number of students enrolled in their programs and the largest number of students per institution. Only EAP has an enrollment comparable to the agriculture colleges. The largest number of instructors are also employed by the agriculture colleges. However, the colleges average fewer staff than EAP. More important, student-teacher ratios for technical schools, including EAP, are more favorable than those for the other institutions. But this appears to impose considerable costs - the

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TABLE 15

TYPE OF AGRICULTURAL TRAINING INSTITUTIONS

Type of Institution	Regional Total No.	Avg. Annual Teaching Budget	No. of Students		Average No. Students	Total Staffing Level (1)	Average Staffing Level	Student Teacher Ratio	Average Per Pupil Expenditure
Vocational	6	$131,733(2)	1371	21%	229	40	7	35	$400(2)
Technical	4	698,667	753	11%	188	117	29	6	3,711
EAP	1	2,600,000	430	6%	430	70	70	6	6,047
Ag. College	8	604,418	4099(3)	62%	526(3)	362	45	13(3)	1,004(3)
TOTAL	19	664,076	6653	100%	370	588	31	11	1,597(4)

(1) Combines full-time and full-time equivalent of part-time instructors.
(2) This average represents data from only three vocational schools.
(3) Due to missing enrollment data for one case these estimates are based on the remaining seven cases.
(4) Excludes cases with missing data for budget or number of students.

expense of educating a student at EAP is considerably greater than for the agriculture colleges. The difference between other technical schools and the agriculture colleges should be interpreted cautiously. The magnitude of the difference is questionable, and if government subsidies were included in the agriculture colleges' budget, the expenditure differentials would be smaller. In short, the differences are credible, but the magnitude of those differences cannot be determined with any degree of confidence with the available data.

What the findings suggest is that agriculture colleges will be the "student mills" for the region in the coming years. That is, over time, increasing numbers of agriculturalists will have graduated from a B.S. degree program. As that occurs, it is likely that a B.S. degree will increasingly become a normal expectation on the part of employers, in effect, serving as something of a "union card". Certainly graduates of technical schools will continue to be a desirable type of employee, especially those of EAP, if for no other reason than the value employers place on applied training. However, data from the employer survey indicated that significant salary differentials already exist between agriculturalists with a B.S. degree and graduates of technical schools. Moreover, the recent hiring patterns and future anticipated hiring of private and quasi-private sector employers indicates a clear preference or need for agriculturalists with a B.S. degree. Competition for better paying jobs will probably sharpen as the number of B.S. degree holders increase, placing those without an agriculture degree at an even greater disadvantage. To the extent that these types of changes occur, the graduates of the Regional Agriculture College should be in a fairly favorable position - i.e. they will have a B.S. degree in agriculture and will have graudated from a program which emphasized applied, practical training.

2.2 Tuition Increases

Tuition increases over the past five years provide additional evidence of the substantial expense entailed with the type of program offered by EAP.

(see Table 16)

With only a few exceptions, the institutions surveyed reported tuition increases. The average increase for vocational schools, technical schools and agriculture colleges was between fifty and sixty percent. Again, government subsidies might be influencing the tuition data for the agriculture colleges. For example, if government subsidies have suppressed tuition increases by half, that would mean that without such subsidies, tuition for agriculture colleges would have increased on average roughly one hundred percent. Even if that were the case, that increase would still be

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TABLE 16

TUITION LEVELS

Average	Vocational	Technical (1)	EAP	Ag. College
Five Years Ago	283	919	330	413
Present	455	1428	2700	601
% Change	61%	55%	718%	46%

(1) Based on data for three cases.

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far less than the 718% increase reported by Zamorano. If increases of that magnitude continue, EAP will soon become a very elitist institution inaccessible to the vast majority of students from poor, rural families - if that has not already occurred.

2.3 Applications and Enrollment

Data on student applications for admission and enrollment suggest that the increasing costs of agricultural training is affecting which programs are expanding.

(see Table 17)

Table 17 indicates that technical schools, including EAP, are considerably more selective about admissions than are vocational schools and agriculture colleges. Clearly, the percentage accepted to technical schools (23%) and EAP (40%) is only possible because current applications for admissions exceeds enrollment capacity. Though this reflects a strong demand for technical school training - probably due in large part to the applied program of instruction - data on changes in the number of applications and changes in the size of enrollment indicate that the expense of attending a technical school appears to be channelling students to other institutions.

(see Tables 18 and 19)

Tables 18 and 19 show a sharp difference between vocational schools and agriculture colleges, on the one hand, and technical schools, including EAP, on the other. None of the technical schools reported an increase in the number of applicants over the past five years, and only one reported an increase in enrollment. EAP reported a decrease in both the number of applicants and in actual enrollment. This suggests that the regional capacity for providing technical agricultural training is not expanding.

The opposite situation holds for vocational schools and agricultural colleges. Five out of six vocational schools report an increase in both the number of applications and the size of enrollment. Seven out of eight agriculture colleges report either a constant or expanding number of applications and admissions. This implies that these two types of educational institutions are growing to meet demand for agricultural training. At least in the case of agriculture colleges, the type of training - a B.S. degree - is an important factor attracting students to the program. But the tuition for both vocational schools and agricultural colleges is considerably lower than that for technical schools. In this case, the fact that colleges are subsidized is not a distorting element. To the contrary, such subsidies are important in trying to account for the growth of admissions and enrollments at agriculture

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TABLE 17

	Average % Applicants Accepted
Vocational	84
Technical	23
EAP	40
Ag. College	89

TABLE 18

CHANGES IN THE NUMBER OF APPLICATNS OVER THE PAST 5 YEARS

	Type of School									
	Vocational		Technical		EAP		Ag. College		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Increase	5	83	0	0			2	25	7	37
Decrease	1	17	1	25	1	100	1	13	4	21
Constant	0	0	3	75			5	62	8	42
TOTAL	6	100	4	100	1	100	8	100	19	100

TABLE 19

CHANGES IN ENROLLMENT OVER THE PAST 5 YEARS

	Type of School									
	Vocational		Technical		EAP		Ag. College		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Increase	5	83	1	25			3	37	9	47
Decrease	1	17	1	25	1	100	1	13	4	21
Constant	0	0	2	50			4	50	6	32
TOTAL	6	100	4	100	1	100	8	100	19	100

colleges. (In other words, subsidies do not distort the actual differentials in expenses students incur). Despite the potential advantages offered by training at a technical school, it is very likely that, other considerations aside, the costs of such an education are simply too great for many students. Hence, these students are turning to less expensive alternatives - vocational schools and agriculture colleges.

These findings are important in regard to the Regional Agriculture College. The data indicate that enrollment at technical schools is static or contracting. Data for the vocational schools and agriculture colleges indicate an increase in the number of applications and a general expansion in the enrollment in these institutions. Though their admission levels are high, the data suggest the possibility that demand for agriculture training exceeds current capacity. If this is the case, then the Regional Agriculture College would serve as one means of meeting this excess demand.

2.4 Staffing Patterns

As one would expect, data on the level of faculty education indicate that the type of staff required varies according to the nature of the program offered.

(see Tables 20 and 21)

The faculty of vocational schools are evenly divided among those who do not have a B.S. degree and those who do. Technical schools report a greater number of faculty with B.S. degrees (64%), and some with a M.S. or Ph.D (13%). EAP has a relatively large percentage of full time faculty without B.S. degrees (59%) combined with a significant number with a M.S. or Ph.D. (34%). The faculty at agriculture colleges differ significantly from the other schools - all have at least a B.S., and more than half have a M.S. or Ph.D. A similar pattern is found for part time instructors at agriculture colleges.

On the basis of these data alone, it is very questionable whether the quality of instruction is necessarily better at schools which have a greater number of faculty with advanced degrees. To do so would be akin to comparing apples and oranges - the programs offered by each type of school differ and, consequently, staffing requirements vary accordingly. In other words, differences in the type of training should not be confused with differences in the quality of training. A preferable basis for comparing the instruction provided are the differences in hiring patterns of employers and salary differentials discussed in section 1.1 and 1.3.

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TABLE 20

TRAINING LEVEL FULL-TIME INSTRUCTORS

	Type of School									
	Vocational		Technical		EAP		Ag. College		Total	
Level	No.	%	No.	%	No.	%	No.	%	No.	%
Less than B.S.	18	49	26	24	41	59	0	0	85	17
B.S.	19	51	70	64	5	7	120	43	214	43
Grad. Training	0	0	0	0	0		5	2	5	1
M.S.	0	0	10	9	8	11	122	44	140	28
Ph.D.	0	0	4	3	16	23	30	11	50	11
TOTAL	37	100	110	100	70	100	277	100	494	100

TABLE 21

TRAINING LEVEL FOR PART-TIME FACULTY

	Type of School									
	Vocational		Technical		EAP		Ag. College		Total	
Level	No.	%	No.	%	No.	%	No.	%	No.	%
Less than B.S.	1	10	2	9	0	0	0	0	3	1
B.S.	8	80	8	35	0	0	87	47	103	47
Grad. Training	0	0	0	0	0	0	61	33	61	28
M.S.	1	10	12	52	1	33	26	14	40	18
Ph.D.	0	0	1	4	2	67	11	6	14	6
TOTAL	10	100	23	100	3	100	185	100	221	100

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The findings do suggest an important consideration for the Regional Agriculture College regarding the availability of faculty. The applied training the college will offer combined with a B.S. degree could draw faculty from any of the other existing institutions in the region. Though it is predictable that this will happen to some extent, it could be detrimental to other agricultural training programs if the Regional College attracted an inordinate number of the best faculty from other schools. In effect, the agriculture college might suddenly expand the demand for agriculture instructors at the expense of existing institutions.

On the other hand, the faculty of the Regional College will be relatively few in number in comparison to the total number of agriculture instructors in the region, and how many will be attracted to the college remains to be seen. But assuming the possibility of an adverse effect, the planned use of temporary faculty from U.S. and other universities should mitigate the problem in the short term. But to establish the type of viable, independent institution envisioned, a more permanent faculty needs to be developed using agriculturalists from the region. How this is done will largely determine whether the Agriculture College adversely affects staffing at other schools. For example, the temporary faculty of the Agriculture College could be gradually replaced over a five to ten year period. This would allow time for new people to enter the job market and meet the demand for additional agriculture instructors and researchers. In short, if a permanent staff for the Regional Agriculture College is developed gradually, the potential for disruptive effects will be minimal.

2.5 Graduates and Employment

Data on the number of graduates produced by the agriculture schools in the region over the past three years allows comparing what jobs employers have been hiring agriculturalists for, versus what types of agriculturalists the schools have been producing.

(see Table 22)

Table 22 indicates that there are only four major areas of agricultural training being offered in the region: general agriculture, crops, animals and administration/management. The vocational and technical schools, including EAP, are only producing general agriculturalists. Only at agriculture colleges are students majoring in specializing areas of agriculture.

A comparison of Table 22 to Table 1 (Number of Agricultural Graduates Hired in the Past Three Years by Area of Specialization) suggests a misalignment between hiring patterns and available training. First, extension/TA was the area where most agriculturalists had been hired in the past three years (27%). But

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TABLE 22

NUMBER OF GRADUATES BY SPECIALIZATION IN PAST THREE YEARS

Type of Specialized Training	Type of School: Vocational		Technical		EAP		Ag. College		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Crops		0		0		0	722	50	722	23
Animals		0	79	11		0	128	9	207	7
Marketing		0		0		0		0	0	0
Processing		0		0		0		0	0	0
Sales		0		0		0		0	0	0
Research		0		0		0		0	0	0
Extension/TA		0		0		0		0	0	0
Admin/Mngnt		0		0		0	163	12	163	5
General Ag.	741	100	630	89	267	100	417	29	2055	65
TOTAL	741	100	709	100	267	100	1430	100	3147	100
Annual Average	247		236		89		477		1049	

none of the agriculture schools are producing graduates with a specialization in this area. Second, agriculture colleges are producing animal specialists, but private and quasi-private sector employers hired relatively few agriculturalists for such work (3%). Third, employers are hiring agriculturalists for a number of areas where no specialists are being produced: i.e., 23% of the jobs for agriculturalists were in the areas of marketing, processing, sales, and research. If extension/TA jobs are added, then approximately half of the agriculturalists hired were employed in areas outside of the specializations being produced by agriculture schools.

However, the actual situation might not be as bad as the data imply. Training in general agriculture is probably sufficient for many of the entry level jobs for which graduates are hired. Also the public sector is a major employer of agriculturalists and perhaps current training is better attuned to the needs of government. Data from a survey of Costa Rican agriculturalists offers some support for this view.

(see Table 23)

The table indicates that many agriculture graduates of the University of Costa Rica are employed in the public sector, whereas EAP graduates are evenly divided among the private sector, public sector and self employment. If these data are even roughly representative, slightly more than half of the total number of the agriculturalists are working in the public sector.

On the other hand, the discrepancies between hiring patterns and the type of graduates being produced cannot be dismissed entirely. Recall that 85% of employers reported that recent agriculture graduates need additional training beyond normal job orientation. This becomes more understandable in light of the above findings. Approximately 65% of the graduates are general agriculturalists, whereas the majority of jobs for which they were being hired are in specialized areas of agriculture.

These findings reiterate what was apparent from the employer survey - there is credible evidence of a need for better agricultural training targetted on the requirements of private and quasi-private sector employers. The Regional Agriculture College and, in particular, its emphasis on applied training in its B.S. degree program, will begin to meet that need.

TABLE 23

PRIMARY SOURCES OF EMPLOYMENT

	UCR		EAP	
	No.	%	No.	%
Public	44	77	17	35
Private	7	12	15	31
Self Employed	5	9	14	29
Retired	1	2	2	5
	57		48	

ATTACHMENT 1

ENCUESTA PARA GRADUADOS DE LA E.A.P.

I Datos personales

N°de encuesta [1 1-3] Fecha _____

a) Nombre _____

b) Provincia _____ [1 5-7] c) Cantón _____ [1 9-11]

d) Dirección _____

_____

_____ Teléfono _____

e) Educación secundaria (Bachiller) [1 13-15] SI [1] [1 13-15] NO [2]

Lugar _____

Provincia _____ [1 17-19] Cantón _____ [1 21-23]

II Graduación

a) Año de graduacion [1 25-27]

b) Edad al graduarse [1 29-31]

c) Educación recibida despúes de su graduación en la E.A.P.

Institución	Año	Duración semanas	Tipo de Certificado o Diploma			
Universitario			B.S	[1 33-35] 1	Lic.	[1 37-39] 2
Posgrados			M.Sc.	[1 41-43] 3	Ph.D.	[1 45-47] 4
Adiestramiento						[1-49-51]
						[1 53-55]
						[1 57-59]

d) Especializaciones _____ 1 61-63

_____ 1 65-67

_____ 1 69-71

_____

III Trabajo 2 1-3

a) Trabajo Actual: Dependencia _____

Dependencia _____ 2 5-7 Dependencia _____ 2 9-11

Pública	2 13-15: 1	Privada	2 17-19: 2	Propia	2 21-23: 3

Años laborando

Pública	2 25-27	Privada	2 29-31	Propia	2 33-35

Provincia

Pública	2 37-39	Privada	2 41-43	Propia	2 45-47

b) Otros trabajos anteriores(4 últimos)

Dependencia	Años	Provincia
2 49-51	2 53-55	2 57-59
2 61-63	2 65-67	2 69-71
3 1-3	3 5-7	3 9-11
3 13-15	3 17-19	3 21-23

IV Utilización del tiempo TOTAL del trabajo actual (porcentaje)

a) Finca propia	3 25-27
b) Administración y/o supervisión de finca	3-29-31
c) Ventas o servicios propios	3 33-35
d) Supervisión y/o administración de ventas	3 37-39
e) Extensión	3 41-43
f) Enseñanza	3 45-47
g) Crédito	3 49-51
h) Investigación	3 53-55
i) No agrícola	3 57-59

V Desglose del tiempo por actividad (porcentaje)

a) Finca propia

- Cultivos anuales ..	3 61-63
- Cultivos perennes	3 65-67
- Forestal	3 69-71
- Otros fitotecnia	4 1-3
- Ganadería de Carne	4 5-7
- Ganadería de Leche	4 9-11

- Otros zooctecnia	4 15-15
- Administración	4 17-19
- Otros economía	4 21-23

b) Supervisión y/o administración de finca (como empleado)

- Cultivos anuales	4 25-27
- Cultivos perennes	4 29-31
- Forestal	4 33-35
- Otros fitotecnia	4 37-39
- Ganaderia de carne	4 41=43
- Ganaderia de leche	4 45-47
- Otros zootecnia	4 49-51
- Administración	4 53-55
- Otros economía	4 57-59

c) Ventas o servicios propios

- Ventas de productos agrícolas	4 61-63
- Asistencia técnica a compradores	4 65-67
- Administración	4 69-71

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Consultorias privadas	S 1-3
a) Técnicos agricultura	S 5-7
b) Técnicos ganaderia	S 9-11
c) Mixtas	S 13-15
d) Económicos (factibilidad)	S 17-19

d) Administración o supervisión de agronegocios (como empleado)

- Ventas de productos agrícolas	S 21-23
- Asistencia técnica a compradores	S 25-27
- Regencia	S 29-31
- Administración	S 33-35
- Consultoría	S 37-39

e) Extensión agrícola

- Agricultura (cultivos)	S 41-43
- Ganadería	S 45-47
- Economía	S 49-51
- Mixta ganadería-cultivos	S 53-55
- Mixta con economía	S 57-59

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f) Enseñanza

- Escuela secundaria rural _____ 5 61-63
- Escuelas agrícolas de nivel superior _____ 5 65-67
- Universidad _____ 5 69-71

Cursos que imparte

1. _____ 6 1-3 2. _____ 6 5-7 3. _____ 6 9-11

g) Crédito

- Agricultura (cultivos) _____ 6 13-15
- Ganaderia _____ 6 17-19
- Mixto ganaderia-cultivos _____ 6 21-23

h) Investigación
(cítese la orientación: fitotecnia, zootecnia, economia)

_____ 6 25-27
_____ 6 29-31
_____ 6 33-35

i) Actividades NO relacionadas con la agricultura
(cítese: comercio, política, industria, enseñanza, etc)

_____ 6 37-39
_____ 6 41-43
_____ 6 45-47

VI Generalidades (objetivos)

a) Relación con la agricultura antes de estudiar en la E.A.P.

1=Ninguna. 2=Moderada. 3=Regular. 4=Fuerte 6 49-51

b) Tuvo problemas en la E.A.P. por falta de cursos de nivelación 6 53-55

1 = SI 2 = NO

En que materias

1. _____ 6 56-57 2. _____ 6 59-61

3. _____ 6 63-65 4. _____ 6 67-69

c) En que áreas considera Ud. que debió recibir instrucción a un mayor nivel, en la E.A.P.

1. _____ 7 1-3 2. _____ 7 5-7

3. _____ 7 9-11 4. _____ 7 13-15

d) Considera Ud. conveniente el tener algún grado de especialidad al nivel de E.A.P. 7 17-19

1 = SI 2= NO

(Ejemplo: 2 años base y un 3°a escoger entre: Cultivos, ganadería economía, maquinaria u otro). Indique cual 7 21-23

_____

e) Considera usted que el sistema disciplinario de la E.A.P. tuvo una importancia fundamental en su formación profesional. 7 25-27

1 = SI 2 = NO

Por que: 7 29-31

_____

f) Si enviara a sus hijos a estudiar a la E.A.P., que le gustaría que cambiara en el sistema diciplinario

7 33-35

g) Si en Costa Rica existiera una escuela como la E.A.P., sin ningun costo y teniendo la E.A.P. un costo actual de $5000.00 por año

¿ A cuál enviaria usted sus hijos?

7 37-39

1= E.A.P. 2= C.R.

h) Con la misma situación anterior pero si las dos fueran sin costo.

¿ A cuál los enviaria?

7 41-43

1= E.A.P. 2= C.R.

i) Considera Ud. que existe competencia por trabajo entre los graduados de la E.A.P. y los de la U.C.R.

7 45-47

1= SI 2= NO

En que grado

7 49-51

1= Ninguna. 2= Regular. 3= Moderado 4=Fuerte

j) Conteste las siguientes preguntas:

¿ Tuvo Ud. que obtener un grado universitario porque sus oportunidades de hallar trabajo fueron limitadas?

7 53=55

1= SI 2= NO

En caso afirmativo ¿ Por qué?

7 57-59

¿ Considera Ud., que la falta de título universitario ha puesto límites en su carrera profesional?

7 61-63

1 = SI 2 = NO

En caso afirmativo ¿ Por qué?

7 65-67

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k) Considera que su formación respecto a adminitración y manejo empresarial fue adecuada o no ¿ Por qué? 7 69-71

1 = SI 2 = NO 8 1-3

l) Considera Ud. que los graduados, además de su preparación técnica deberían ser preparados en algún grado en técnicas de investigación. 1= SI 2=NO 8 5-7

m) Cual considera Ud. que es la mejor combinación de laboratorio de campo (trabajo) en relación con las actividades de clase y de investigación.

clase	práctica	clase	práctica	investigación
8 9-11	8 13-15	8 17-19	8 21-23	8 25-27

n) Ha trabajado en el trópico humedo 8 29-31

1 = SI 2 = NO

o) Si ha trabajado en el trópico humedo, donde y como aprendió a trabajar en esas condiciones 8 33-35

p) Que opina Ud. sobre la importancia del tropico humedo 8 37-39

VII Diseño curricular(aciertos y deficiencias)

a) Que porcentaje considera que debe tener cada área. 8 41-43

- Fundamentos culturales 8 45-47
- Ciencias básicas 8 49-51
- Tecnologia aplicada a la agricultura 8 53-55
- Complementos con orientación a la investigación

b) Marque con un uno (1) los cursos que más ha utilizado.

Marque con un dos (2) los cursos que le hubiera gustado pero no lle

- Fundamentos culturales

Filosofía	8 57-59	Historia	8 61-63
Economia	8 65-67	Ciencias Politicas	69-71
Otros	9 1-3		

- Ciencias básicas

Biologia	9 5-7	Matemáticas	9 9-11
Física	9 13-15	Química	9 17-19
Otro	9 21-23		

- Tecnología aplicada a la agricultura

Suelos	9 25-27	Fisiología	9 29-31
Cultivos	9 33-35	Horticultura	9 37-39
Protección vegetal	9 41-43	Tecnología semillas	9 45-47
Fitomejoramiento	9 49-51	Otro	9 53-55
Sanidad animal	9 57-59	Industria porcina	9 61-63
Produccion carne	65-67	Produccion leche	9 69-71
Productos lácteos	10 1-3	Avicultura	10 5-7
Otro	10 9-11		

Administración rural	10 13-15	Administ.Financiera	10 17-19
Mercadeo prod. agr.	10 21-23	Programación presup.	10 25-27
Producción agr	10 29-31	Comunicación	10 33-35
Contabilidad	10 37-39	Gerencia agroind.	10 41-43
Preparación y evaluación de proyectos			10 45-47
Ingles técnico	10 49-51	Redacción técnica	10 53-55
Documentación tec	10 57-59	Otro	10 61-63

d) Complementos con orientación a la investigación

Estadistica	10 65-67	Muestreo	10 69-71
Diseños exp	11 1-3	Computación	11 5-7
Documentación	11 9-11		
Metodología de Investigación	11 13-15		

INVENTARIO DE PROGRAMAS DE CAPACITACION AGRICOLA

I TIPO DE INSTITUCION

A) Nombre de la Institución

B) Tipo de Institución

1) Colegio Vocacional(Eje secundaria con capacitación en agricultura)
2) Escuela Técnica que ofrece capacitación superior (más que la secundaria pero no a nivel universitario)
3) Escuela de Agricultura que ofrece Bachillerato Universitario
4) Escuela de Agricultura que ofresca post grado

C) Cuál es el presupuesto de operación anual para la enseñanza en la división de agricultura?

Entrevistador excluya el presupuesto de investigación

II Profesorado y Curriculum Agrícola

2.1 Cuántos estudiantes han sido graduados (con certificado diplomas o el grado completo del curso de instrucción) en los últimos 3 años en las siguientes áreas de especialización

(Entrevistador reporte el # por area)

1	Cultivos	5	Ventas
2	Zootecnia	6	Investigación
3	Mercadeo	7	Estensión A T
3.1	Procesamiento-Agroindustria	8	Administración Manejo
		9	Otros

2.2 Cuál de estas áreas de especialización pertenece a Agricultura Tropical

1	Cultivos	5	Ventas
2	Zootecnia	6	Investigación
3	Mercadeo	7	Extensión A T
4	Procesamiento Agroindustria	8	Administración Manejo
		9	Otros

2.3 Qué cursos específicos para agricultura en áreas ofrece la institución (Entrevistador Liste los cursos)

2.3.1 En cuáles de estos cursos se incluye prácticas de campo (Entrevistador Liste los cursos)

2.4 Además de la instrucción técnica ofrece la institución capacitación de administración de fincas o adeministración agronegocios

III 3.1 Cuántos instructores de agricultura a tiempo completo tiene empleados la institución?

3.2 Cuántos instructores en agricultura que no tienen tiempo completo (1/2, 1/4 de tiempo u horas) tiene empleados la institución?

3.2.1. Cuál es el equivalente en tiempo completo de los instructores de la pregunta 3-2?

3.3 Cuántos de los instructores a tiempo completo tienen los siguientes niveles
1) Menos que Bachillerato
2) Bachillerato
3) Cursos de post grado
4) Maestría
5) Ph.D

3.4 Cuántos de los instructores que no están asignados a tiempo completo tienen los siguientes niveles:
1) Menos de Bachillerato
2) Bachillerato
3) Cursos de post grado
4) Maestría
5) Ph.D

IV Matrícula

4.1 Cuántos estudiantes están matriculados en los programas de agricultura.

4.2 Durante los últimos 5 años la matrícula de estudiantes de agricultura se ha incrementado, disminuído o se mantiene relativamente constante.

4.3 Qué porcentaje de las solicitudes de ingreso son aceptadas en los programas de agricultura?

4.4 En los últimos 5 años el # de solicitudes de ingreso a programas de agricultura se ha incrementado , disminuído o se mantiene relativamente constante.

4.5 Cuál es el Costo actual por año para asistir a la Escuela de Agricultura.

4.6 Cuál era el Costo por año hace 5 años para asistir a la Escuela de Agricultura.

I CARACTERISTICAS DEL EMPLEADOR

1-1 Nombre de la Compañía

1-2 Tipo de operación

1 Producción agrícola

2 Mercadeo y Distribución

3 Crédito y Finanzas

4 Procesar productos agrícolas

5 Venta, reparación e instalación de equipos

6 Investigación y asistencia técnica

1-3 Qué porcentaje de las ganancias brutas es derivado de las operaciones en áreas tropicales húmedas

II Empleo de graduados en Agricultura

2-1 En los últimos 3 años

2-1-1- Qué cantidad de graduados en agricultura por área de especialización ha contratado la compañía

	Número		Número
1. Cultivos		5. Ventas	
2. Zootecnia		6. Investigación	
3. Mercadeo		7. Extensión	
4. Procesamiento Agroindustria		8. Administración Manejo	
		9. Otros	

2-1-2 Cuál es el nivel de preparación.
Entrevistador Reporte el # de empleados / Categoría.

	Número
1) Vocacional	
2) Escuela Técnica	
3) Bachillera Ing. Agrónomo	
4) Post grado	

2-1-3 Cuántos han sido capacitado en instituciones locales y cuántos capacitados fuera de la región de CA/P

1) # capacitados localmente

2) # capacitados fuera de la región

2-1-4 Para los capacitados fuera de la región, en qué áreas de especialización fueron contratados

1) Cultivos
2) Zootecnia
3) Mercadeo
4) Procesamiento-Agroindustria
5) Ventas
6) Investigación
7) Extensión A/T
8) Otros

2-1-5 Por área de especialización, cuántos agrónomos no originarios de la región (otros países) han sido contratados? (Indicar el # por área)

1) Cultivos
2) Zootecnia
3) Mercadeo
4) Procesamientos Agroindustria
5) Ventas
6) Investigación
7) Extención A T
8) Administración manejo
9) Otros

II Salario y Promoción de Graduados en Agricultura

3-1 Cuál es el rango del salario para los nuevos empleados por nivel de capacitación en agricultura

Moneda Local	Rango del salario bajo	alto
1) Escuela vocacional		
2) Escuela Técnica		
3) Bachillera/Ing.Agrónomo		
4) Post grado		

3-2 Concerniente a la promoción de empleados con capacitación en agricultura

3-2-1 En promedio con qué frecuencia los empleados con avanzada capacitación en agricultura , reciben una promoción-Cualquiera de los 2, aumento salarial y/o nueva posición dentro de la compañía

3-2-2 En comparación los empleados que no tienen avanzada capacitación en agricultura (eje Diploma de secundaria o menos) o los capacitados en agricultura reciben promociones más frecuentemente)

3-2-3 Cuál es el rango del incremento del salario asociado con las promociones de los graduados en agricultura

Bajo Alto

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IV Calidad de la Capacitación

4-1 Más allá de la normal orientación para un nuevo trabajo, necesitan los graduados entrenamiento adicional para ejecutar sus tareas en sus trabajos

4-1-2 Da la empresa esta capacitación?

4-2 Qué tipo de entrenamiento en agricultura le son más útiles para la compañía (Entrevistador señala el número apropiado)

1) Cultivos
2) Zootecnia
3) Mercadeo
4) Procesamiento Agroindustrial
5) Ventas
6) Investigación
7) Extensión A T
8) Negocios-Manejo
9) Otros

4-3 Cuáles son las mayores debilidades en capacitación agrícola en la región de CA/P que usted ha detectado en el entrenamiento de los Agrónomos contratados recientemente (En los los últimos 2-3 años)

4-4 En adición a la capacitación técnica , la capacitación adicional en administración de negocios (eje contabilidad manejo personal) usualmente contribuye al avance de los empleados en su carrera.

V Demanda Futura de Agrónomos

5-1 En los próximos 5 o 10 años aproximadamente qué cantidad y tipo de agrónomos va a necesitar la compañía

1) Cultivos
2) Zootecnia
3) Mercadeo
4) Procesamiento Agroindustria
5) Ventas
6) Investigación
7) Extensión AT
8) Negocios Administración
9) Otros

5.1 Cuántos por niveles de capacitación

Número

1) Escuela Vocacional
2) Escuela Técnica
3) Bachiller/Ing.Agrónomo

5.2 Es probable que la Compañía expanda sus operaciones en agricultura hacia áreas tropicales húmedas en los próximos 5 o 10 años?