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5150138-2  
PD- AAF- 472-B1

JUL 12 1979

9/p

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR (LAC)

FROM: LAC/DR, Marshall D. Brown

Problem: To authorize \$4,500,000 for the Costa Rica Science and Technology Loan Project, No. 515-0138

Discussion: The Project's purpose is to strengthen Costa Rica's capacity to plan, conduct, and apply to its productive processes scientific and technological research which takes into account the needs of Costa Rica's poorest groups and the rational use of its natural resources. It will do this by establishing a system for identifying research priorities, promoting and funding such research, and disseminating new technologies and research results. The major implementing agency will be the National Council for Scientific and Technological Research (CONICIT), although the Technology Institute of Costa Rica (ITCR) will play an important role in promoting the use of research results.

The total cost of the project is \$9.0 million, of which half is from A.I.D. and half from GOCR counterpart. The \$4.5 million loan will finance research projects (\$1,500,000), long-term academic training (\$1,425,000), short-term training and research exchange (\$269,000), short-term technical assistance (\$145,000), an industrial sector and technology assessments (\$150,000), a project coordinator and evaluation costs (\$105,000), and miscellaneous information and contingency costs (\$906,000). The GOCR counterpart will finance research projects (\$1,800,000), operating costs of CONICIT and ITCR (\$1,085,000), long-term training (\$595,000), and miscellaneous other costs including contingencies (\$1,020,000).

Of the authorized amount, \$2,000,000 will be provided from Section 105 (EH) funds and \$2,500,000 from Section 106 (ST) funds.

The DAEC reviewed the Project Paper on June 7, 1979. It was approved subject to the following modifications:

1. Language was added describing the role of the private sector in determining research priorities and in reviewing the CONICIT-sponsored technology assessments.
2. A section was added describing how the project will draw upon DS/ST and its ongoing grant with the National Academy of Sciences to monitor loan progress and to provide policy-level assistance to CONICIT.

3. A flow chart illustrating the project process from assessment to research dissemination and the roles of CONICIT and ITCR was added.

4. A request for a Code 935 blanket source and origin waiver for equipment and services was reduced from \$500,000 to \$250,000.

The request for a \$250,000 blanket source and origin waiver is based on the following Handbook 1, Supplement B, criteria: 5B4B(5) -- impelling political considerations; 5B4B(7)--other circumstances critical to the success of project objectives; and partially on 5B4B(2)--limited commodity availability. Political considerations are the most important reason. During the early 1970's the Mission had an unfortunate experience with the University of Costa Rica over what the University felt was excessive control of its internal affairs by A.I.D. The result was a series of demonstrations and other public criticism directed against the United States. Even though university demonstrations and anti-Americanism seem out of style at present, the universities remain highly politicized. The Mission does not want unnecessary restrictions on source and origin to cause confrontation and accusations of U.S. interference in domestic science and technology activities. Because universities will conduct much of the research financed by the loan and in order to avoid conflict and to help everyone focus on quality work, the Mission believes that it would be most prudent to present the universities with research contracts which provide flexibility on source and origin.

The Mission also believes that the waiver is important for achievement of project objectives--i.e., a restrictive source and origin policy, especially on services and information, would inhibit greater international scientific contacts and cross fertilization of information. The loan is also expected to finance the purchase of scientific equipment which is not available from Code 941 countries, e.g., optical, electronic, and photographic equipment.

The IEE has been reviewed, and a negative Environmental Threshold Decision was made on February 4, 1978. The project is included in the FY 79 Congressional Presentation at \$3 million. An Advice of Program Change was forwarded to the Congress on June 4, 1979; the waiting period expires on June 18, 1979.

Recommendation: That you sign the attached Project Authorization and Request for Allotment of Funds (PAF) for the Costa Rica Science and Technology Project.

**DEPARTMENT OF STATE**  
**AGENCY FOR INTERNATIONAL DEVELOPMENT**  
WASHINGTON, D. C. 20523

**ASSISTANT  
ADMINISTRATOR**

Loan Number 515-W-030 2,500,000  
515-V-031 2,000,000  
Ref. AID/LAC/P-018

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

Name of Country: Costa Rica  
Name of Project: Science and Technology  
Number of Project: 515-0138

Pursuant to Part I, Chapter 1, Sections 105 and 106 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Loan to The Republic of Costa Rica, the "Cooperating Country", of not to exceed Four Million Five Hundred Thousand United States Dollars (\$4,500,000), the ("Authorized Amount"), to help in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The project consists of the establishment of a system for: (i) identifying priority research opportunities related to the better use of Costa Rican human and natural resources; (ii) promoting and funding such research; and (iii) disseminating the new technologies and knowledge resulting from that research and from adapted foreign technologies (hereinafter referred to as the "Project"). Of the Authorized Amount, \$2,000,000 will be provided from Section 105 funds and \$2,500,000 from Section 106 funds. The entire amount of the AID financing herein authorized for the project will be obligated when the Project Agreement is executed.

I hereby authorize the initiation of negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with AID regulations and Delegations of Authority subject to the following essential terms and covenants and major conditions; together with such other terms and conditions as AID may deem appropriate.

A. Interest Rate and Terms of Repayment

The Cooperating Country shall repay the Loan to AID in United States Dollars within twenty (20) years from the date of first disbursement of the Loan, including a grace period of

not to exceed ten (10) years. The Cooperating Country shall pay to AID in United States Dollars interest from the date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

B. Source and Origin of Goods and Services

Except for ocean shipping, goods and services financed by AID under the project shall have their source and origin in the Central American Common Market or in countries included in AID Geographic Code 941 except as AID may otherwise agree in writing. Ocean shipping financed under the Loan shall be procured in countries which are members of the Central American Common Market or in the United States.

C. Conditions Precedent to Initial Disbursement

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement, the Cooperating Country shall furnish to AID, in form and substance satisfactory to AID:

(i) an inter-institutional agreement between the Technology Institute of Costa Rica (ITCR) and the Costa Rican National Council for Scientific and Technological Research (CONICIT) delineating the roles and relationships between CONICIT and ITCR relating to ITCR's Division of Investigation, Development and Technological Extension's (DIDET) dissemination of project-financed research results; graduate training of ITCR faculty; machinery and vehicle lists; and identification of new DIDET personnel to execute an expanded technology extension effort;

(ii) evidence that a Project Coordinator acceptable to AID and the Cooperating Country has been named; and

(iii) a general Project Implementation Plan for the life of the project and a detailed first year implementation plan.

D. Conditions Precedent to Disbursement for Research Projects and Scholarships

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement to finance research projects and/or scholarships, the Cooperating Country shall furnish to AID, in form and substance satisfactory to AID:

(i) a copy of its research project and participant training regulations applicable to loan-funded research and training. This will include selection criteria for research proposals, a description of researcher and research-entity eligibility, eligible research costs, dispositions regarding use, ownership and transfer and commodities funded by research projects, and the selection criteria and other rules regarding scholarships; and

(ii) model agreements for Project research and scholarship grants which incorporate provisions of the pertinent regulations called for in D(i) above.

E. Condition Precedent to Disbursement of More Than \$600,000 for Loan-Funded Research Projects

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement to finance more than \$600,000 of Loan-funded research projects, the Cooperating Country shall furnish to AID, in form and substance satisfactory to AID, one completed industrial sector assessment and technological assessments for at least six industrial sub-sectors as well as two technological assessments in energy and two in natural resources.

F. Special Covenants

The Cooperating Country shall covenant that in addition to CONICIT's normal research and selection criteria:

(i) all research involving radioactive substances and all research recombining DNA (deoxyribonucleic acid) will require prior AID approval; and

(ii) no research involving weather modification will be project funded.

G. Waiver

A waiver is hereby approved to AID Geographic Code 935 to permit procurement of up to \$250,000 worth of scientific equipment and services. It meets the criteria set forth in AID Handbook 1B, Chapter 5, Section 5B4b(5) and (7).

Exclusion of procurement from Free World countries other than the Cooperating Country and countries in Code 941 would seriously impede attainment of U.S. foreign policy objectives and objectives of the foreign assistance program.

Assistant Administrator  
Bureau for Latin America and  
the Caribbean

June 22, 1979  
Date

Clearances:

GC/LAC, J. Kessler	<u>JMK</u>	date	<u>6/24/79</u>
LAC/DR, C. Leonard	<u>CL</u>	date	<u>6/11/79</u>
LAC/DR, M. Brown	<u>MB</u>	date	<u>6/11/79</u>
LAC/CEN, R. Lindsay	<u>RL</u>	date	<u>6/8/79</u>
SER/COM, W. Schmeisser	<u>WS</u>	date	<u>6/13/79</u>

GC/LAC:RMCotten:ec:6/12/79:x29182

AGENCY FOR INTERNATIONAL DEVELOPMENT  <b>PROJECT PAPER FACESHEET</b>	1. TRANSACTION CODE  <div style="border: 1px solid black; display: inline-block; padding: 2px;">A</div> A. ADD C. CHANGE D. DELETE	PP  2. DOCUMENT CODE  3
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3. COUNTRY ENTITY  COSTA RICA	4. DOCUMENT REVISION NUMBER  <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div>
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5. PROJECT NUMBER (7 digits)  <div style="border: 1px solid black; display: inline-block; padding: 2px;">515-0138</div>	6. BUREAU/OFFICE A. SYMBOL LA	B. CODE <div style="border: 1px solid black; display: inline-block; padding: 2px;">05</div>	7. PROJECT TITLE (Maximum 40 characters)  <div style="border: 1px solid black; display: inline-block; padding: 2px;">SCIENCE AND TECHNOLOGY</div>
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8. ESTIMATED FY OF PROJECT COMPLETION  FY <div style="border: 1px solid black; display: inline-block; padding: 2px;">84</div>	9. ESTIMATED DATE OF OBLIGATION A. INITIAL FY <div style="border: 1px solid black; display: inline-block; padding: 2px;">79</div> B. QUARTER <div style="border: 1px solid black; display: inline-block; padding: 2px;">3</div> C. FINAL FY <div style="border: 1px solid black; display: inline-block; padding: 2px;">79</div> (Enter 1, 2, 3, or 4)
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10. ESTIMATED COSTS \$000 OR EQUIVALENT \$1 -						
A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. C.C.	D. TOTAL	E. FX	F. C.C.	G. TOTAL
AID APPROPRIATED TOTAL	2,835	1,665	4,500	2,835	1,665	4,500
(GRANT)	( )	( )	( )	( )	( )	( )
(LOAN)	( 2,835 )	( 1,665 )	( 4,500 )	( 2,835 )	( 1,665 )	( 4,500 )
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY				450	4,050	4,500
OTHER DONOR(S)						
TOTALS				3,285	5,715	9,000

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY <u>79</u>		H. 2ND FY <u>    </u>		K. 3RD FY <u>    </u>	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1) EH	699		690		2,000				
(2) ST	750		978		2,500				
(3)									
(4)									
TOTALS									

A. APPROPRIATION	N. 4TH FY <u>    </u>		O. 5TH FY <u>    </u>		LIFE OF PROJECT		12. IN-DEPTH EVALUATION SCHEDULED
	Q. GRANT	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	
(1) EH						2,000	<div style="border: 1px solid black; display: inline-block; padding: 2px;">           MM YY            05 82         </div>
(2) ST						2,500	
(3)							
(4)							
TOTALS							

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

2    1 = NO  
       2 = YES

14. ORIGINATING OFFICE CLEARANCE SIGNATURE TITLE <b>Stephen P. Knaebel</b> <b>Mission Director</b>	15. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION  DATE SIGNED <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">MM</div> <div style="border: 1px solid black; padding: 2px;">DD</div> <div style="border: 1px solid black; padding: 2px;">YY</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px;">05</div> <div style="border: 1px solid black; padding: 2px;">26</div> <div style="border: 1px solid black; padding: 2px;">79</div> </div>
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AGENCY FOR INTERNATIONAL DEVELOPMENT  
**PROJECT IDENTIFICATION DOCUMENT FACESHEET**  
 TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE  
 C A = ADD  
 C = CHANGE  
 D = DELETE

PID  
 2. DOCUMENT CODE 1

3. COUNTRY/ENTITY COSTA RICA

4. DOCUMENT REVISION NUMBER 1

5. PROJECT NUMBER (7 DIGITS) 515-0138

6. BUREAU/OFFICE  
 A. SYMBOL LA B. CODE 25

7. PROJECT TITLE (MAXIMUM 40 CHARACTERS) SCIENCE AND TECHNOLOGY

8. PROPOSED NEXT DOCUMENT  
 A.  2 = PRP  
 3 = PP  
 B. DATE 05 79

10. ESTIMATED COSTS (\$000 OR EQUIVALENT, \$1 = 8.54)

FUNDING SOURCE		
A. AID APPROPRIATED		4,500
B. OTHER U.S. 2.		
C. HOST COUNTRY		4,500
D. OTHER DONOR(S)		
TOTAL		9,000

9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION  
 a. INITIAL FY 79 b. FINAL FY 79

11. PROPOSED BUDGET AID APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. FIRST FY		LIFE OF PROJECT	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	H. GRANT	I. LOAN
(1) EH	699		690		2,000		2,000
(2) ST	750		978		2,500		2,500
(3)							
(4)							
TOTAL							

12. SECONDARY TECHNICAL CODES (maximum six codes of three positions each)  
 870 873 878

13. SPECIAL CONCERNS CODES (MAXIMUM SIX CODES OF FOUR POSITIONS EACH)  
 RGN TECH

14. SECONDARY PURPOSE CODE

15. PROJECT GOAL (MAXIMUM 240 CHARACTERS)  
 Permanent socio-economic improvement of Costa Rica's population, especially its poorest groups, through increased access to and more productive use of the means of production.

16. PROJECT PURPOSE (MAXIMUM 400 CHARACTERS)  
 To strengthen Costa Rica's capacity to plan, conduct, and apply to its productive processes scientific and technological research which takes into account the needs of Costa Rica's poorest groups and the rational use of its natural resources.

17. PLANNING RESOURCE REQUIREMENTS (staff/funds)

18. ORIGINATING OFFICE CLEARANCE  
 Signature \_\_\_\_\_  
 Title \_\_\_\_\_ Date Signed MM DD YY \_\_\_\_\_

19. DATE DOCUMENT RECEIVED FOR AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION  
 MM DD YY \_\_\_\_\_

SCIENCE AND TECHNOLOGY

Project Paper

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- B. DAEC Interim Report Review Cable
- C. Detailed Illustrative Research Project Descriptions
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- I. Relationship to ROCAP ICAITI Project
- J. Schedule of Major Events

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SCIENCE AND TECHNOLOGY

PROJECT PAPER

I. PROJECT SUMMARY AND RECOMMENDATIONS

A. Face Sheet (attached)

B. Recommendations

It is recommended that AID approve the following:

Loan: \$4,500,000

Terms: 20 years to include  
a 10-year grace period on  
amortization; 2% interest  
during the grace period  
and 3% thereafter.

GOCR Contribution: 4,500,000

Project Total \$9,000,000

Implementation Period: 5 years

Waiver: AID Geographic Code 935 may be used to  
procure up to \$500,000 worth of scientific equipment.

C. Description of the Project

1. Borrower

The Government of Costa Rica (GOCR) will be the Borrower. The Costa Rican National Council for Scientific and Technological Research (CONICIT), an autonomous GOCR agency, will have the overall responsibility for the Project's implementation. Other Costa Rican entities involved in aspects of Project implementation include the Technology Institute of Costa Rica (ITCR), the University of Costa Rica (UCR), the National Autonomous University (UNA), the research institutes associated with these universities, and other Costa Rican scientific and research entities.

UNCLASSIFIED

## 2. Project Summary

The goal of the proposed Project is the permanent socio-economic improvement of Costa Rica's population, especially its poorest groups, through increased access to and more productive use of the means of production.

The Project's purpose is to strengthen Costa Rica's capacity to plan, conduct, and apply to its productive processes scientific and technological research which takes into account the needs of Costa Rica's poorest groups and the rational use of its natural resources. The Project will establish a system for: identifying priority research opportunities related to the better use of Costa Rican resources, promoting and funding such research, and disseminating new technologies and knowledge resulting from research that will be conducted by a strengthened local research community or will be imported and adapted to local circumstances. The technology research system established by the Project should result in a process of indigenous technological innovation and adaptation which will contribute to Costa Rica's future economic growth with equity.

The AID Loan will finance short-term training and international researcher exchange, masters and doctoral level graduate training, short-term technical assistance, technology assessments, an industrial sector assessment, research and development projects, technology information searches, and honorariums for research proposal evaluations. The Loan will also fund a project coordinator, and in-depth project evaluations.

The Project will finance activities in the following interrelated components:

### a. Research and Development Assessment, Planning, and Promotion

This component will strengthen CONICIT's ability to identify, promote and fund an increased amount of relevant high quality research in industrial technology, natural resources, and energy, the Project's priority sectors. These sectors were chosen for the economic potential that they offer for the development and employment of new technologies utilizing local human and natural resources, and because of the paucity of research presently being conducted in them. In recent years the percentage of the labor force employed in industry has leveled off, the rising cost of imported pe-

troleum has eroded much economic progress; and the irrational exploitation of natural resources has reached a point where the country's continued long-term growth is in jeopardy. Yet the amount of technology research in the industrial, energy, and natural resources sectors is very limited -- in 1977 research in these areas accounted for only 15% of all research projects being conducted in Costa Rica.

CONICIT will use AID Loan funds to finance an industrial sector assessment that will identify those sub-sectors in which technological change has the most potential for increasing labor demand and productivity. Loan-funded technology assessments carried out in these industrial sub-sectors and in energy and natural resources will identify fruitful areas for research. Based on the technology assessments, CONICIT will formulate a research program consisting of research project ideas which it will actively promote and fund. Loan funds and GOCR counterpart funds will be used to finance approximately 58 research projects over the life of the Project. These projects will give Costa Rica experience in conducting research in areas which have received inadequate research funding in the past, provide some immediate solutions to technological problems in Costa Rica, and create incentives for the growth of an institutionalized research capacity in these areas.

Loan funds from this component will also be used to pay for a project coordinator, information searches, honorariums for research project evaluation, and in-depth evaluations of the Project.

b. Research Community Support

The objective of this component is to strengthen the capability of Costa Rican research entities to carry out an increased amount of high quality research in the Project's priority sectors. This will be done by increasing the supply of researchers with relevant graduate level scientific and technological educations, providing short-term in-country and foreign training, and upgrading research management practices. The AID Loan will fund training in the priority areas for 35 researchers at the Master's degree level and for six researchers at the PhD level. Short-term training to be Loan-funded will include an exchange program involving Costa Rican and foreign researchers and research administrators. Research management will be improved by means of Loan-funded research methodology workshops and counterpart-funded research entity management evaluations.

c. Technology Extension

This component will strengthen the link between small producers and new technologies, both those developed under this Project and those imported technologies which can be adapted to the needs of Costa Rican small producers. Making maximum use of existing agricultural and small industry extension services and a network of small producer organizations, a technology extension unit in the ITCR will increase its ability to carry out in-depth technology consultations, prepare and publish technology information pamphlets, and give short courses and demonstrations. The foregoing will require a larger extension staff, greater use of international technology information services, and Loan-funded short-term technical assistance. Loan-funded graduate (PhD level) scholarships will also help develop a core of well trained industrial technologists on the ITCR faculty. These people will provide high quality backstopping for technology extension and research and will upgrade the training of industrial technology researchers and extensionists.

D. Summary Findings and Recommendations

The Project Committee has reviewed the technical, financial, social and economic aspects of the proposed Project. DS/OST assisted the Mission in Project design and in technical review. LAC/DR assisted in Project design and in the Economic Analysis. Because of the high priority the 1979-1982 National Development Plan gives to science and technology development, it is highly unlikely that the GOCR will fail to provide the required counterpart funding for the Project. (The GOCR's doubling of its funding support to CONICIT in 1979 as compared to 1978, is in keeping with the Plan and is an indication of their seriousness). Taking into account the technical and other assistance, including training that the AID Loan will provide and the plans of CONICIT and ITCR to increase their personnel in key areas, it is believed that GOCR institutions will have the capacity to carry out the Project. None of the Project analyses identify significant feasibility issues. [The Project contains mechanisms to minimize needless duplication of science and technology activities already being carried out by others and will be closely monitored by USAID/Costa Rica to avoid such duplication. The Project provides for cost-effective international technological interchange. The GOCR is expected to have the overall technical and financial ability to maintain the level of Project activities after AID' support terminates. The Project can be completed in five years, will not have environmental effects, and meets all statutory criteria.

On the basis of the analysis contained herein, the USAID Mission to Costa Rica concludes that the Project is technically, economically, and financially sound and recommends that a Loan not to exceed \$4,500,000 be authorized to the GOCR.

The Mission is also requesting a waiver to AID Geographic Code 935 for the procurement of up to \$500,000 worth of scientific equipment and services. The justification for this waiver is contained in a separate cable (San Jose \_\_\_\_\_).

E. Project Issues

The issues raised by the Interim Report DAEC Review cable (STATE 038060) are covered in various sections of this PP. Two of the Project Rationale issues are covered as follows: the general issue of alternatives is dealt with in the Technical Analysis (Alternative Project Design); and the issue of research and studies is covered in the Technical Analysis (Demand Analysis), in Annex II-C (Detailed Illustrative Research Project Descriptions), and in the detailed Description (Research and Development Assessment Planning and Promotion). The Science Infrastructure Component was dropped from the Project, and therefore is not covered. The long-term financing of research and development is discussed in the Financial Analysis. Operational costs are not financed by AID Loan funds, and therefore not covered. The research project selection criteria are described in the Detailed Description (Research and Development Assessment Planning and Promotion). The relationship to ROCAP-ICAITI Project is dealt with in Annex II-I; the relationship with other donor programs is covered in the Background (Relationship to AID and Other Donor Programs). Finally, the recommendation to provide "cross fertilization" in the Project has been heeded; the Project connects Costa Rican research activities to research efforts beyond its borders in each component.

F. Composition of the Project Committee

CONICIT

Mariano Ramírez	-Executive Secretary
Federico Vargas	-Advisor to Executive Secretary and Director of Human Resources Office
Jorge Ramírez	-Director of Projects Office

ITCR

Gustavo Prifer	-Former Director of DIDET
Alejandro Cruz	-Director of DIDET
Walter Bolaños	-Industrial Production
Federico Abarca	-Industrial Production
Juan Tuk	-Wood Research Laboratory
José Leñero	-Metal Working Laboratory
John De Clue	-PCV-Metal Working
Donald Peterson	-PCV-Solar Energy

UNA

Ludwig Nagel	-Professor Marine Biology
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Meteorological Institute

Patricia Ramírez	-Assistant Director
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AID

Mary Likar Cruz	-Consultant to USAID/CR
Robert Mausehammer	-TDY, LA/DR, AID/W
John Daly	-TDY, DS/OST, AID/W
Suzanne Owens	-TDY, DS/OST, AID/W
Dave Straley	-Assistant Capital Project Development Office, USAID/CR
Bastiaan Schouten	-Chief, Capital Development Office, USAID/CR

Reviewed and approved by:

Mary Kilgour	-Assistant Director, USAID/CR
Stephen Knaebel	-Director, USAID/CR

## II. BACKGROUND AND DETAILED DESCRIPTION

### A. Background

#### 1. Science and Technology and Costa Rican Development Strategy

##### a. Costa Rican Development Strategy to Date

Over the last two decades Costa Rica has made excellent socio-economic progress. Per-capita income has more than doubled, the population growth rate has dropped significantly, infant mortality has decreased sharply, and basic literacy is now almost universal. In spite of past progress -- and to some extent as a result of it -- basic development problems persist, new ones have been created, and the strategies for dealing with them cannot be the same as they have been in the past.

Since the early 1960's Costa Rica has followed development strategies which can be summarized as follows:

(1) expansion of traditional agricultural exports, (2) industrialization by means of import substitution and regional (CACM) integration, and (3) the extension of infrastructure and basic social services through a growing public sector. These strategies have been financed, in large part, by foreign loans and direct investment and have involved the use of imported technologies. It is widely agreed that although these strategies have been successful in the past, they cannot, for various reasons, continue to be the basis for Costa Rican development.

##### (1) Traditional Agricultural Exports

Costa Rica's output, consumption, employment, and balance of trade are strongly influenced by the production levels of and the world market prices for coffee, bananas, beef, and sugar. Together, these commodities account for almost two-thirds of the country's exports, and their expanding production has constituted the Costa Rican economy's principle motor of growth. The medium and long term prospects for these commodities are not good. Coffee, already priced at a low level, has a weak futures market. Sugar prices continue to stagnate at a very low level, and banana prices are stable but below their 1974-1975 levels. Although market perspectives for aftosa-free beef are good, production cannot expand, unless pasture and other cattle management practices are

intensified. To do otherwise, will result in environmental problems (Costa Rican forest lands are being converted into what are usually marginal pastures at the rate of approximately 60,000 hectares p.a.)

(2) Industrialization Through Import  
Substitution and Regional Integration

Much of Costa Rica's rapid industrial expansion in the last ten to fifteen years is a consequence of its participation in the Central American Common Market (CACM), which served to promote import substitution within Central American that was heavily dependent on imported materials, capital goods, and technologies. Future industrial growth through import substitution will not be as significant anywhere in the CACM region as in the past because most of the easy import substitution opportunities are gone. Past growth due to participation in the CACM cannot be repeated.

While import substitution and economic integration did stimulate the growth of industrial production, they have also left another legacy -- an industrial sector whose share in GNP increased from 15.0% in 1963 to 18.7% in 1973, while the percentage of the labor force employed in industry changed only from 11.5% to 11.9% during the same period. Only an estimated 60% of the sector's installed capacity was utilized in 1976 <sup>1/</sup>. Industrial productivity is low while unit costs, profit margins, and output prices are high; incentives to produce and export products with a high content of Costa Rican labor and raw materials are limited; and the technological structure of the industrial sector has developed without having to concern itself excessively with Costa Rica's relative factor endowment of labor and capital or its natural resource base. The effects of import substitution and economic integration upon the poor have probably been two-fold: on the one hand, their incomes have suffered due to lower levels of employment and/or real wages than might have resulted from alternative industrialization policies; and on the other, they have had to pay higher prices for manufactured goods.

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<sup>1/</sup> IBRD, Economic Position and Prospects of Costa Rica, November 11, 1977.

In Costa Rica, the region-wide adverse consequences of the CACM import substitution policy were compounded by underpricing capital goods through a series of incentives, including artificially low interest rates, and overpricing labor through high payroll taxes and minimum wages.

The GOCR is attempting to rationalize overall resource allocation by adopting market interest rates, lowering taxes on many imported products, and lobbying for overall CACM policy changes. Some of these changes are proving easier to make than others.

(3) The Extension of Infrastructure and Basic Social Services

Between 1961 and 1971 the number of absolute poor, those with per capita incomes of less than \$150 (1969 prices), has decreased by 40%. This statistic shows the general improvement of the situation of Costa Rica's poor over the last two decades, a period characterized by general prosperity and the extension of infrastructure and basic health and education services to most Costa Ricans. Indications do exist, however, that the incomes of the poorest segments of the population are not growing as fast as those of the population as a whole (see FY 81-85 CDSS) and that the problems of those remaining in absolute poverty (about 25%) are more intractable and cannot be solved merely by a further expansion of public sector social services. Furthermore, there is widespread concern in Costa Rica about the increasing size of the public sector, about the efficacy and efficiency of many GOCR programs, and about transfer payments that are growing faster than the capacity to make them. Concern also exists that a modern welfare state has been created without the corresponding productive structure to support it over the long-run.

b. Current Development Strategy

Current GOCR development strategy as reflected by the draft 1979-1982 National Development Plan (summarized and discussed in the Mission's FY 81-85 CDSS), places greater stress than has existed in the past on achieving a more efficient productive structure, on the rationalization of resource use, both human and natural, and on the permanent socio-economic improvement of the Costa Rican population, especially

its poorer segments, through higher productivity and greater access to the means of production. Broader popular participation, greater public sector effectiveness, "man-centered" development, geographic decentralization, and a level of consumption more appropriate to Costa Rica's possibilities are also concerns of the plan.

In short, present GOCR strategies recognize that sustaining, consolidating, and increasing the socio-economic development that Costa Rica has achieved to date will require productive structures having greater economic efficiency than at present so that Costa Rica is able: to compete in a broader spectrum of world markets; to promote domestic savings; and to husband and enhance both its human and natural resources. Although these strategies have the ring of an orthodox "market-to-market" approach and, indeed, contain many "market-to-market" prescriptions, characterizing them as such would do injustice to their subtlety. The approach is man-centered, and growth with equity is central to it. The poor, therefore, are seen as development resources with a potential for enhancement, and this enhancement is seen as the long-run solution to their poverty as well as a new source of dignity. Thus, larger transfer payments are rejected in favor of the "capitalization" of the poor. The objective is to increase their skills, their productivity and their participation in the ownership of other productive assets.

Within these new GOCR strategies scientific and technological improvement plays a key role.

c. The Role of Scientific and Technological Development in Current Development Strategy

Although being able to import technologies from beyond its borders offers certain advantages to a small, developing country like Costa Rica, since it does not have to pay the full cost of developing such technologies <sup>1/</sup> nor

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<sup>1/</sup> Costa Rican payments in the form of licensing fees and other charges related to the use of foreign technology are, however, significant. These charges increased from \$3,021,000 in 1970 to \$9,098,000 in 1977 and totaled more than \$36,000,000 over the period (OFIPLAN, Programa de Ciencia y Tecnología).

invest in the scientific and technological research capacity required to produce them, the resulting technological dependence also has disadvantages. One important disadvantage of employing imported technology is that unless it is adapted to local circumstances, it will usually result in a pattern of resource utilization that is less than optimum, with negative consequences for both income distribution and productive efficiency. <sup>1/</sup> A second, and perhaps more serious consequence of technological dependence may be that because a country looks outward for its technology, an indigenous science and technology capacity is not developed, with the result that technologies utilizing locally available resources are not developed because of a lack of knowledge or interest about them.

Given the disadvantages inherent in technological dependence, a Costa Rican development strategy which has among its principal objectives the promotion of more efficient productive structures and the better utilization of human and natural resources cannot depend exclusively on market-directed resource allocation in the technology area; the government must take a more active role.

In Costa Rica a need exists to strengthen local capabilities to:

(1) search out and adapt to local circumstances, to the degree possible, both technologies developed for use in more developed countries, as well as so-called "intermediate", "appropriate", or "light-capital" technologies, which are increasingly available in other developing countries; and

(2) develop technologies using locally available resources.

Technical innovation and adaptation are needed

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<sup>1/</sup> The relationships between technological improvement and economic growth and efficiency are dealt with at greater length in the Economic Analysis Section of this paper.

to increase output and productivity, to take advantage of present Costa Rican markets and resources, and to facilitate entry into the new markets which Costa Rica must enter if past rates of growth are to be maintained.

The foregoing is acknowledged by Costa Rica's draft Development Plan. It cites science and technology as important to "promoting a structure of production adequate for the integral development of the Costa Rican people," ("Integral development" in Latin American economic circles has come to stand for "growth with equity"). According to the Plan, Costa Rican science and technology must be strengthened and its emphasis redirected to reduce past and present dependence on imported materials and components and to improve the country's productive resources. Thus, Costa Rica recognizes that if it does not establish a capability to induce technological advances specific to its resources and problems, it will continue to be faced with technological options that do not necessarily make the most of its human and natural resources; and that this underutilization will make it harder to maintain its economic growth and to provide for "a Costa Rica which is better for all".

The draft National Development Plan includes a Science and Technology Program which contains two general objectives for the next four years:

(1) Build a strong national scientific and technological foundation so that Costa Rica can develop a local capacity to create its own technology and enable it to seek out, select, use, assimilate and adapt imported technology. The above should be done in close coordination with the nation's productive sectors, considering their most urgent needs.

(2) Promote national scientific research capacity in order to permit the country's scientific community to place science at the service of the economic and social development of the entire Costa Rican population and to enable it to participate more and more in universal scientific progress.

In order to reach these objectives the GOCR Science and Technology Program sets a strategy, a specific action plan, and earmarks resources to carry it out. The program, which is summarized in ANNEX II-E, stresses the need to train more researchers, to strengthen Costa Rica's science and technology

centers, and to adequately finance research projects. The program, which also identifies priority areas for research in eight sectors, contemplates an increase in GOCR subsidies through CONICIT from slightly over \$500,000 in 1978 to approximately \$1.5 million in 1979 with further progressive increases to over \$4.6 million in 1982 (in 1979 prices). In addition, the program contemplates channeling 25% of the AID-GOCR Two-Step Fund to scientific research.

The activities of this Project which support improving Costa Rica's capacity to plan, conduct, and apply to its productive processes scientific and technological research are thus responsive to and consistent with the general outlines of the draft 1979-1982 GOCR Science and Technology Program.

2. Costa Rican Science and Technology Problems

a. Research and Development Priorities

(1) Present Research Priorities

In 1978 CONICIT published an inventory of research that was being conducted in the 1976-1977 period. This inventory indicates that out of 699 research projects being carried out in Costa Rica, only 110 were in applied science, excluding medicine or agriculture. A recent CONICIT paper prepared for the 1979 U.N. Conference on Science and Technology states that (in Costa Rica) "Basic research takes place primarily in the natural sciences and the greater part of applied research in medicine and agriculture." <sup>1/</sup> It is because of the relatively small amount of research currently being conducted in industrial technology, natural resources, and energy and the importance of these sectors to continued economic growth (as emphasized quite correctly in the GOCR's current development strategy) that Project research funding is confined to them.<sup>2/</sup>

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1/ CONICIT, La Situación General de la Ciencia y la Tecnología,  
p. 11.

2/ The restriction of Project funded research to the priority sectors in no way implies that research in such areas as agriculture and the health sciences is not important. It is rather that research capabilities and extension systems in those two sectors are comparatively well established while they are virtually non-existent in the Project's priority areas. In any case, the effort required to upgrade agricultural research and extension systems in Costa Rica, for example, would be beyond the scale of this Project.

There appear to exist several interrelated reasons for the small amount of research and development taking place in this Project's priority areas -- industrial technology, natural resources, and energy.

The first reason, which has been discussed previously, is that most technologies used to date in the priority areas are imported.

The second reason is the limited financing for research in these areas. In 1976 only two out of the 32 research projects funded by CONICIT were in the priority areas; one dealt with raw materials for artisan use and the other with the growth rates of tropical forests. These two projects received \$4,979, an amount which constituted 3.3% of CONICIT subsidies. In 1977, three out of 29 CONICIT-subsidized research projects were in priority areas; they received \$16,400 or 9.7% of CONICIT subsidies. Table II.A.1. indicates the breakdown of CONICIT funded research in 1977 by scientific technological area. No comparable data are yet available for 1978 but the distribution is expected to be similar.

TABLE II.A.1.

CONICIT Funded Research Underway During 1977,  
by Scientific-Technological Areas

<u>Area</u>	<u>Number of Projects</u>	<u>Amount (\$000)</u>	<u>% of Amount</u>
Health Sciences	8	58	34.3
Agricultural Sciences	7	43	25.6
Exact & Natural Sciences	6	23	13.6
Social Sciences	5	28	16.8
Engineering & Technology	<u>3</u>	<u>16</u>	<u>9.7</u>
TOTAL	29	168	100.0

Source: CONICIT, Informe Anual, 1977.

Analysis of the research budget of the University of Costa Rica shows a similar pattern. In 1975, the latest year for which complete data is available, the UCR research budget was \$486,000. As indicated in Table II.A.2., if food research is counted as falling within the priority areas, only 7.4% of the budget was allocated to those areas.

TABLE II.A.2.

Distribution of the Research Budget of the  
University of Costa Rica, 1975

<u>Area</u>	<u>Amount (\$000)</u>	<u>% of Amount</u>
Institute for Psychological Investigation	\$ 73	15.0
Food Research Institute	36	7.4
Central American Studies Institute	16	3.3
Engineering and Architecture Arts	-	0.0
Economic Studies	49	10.1
History	10	2.1
Health	40	8.2
Agronomy	<u>262</u>	<u>53.9</u>
TOTAL	\$486	100.0

Source: CONICIT

The third and perhaps most fundamental reason for the meager amount of research in the Project's priority areas is because there are few researchers in Costa Rica in these areas. The Mission's analysis of the 1978 CONICIT inventory of research projects found that 341 researchers were involved in the 699 research projects. Table II.A.3 classifies those researchers by research area.

TABLE II.A.3.  
Costa Rican Researchers by  
Area of Research (1976-1977) 1/

<u>Area</u>	<u>Number</u>	<u>% of Number</u>
Agronomy	118	34.6
Medicine, Health & Nutrition	70	20.5
Biology and Microbiology	28	8.2
Industrial Technology	25	7.3
Food Technology	21	6.1
Economics, Law, and Sociology	19	5.6
Psychology	16	4.7
Energy	12	3.5
Veterinary Medicine	10	2.9
Marine Science & Oceanography	7	2.1
Forestry	6	1.8
Nuclear	4	1.2
Environment	2	0.6
Other	<u>3</u>	<u>0.9</u>
	341	100.0

Source: Mission Analysis of CONICIT's Indice de Investigaciones en Curso en Costa Rica, 1978 (draft).

1/ These data have certain limitations. In some cases all those working on the research project were mentioned, including laboratory technicians, research assistants, etc., while in others only scientists were mentioned.

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The average researcher worked on 4.97 projects and the average project had 2.48 participants. The heavy predominance of researchers in agriculture and the health sciences is easily noted from Table II.A.3., where it can be seen that 58% of the researchers were involved in these fields. From the data in Table II.A.3. it is difficult to establish how many Costa Rican researchers are working in areas of priority to this Project. Biologists, for example, may or may not be involved in research in the priority areas. Similarly, economists might be involved. In any case it is doubtful that more than 80 to 90 people were working in these areas.

A survey of department heads at the University of Costa Rica also highlighted the deficiency in trained personnel. The electrical engineering department head discussed the void in solar energy investigation -- there are no funds to start a solar research center, and no one actually trained in the field. The civil engineering department head cited the absence of engineers with advanced training in the areas of environmental conservation, water, forest resources, and transportation; they are needed to conduct research and teach. The head of chemical engineering told the Mission that there is no one in Costa Rica highly qualified in energy and environmental analysis. The head of mechanical engineering described the department's current attempt to place three individuals overseas for training in small farm machinery since no one in the country has any experience. The man in charge of industrial engineering pointed to the need for highly trained individuals in systems and production engineering. Finally, the marine biology department head reiterated a conclusion contained in CONICIT's recent situation paper, "One of the factors which impedes the rational use of marine resources is the lack of qualified personnel at all levels." <sup>1/</sup>

Because it is working researchers who in the main develop research proposals and present them for funding, it is logical that their areas of interest and experience influence funding allocations. Similarly, it is difficult to undertake research in areas where qualified research personnel are not available. Thus the lack of trained research people is an important factor influencing the small amount of research in priority areas.

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<sup>1/</sup> CONICIT, Situación General de la Ciencia y La Tecnología, p. 64.

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(2) Determination of Research Priorities

In Costa Rica, the National Council for Scientific and Technological Research (Consejo Nacional de Investigaciones Científicas y Tecnológicas - CONICIT), created in 1973, is responsible for providing scientific and technical advice to the GOCR, and shares with the National Planning Office (OFIPLAN) responsibility for developing science policy. CONICIT's primary function is to promote and direct scientific and technological development for peaceful purposes; it does this as the GOCR's principal financing entity for scientific and technological research. CONICIT is thus in a position to influence Costa Rica's research and development priorities both through its role in policy development and through its research funding.

CONICIT is a small, but successful, institution. In 1977 its science subsidies totaled over \$308,000 compared to about \$130,000 of such subsidies in 1975, and less than \$34,000 in 1974, its first full year of operation. CONICIT has developed a good system for the technical evaluation of research proposals submitted to it and a fairly complete inventory of research being carried out in Costa Rica. It has collaborated with OFIPLAN in putting together the Science and Technology Program of the draft National Development Plan. CONICIT has also subsidized foreign training of researchers, international scientific interchange, and the establishment of new research facilities. These successes and others have earned for this relatively young organization a well deserved reputation for excellence.

In spite of its successes, CONICIT has not had enough staff and budgetary resources to be able to systematically analyze economic problems or technology opportunities and to identify and promote research directed at them. Its ability to supervise or monitor adequately the research it funds has been limited, not to speak of the research it does not fund. Nor has CONICIT had the capability to evaluate and disseminate the results of research. To date, CONICIT has played a somewhat passive role in promoting and directing Costa Rican research. It has responded to proposals put before it and has in many cases helped to improve the structuring, but it has not had the capacity to actively seek out proposals. CONICIT has not stressed research in the areas this Project focuses upon, nor, indeed, has it had a mandate to do so. The 1979-1982 GOCR Science and Technology Program, which is summarized in Annex II-E, does assign

CONICIT such a role.

The Project will deal with the insufficiency of research in the areas of industrial technology, natural resources, and energy by providing funding for research and for the training of researchers in these sectors. By institutionalizing within CONICIT a system for identifying and promoting research opportunities in the priority sectors, the Project will strengthen CONICIT's ability to identify and actively promote research.

b. Design, Organization, and Conducting of Research

As stated previously, CONICIT has responded to research proposals put before it and has not actively sought out proposals in priority areas nor attempted to develop research objectives or methodologies and promote them. Many of the research proposals CONICIT receives are poorly organized and not directed at solving real problems, and too often the research it funds is not well done because the organizations, groups and individuals proposing research are inexperienced in designing, supervising and conducting research. Nevertheless a variety of research entities do exist and are operating, even though they may be limited in well-trained staff, experience, facilities, and financial support. In general, formation of new research institutions is not required. A base exists to build upon.

At the universities, one can find at least one research entity working in almost all areas of industrial technology, energy, and natural resources. For instance, there are five research institutes at the Instituto Tecnológico de Costa Rica (ITCR): Industrial Production and Maintenance, Construction, Metal Working, Forestry and Wood Products, and Agro-Industry. The Industrial Production and Maintenance Center has done some work in analysis of plants, inventory and distribution of industries, time and motion studies, quality control, and maintenance programs. The Construction Center has provided some extension services to construction contractors and performed quality control tests on the construction materials they use. The Metal Working Center has initiated a program to adapt and improve metal working equipment and processes to make maximum use of local resources. The Woodworking Laboratory has set out to help woodworking industries to recognize and solve problems, reduce waste, and produce better products. The Agro-Industry Center has done work in time and motion studies, agro-forestry project preparation and evaluation, and production planning. The ITCR research centers are new and inexperienced; all have operated

for less than three years.

At the University of Costa Rica several of the scientific and technological departments have also conducted research and development projects in a few of the priority areas, even though they were not formal research centers. The Department of Electrical Engineering has carried out several energy projects: solar devices for cooking, water heating, and drying; vertical axis windmills; design and testing of low-head hydro generation; studies of ethylic additives to gasoline; and studies of urban waste recycling. The Chemistry Department has designed a reactor to produce bio-gas and studied the recycling of banana wastes. The Leather Technology Institute at the UCR has investigated the use of local raw materials in the curing and tanning process. The Mechanical Engineering Department, with the beginnings of an Agro-Machinery Center, has constructed a yucca harvester and bean thresher. The Agronomy Department has the Food Research Institute under its administration, which has done research in canning and preservation of foods.

An AID evaluation of a well established research center revealed the problems plaguing the majority of the research entities. The evaluation cites the inability of the center to write well-defined objectives as a principal weakness; the objectives it writes for its research projects are not directed at serious problems. Reasons for this fault were found to be: inadequate gathering of information on the needs of the beneficiaries prior to designing the research; insufficient appraisal of the potential benefits of proposed solutions before starting the research; and not enough pilot work to confirm likelihood of success. The above problems are generally compounded by a need for more trained research personnel, inadequate research facilities, insufficient investigation of work done outside of Costa Rica to avoid duplication, and too little contact with foreign research personnel and research results.

The above does not mean that some "world class" research is not being done in Costa Rica. Excellent work is being done by a small group of people in medicine and health, coffee, and the tropical environment. Much more research needs to be done, however, especially in the areas of industrial research, energy, and natural resources -- areas in which almost no installed research capacity exists in spite of their economic importance.

The Project will attempt to improve the capabilities of the Costa Rican entities engaged in research through training, exchange of researchers, assistance in research proposal formulation, research management evaluations, and research methodology workshops.

c. Dissemination of New Technologies

Unfortunately, the assumptions underlying the saying "build a better mousetrap and the world will beat a pathway to your door" are rarely made explicit. The general adoption of even a simple device such as a better mousetrap requires that:

- (1) potential users have a problem and are aware that they have it (i.e., there is a recognized excess of mice);
- (2) potential users know that a new technology exists and that it is more cost-effective than present technologies (i.e., people know that a new mousetrap exists and that it is in fact a better mousetrap); and
- (3) a readily available supply of instruments or plans associated with the new technology exists (i.e., better mousetraps are in fact available and people know where to get them or instructions for building them).

Thus, even the simplest new technology requires dissemination or promotion for its adoption.

An indigenous Costa Rican technology development capability which emphasizes the needs of small farms and businesses requires mechanisms to link it to the existing extension services and producer organizations in both agriculture and small industry.

This Project will strengthen a relatively new ITCR entity in its role as a link between new technologies and producers.

3. Relationship to AID and Other Donor Programs

This Project is consistent with AID strategy in Costa Rica, is complimentary to other AID-funded activities, and does not overlap with other donor efforts; that the area which the Project addresses is one of high priority to the GOCR has been mentioned previously.

a. Relationship to AID Strategy in Costa Rica

Based on the Mission's assessment of the Costa Rican development situation and the GOCR's draft 1979-1982 National Development Plan, the current Mission Country Development Strategy Statement (CDSS) outlined four strategic objectives for AID assistance during the 1981-1985 period.

Two of these objectives relate primarily to productivity and two to income distribution; they are:

- (1) Increase poor people's access to the factors of production;
- (2) Increase production and productivity in a manner consistent with the first and third objectives;
- (3) Reverse natural resource degradation; and
- (4) Decentralize development by promoting activities in lagging regions, in accordance with the second objective.

The activities to be financed by this Project have a strong relationship to objectives one, two, and three and somewhat weaker links to objective four. Some examples will serve to illustrate the point. A new, more appropriate, more affordable piece of machinery resulting from Project-funded research could generate production opportunities where none previously existed, or could substantially increase production, using the same level of factor inputs. With proper extension and financing arrangements, it could also improve poor people's access to the means of production. Better knowledge of the characteristics of wood from Costa Rica's hundreds of tree varieties and of means to treat and preserve those woods could result in less deforestation. This is

because only a few of the trees felled in land clearing and lumbering are put to commercial use, and trees from reforestation thinnings, an important factor in the economic feasibility of reforestation, have very limited markets. Thus, better knowledge of wood characteristics could help to reverse natural resources degradation and increase production and productivity. Similarly, new decentralized energy sources and new uses for natural resources found in remote areas could help make decentralization economically feasible. The illustrative research projects presented in Annex II-C indicate numerous links to the above mentioned strategy objectives. In short, the Project is fully consistent with the Mission's CDSS.

b. Relationship to Other AID Financed Activities

This Project will complement the Urban Employment and Community Infrastructure (Urban Loan), Commodity Systems, and Natural Resources Conservation projects.

The increased availability of appropriate technology for small businesses brought about by the Science and Technology Loan will contribute to the small business development efforts of the Urban Loan. One objective of that project is to assist small business expansion by providing small businessmen with credit, business training, and technical assistance. Small businessmen in San José could take advantage of the Urban Loan to finance utilization of products and processes developed by Science and Technology Project-funded research. Similarly, training courses initiated by the Urban Loan could be tied into the promotion of Science and Technology Project-funded research results. All of these benefits will accrue to the worker-owned and operated firms also to be established under the Urban Loan.

Both the Mission's Commodity Systems Loan and this Project will fund agro-industrial research. However, because the Commodity Systems Loan will only fund such research as it relates to nine selected geographic areas and because the activities in these areas stress the cultivation, handling, and processing of non-traditional crops, considerable additional room for agro-industrial research remains. CONICIT's review of ongoing and past research, as part of its research proposal approval process, and Mission monitoring will assure that no unnecessary research duplication occurs.

The proposed Natural Resources Loan will improve the institutional capability of the GOCR to conduct a program

of natural resources conservation and management. That loan will fund pilot resource management programs, the preparation of resource management plans, and policy oriented research. Research funded by the Science and Technology Loan will emphasize better utilization of natural resources in the production process, seeking to minimize waste. Both projects will, employing complementary approaches, work towards the same objective of more productive natural resources use. CONICIT and Mission monitoring will avoid duplication of research efforts.

This Science and Technology Loan is the first of a series of planned USAID/Costa Rica activities aimed at improving Costa Rica's ability to adapt or generate technologies for local application. The Mission CDSS projects two possible subsequent loans in this general area during the FY81-85 period.

In addition to complementing the USAID program in Costa Rica, this Loan will work in coordination with two regional projects and Development Support Bureau (DSB) sponsored activities. ROCAP's Transfer of Technology Project is designed to provide technological information services to businesses throughout Central America and thus complements this Project. This Project's technology extension component will make use of the facilities of the National Technological Information Service (NTIS) which is being promoted under the LAC Regional Science and Technology Information Transfer Project. The Project will also provide a vehicle for adapting and extending DSB-funded research in Science and Technology. The agro-machinery research at the International Rice Research Institute (IRRI) and several efforts being coordinated by the DSB Office of Energy would seem to have particular promise in that regard. Activities in this Project could also offer feedback to such DSB-sponsored research and perhaps provide some useful "reality checks."

c. Relationship to Other Donor Programs

Except for the occasional granting of a scholarship or the donation of laboratory equipment, usually by other bilateral donors, the Mission has not been able to identify significant involvement by other donors in the science and technology field. One major exception to the foregoing is the IDB support of the ITCR. The ITCR buildings and facilities financed by the IDB

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will be used during the execution of both the research and technology extension activities of this Project. The possible CABEI loan to the UCR for financing its Ciudad de Investigación (research city) would also greatly complement this Project.

The Peace Corps is also working with the ITCR in the areas of appropriate technology and information dissemination. Should the current program, which involves seven volunteers, be successful and if Peace Corps resources and programming priorities permit it, the Peace Corps will continue placing volunteers at ITCR and thus will be in a position to collaborate actively with the AID-supported activity.

B. Detailed Description

1. Goal

The goal of this Project is the permanent socio-economic improvement of Costa Rica's population, especially its poorest groups, through increased access to and more productive use of the means of production. This Project will bring about a more frequent and numerous occurrence of technological innovations in Costa Rica. The increased flow of research will emphasize better utilization of Costa Rica's human and natural resources and will result in more knowledge of those resources, thereby contributing to the Project's goal.

2. Purpose

The purpose of the Project is to strengthen Costa Rica's capacity to plan, conduct, and apply to its productive processes scientific and technological research which takes into account the needs of Costa Rica's poorest groups and the rational use of its natural resources. To achieve greater technological innovation will require strengthening Costa Rica's ability to explore, adapt, create, and apply scientific knowledge and technological alternatives to productive activities in accordance with national objectives.

The purpose of the Project will have been achieved by its end if specific institutional capabilities in the areas of industrial technology, natural resources, and energy have been significantly strengthened, as described below.

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CONICIT's capability to identify, promote, fund, and monitor research will be considered strengthened if:

- a. CONICIT is using the industrial sector assessment and sub-sectoral technology assessments to identify priority research problems; to promote research about them; and to assist researchers in structuring research proposals in relation to them;
- b. CONICIT is monitoring research it funds more closely by means of site visits and review of research progress reports;
- c. GOOCR budgetary contributions to CONICIT have increased from \$1.5 million in 1979 to \$5.0 million in 1984;
- d. CONICIT's annual budget transfers for science and technology (R&D, training, interchange, etc.) using its own resources increase from \$750,000 in 1979 to \$3.0 million in 1984; of this amount, at least \$1,000,000 will be for R&D subsidies in the priority areas.

The capability of research institutions to carry out R&D will be considered strengthened if:

- a. The number of researchers working in priority areas is increased by 40 by 1984;
- b. Research institutions are able to initiate at least 16 new R&D projects a year, with a total value of approximately \$960,000;
- c. A qualitative improvement has taken place in research proposals submitted to CONICIT.

ITCR's capability to facilitate the adoption of research results will be considered strengthened if:

- a. ITCR technology extensionists are regularly providing worthwhile information for use by CONICIT's R&D project identification system;
- b. ITCR technology extensionists are working effectively with small producer associations and existing GOOCR extension services.

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c. The number of ITCR technology extensionists has been doubled from the equivalent of eight in 1979 to 16 by 1984 (12 full-time, 8 half-time);

d. Twenty-five percent of the completed research projects have produced results which are being used in improving a productive activity one year after the publication of research results. This is estimated to be six or seven research projects by 1984.

### 3. Outputs/Inputs

The Project consists of three components: A) Research and Development Assessment, Planning, and Promotion; B) Research Community Support; and C) Technology Extension. These components are closely interdependent and mutually reinforcing. Should component A be less than successful, it is improbable that fruitful, practical, and high priority research ideas will be identified and funded; producer adoption and successful technology extension would become much less likely. Without component B a reasonable level of high quality research activity in the priority sectors would be difficult to reach, even though some slack research capacity exists at present or could be diverted from lower priority research. A lower quality of research or a lower level of effort than that planned would probably result in less new technology application and in an unsuccessful technology extension effort. Finally, without component C, the dissemination and subsequent productive use of technological innovations would be slowed or frustrated, and it would also be less likely that real needs would be researched. Thus, all the Project components must be successfully implemented if its purpose is to be achieved. The real proof that Costa Rica's institutional capacity to plan, conduct, and apply research has indeed been strengthened will be the continued application of research results that benefit the poorest groups and lead to more rational resource use. The outputs of each of these components and their corresponding input requirements are described in more detail below, as are the activities planned to develop them.

#### a. Research and Development Assessment, Planning, and Promotion

CONICIT's implementation of this Project component will strengthen its ability to identify, promote, and fund an increased amount of relevant, high quality research in industrial

technology, natural resources, and energy.

(1) Outputs

i. Industrial Sector Assessment

During the first year of the Project an industrial sector assessment will be carried out. Its purpose will be to identify areas which are likely to be fruitful ones for subsequent technology assessments of specific industrial sub-sectors. The assessment will identify areas within the industrial sector in which technological change could make important contributions to improving the welfare of lower income Costa Ricans or which have a high potential for better or greater utilization of Costa Rican resources. It will also identify more precisely the artisan (small) industrial sub-sectors by examining such factors as firm size and capital-labor ratios. The industrial sector assessment will be carried out by a Costa Rican institution under CONICIT direction. CONICIT will invite research proposals and use research project procedures. CONICIT will make use of non-Costa Rican short-term technical assistance in drafting final terms of reference for the research and in reviewing the assessment's progress, content, and quality.

Because the natural resources and energy sectors are less complex in structure than the industrial sector, they do not require formal assessments in order to define which sectoral processes should be covered in the detailed technology assessments.

ii. Technology Assessments

Definitive identification of areas or sub-sectors in the industrial sector which merit in-depth technological assessment will depend on the results of the sector assessment referred to above; it is possible, however, to identify areas in which they are likely to occur. Technology assessments in the industrial sector will probably be carried out for leather working, wood working, artisan metal working, agro-industry (including food processing), handicrafts, housing, commercial construction, and perhaps one or two other sub-sectors which the industrial assessment may identify. In natural resources, two areas which will receive in-depth technology assessment are forest resources and fishing. In energy, the technology assessments will

focus on energy production and on energy conservation.

Technology assessments will have the following general content: 1/

- 1) the public policy protective measures, incentives, and disincentives that affect the sub-sector or area;
- 2) the sub-sector or area's industrial structure and ownership patterns;
- 3) present and potential markets for the sub-sector or area;
- 4) a description and analysis of the labor, capital, energy, and raw material inputs (including "free" goods) each area or sub-sector uses and who provides them;
- 5) a description and analysis of the technological processes employed;
- 6) a description and analysis of the environmental considerations affecting the sub-sector or area;
- 7) the identification of technological bottlenecks and other problems which may have technological solutions;
- 8) the identification of possible technological solutions and of specific aspects requiring or meriting technological research and development or basic inventories or studies (e.g., mapping and frequency distribution of marine fauna, chemical and physical properties of clay with possible ceramic use).

CONICIT will supervise the preparation of technological assessments which will also be undertaken by Costa Rican institutions as research projects. CONICIT will receive

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1/ Content would, of course, vary in different areas of sub-sectors. For example, many of the listed topics would not be appropriate for the area of energy conservation, and others might have to be added for such an area.

foreign short-term technical assistance in preparing scopes of work for each technology assessment and in reviewing draft assessment reports for content and progress. In certain areas sufficient experience or interest may not exist in Costa Rican institutions to carry out technology assessments; outside assistance may be required either to supplement Costa Rican expertise or even to carry out some of the assessments.

The technology assessments should be updated approximately every two years to take account of research performed, industry changes, or external technological and economic change. The CONICIT Projects Department, with its increased staff, will be able to carry out such updating with perhaps occasional outside help. The technology assessments will be published and made generally available so that they may be used for other GOCCR planning purposes other than that of identifying research and development projects. The technology assessments will also be valuable resource documents for use by CONICIT in carrying out its GOCCR science and technology advisory and science policy development functions.

iii. Research Programs

Based on technology assessment results, CONICIT's Projects Department will develop an annual research program for each of the priority sectors. These research programs will consist of questions which are thought to be priority ones for fruitful research to which CONICIT will give special support. CONICIT's Projects Department will attempt to interest national research entities in these questions, will help them develop and present research proposals, will conduct searches for relevant information, and will assist national researchers in establishing international contacts related to the research that is to be done.

In formulating the annual research programs, and in updating the technology assessments, CONICIT's Projects Department will maintain contact with the ultimate beneficiaries of proposed and ongoing research, primarily through ITCR and other technology extension agents but also through site visits. Such contacts will help assure that the research to be done will have practical and useful applications which will benefit Costa Rica's poor or result in more rational use of natural resources, or both.

The identification of priority re-

search questions in the technology assessments, and annual research programs cannot be expected to be all-encompassing. CONICIT will therefore continue to encourage the submission of unsolicited research proposals for possible inclusion in the annual research programs. Unsolicited proposals which meet the Project's research selection criteria will be considered for funding on an equal basis as those which have been actively encouraged by CONICIT. Proposals which do not meet Project criteria could of course be funded by CONICIT's non-Project resources.

iv. Research Projects

(1) Scheduling, Costs and Restrictions

It is expected that over the life of the Project, from 1980 through 1984, 42 research projects will be completed. In addition, 16 entirely GOCR funded projects will be initiated in 1984 but will not be completed until after the PACD. Table II.B.1. illustrates the anticipated scheduling and financing of Project-funded research. Research projects are scheduled so that most of them can be reviewed with the benefit of the technological assessments, and to allow enough adequately trained Costa Rican research personnel to have returned from training to be able to carry out the larger amount planned towards the end of the Project. Loan and GOCR counterpart funding for the research projects have been structured to provide for an increasing level of GOCR financial support and decreasing Loan funding during the Project's later years. Thus it will be possible, after the Project's end, for CONICIT to maintain the financial and technical capacity to continue identifying, promoting, reviewing, and funding approximately sixteen new research projects a year, valued at approximately \$1,056,000 <sup>1/</sup>, in the priority areas. CONICIT funding of research in areas such as medicine, health, agriculture, and natural sciences should not decrease below present levels and, given the GOCR's plans to increase support for science and technology, should in fact grow substantially over the period. The reason behind restricting Project-funded research to the priority areas of industrial tech-

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<sup>1/</sup> Of which \$960,000 will be CONICIT funded and an estimated \$96,000 will be provided by the research entities for non-research project-funded salaries, equipment, and facilities.

TABLE II.B.1.  
Schedule of Research Project Initiation, Completion, and  
 Funding, 1980 - 1984<sup>1/</sup>

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>Total 1980 - 1984</u>
<u>A.I.D. FUNDED</u>						
No. of projects initiated	4	7	8	6	0	25
No. of projects underway	4	11	15	14	6	-
No. of projects completed (cum.)	0	4	11	19	25	25
Amount of AID funding (\$000)	120	330	450	420	180	1,500
<u>G.O.C.R FUNDED</u>						
No. of projects initiated	0	2	5	10	16	33
No. of projects underway	0	2	7	15	26	-
No. of projects completed (cum.)	0	0	2	7	17	17
Amount of GOCR funding (\$000)	0	60	210	450	780	1,500
<u>RESEARCH ENTITY FUNDED (\$000)</u>	12	39	66	87	96	300
<u>TOTAL PROJECT</u>						
No. of projects initiated	4	9	13	16	16	58
No. of projects underway	4	13	22	29	32	-
No. of projects completed (cum.)	0	4	13	26	42	42
Total funding (\$000)	132	429	726	957	1,056	3,300

<sup>1/</sup> Assumes that average project costs \$60,000 and lasts two years, see Technical Analysis.

nology, energy, and natural resources is to bring about a better balance in Costa Rican research, one that is more in line with urgent national technology needs. Project research funding restrictions will also encourage the consolidation of Costa Rican research capabilities in the Project priority areas where they are presently weak. 1/

(2) The Role and Amount of Research Funding

The role and need for research funds is clear. First, they will provide an incentive for Costa Rican researchers and research institutions to redirect their efforts and gain experience in productivity-oriented research in the heretofore neglected industrial technology, natural resources, and energy areas. Secondly, the funds will allow CONICIT to acquire experience in identifying and promoting research. Thirdly, the research which they fund will result in technological innovations which will benefit Costa Rica's poorest groups, raise productivity, and improve natural resource use. Finally, the research projects financed will serve to measure the institutional capacities which the Project is building.

When the Mission examined the question of the proper size of the research fund, it was found that the limiting factor was not so much the demand for research, as suggested by the DAEC Review of the Interim Report (STATE 038060); rather it is Costa Rica's limited supply of trained researchers (this issue is discussed at greater length in the Project Technical Analysis).

The Technical Analysis, which includes a detailed treatment of the demand for research shows that during the five year life of the Project at least 42 additional

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1/ A notable exception is the area of food technology, in which a well-established research center exists. In order to prevent the absorption by this institution of a disproportionate amount of Project research funding, the Mission plans to include a provision in the Loan Agreement Project Description Annex which would limit the amount of research funds to be destined to food technology to 15% of total Project research funding.

research projects in the priority areas could be initiated and completed and that another 16 research projects could be initiated. The average cost of these research projects would be approximately \$60,000.

(3) Research Project Selection

Annex II-G contains a summary of CONICIT's regulations covering its subsidies to research projects. For Loan-funded research those regulations will be modified to include certain provisions applicable to AID Loan funding <sup>1/</sup> as well as selection criteria for Loan-funded research projects. CONICIT will submit to AID, for its approval, a modified version of its research project regulations as they apply to Loan-funded research as a condition precedent to disbursement for research projects.

For Project-funded research the selection process will be as follows: Once a proposal reaches CONICIT, either as a result of being included in a Research Program or as an unsolicited proposal, the Projects Department will review its eligibility for Project funding. In order to be eligible, the proposal must fall into the areas of industrial technology, natural resources, or energy. If it does not, it could be funded with CONICIT's non-Project resources.

All Loan-funded research proposals must, in addition meet the following general criteria:

- a) the proposal must coincide with national development objectives;
- b) the anticipated results must contribute directly or indirectly to improving the socio-economic situation of Costa Rica's poorest groups or to more rational natural resource use;

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<sup>1/</sup> For example, CONICIT will purchase all scientific equipment valued in excess of \$2,500 to assure compliance with AID source and origin requirements, although in general AID ICI regulations will apply to Loan-funded research, as set out in the Implementation Plan.

c) if possible, potential beneficiaries of anticipated research results must be identified, including the distribution of ownership of any natural resources to be researched;

d) if the proposal does not form part of a Research Program, it must not be inconsistent with the research being conducted under such a program;

e) unless AID otherwise agrees, no proposals will be funded whose costs exceed \$100,000; and

f) as appropriate, the proposal will contain a plan for dissemination of anticipated results among final users and publication of the research, or a patenting plan.

The application of further, more specific criteria would depend on the type of research to be financed.

g) If the research, adaptation, or application focus is on the processes of artisan industries, then the anticipated research results would be reviewed for:

- 1) the probable number of firms to be affected;
- 2) the possible profitability for entrepreneurs;
- 3) the increased labor demand or productivity; and
- 4) the probable mix of land, labor and capital resulting from the technology to be researched.

h) If the processes of large firms are to be the object of research:

- 1) the use of the anticipated research results must increase labor demand or be capital saving;
- 2) the market for the additional production must be identified if labor productivity is to be

increased; and

3) consideration must be given to patenting the results whenever possible. 1/

i) If productive processes involving the landed or landless rural poor are being researched, the research cannot be primarily agronomic or veterinary and anticipated results must:

1) not reduce overall employment;

capital saving; and

2) be low cost and/or land or

3) not be excessively complex for the final users or their environment.

j) If the anticipated research results focus on greater or improved natural resource utilization or on the production or conservation of energy, they must:

1) not, on balance, be injurious to the poor; and

2) not result in significant negative environmental change.

k) If anticipated research results cannot be classified in accordance with the foregoing, the research proposal must define precisely how its anticipated results will contribute to Costa Rica's development and will require prior AID approval.

CONICIT's Projects Department must apply these criteria to any proposal being considered for Loan-funding prior to forwarding it to outside experts for evaluation (if warranted) or to CONICIT's Board for decision.

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1/ Patents will belong to CONICIT. Depending on CONICIT's share in funding, royalties are divided accordingly (See Annex II-G).

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In addition to the above and CONICIT's normal criteria: (1) all research involving radioactive substances and all research on recombining DNA will require prior AID approval; (2) no research involving weather modification will be Loan-funded; and (3) the first five Loan-funded research proposals will be submitted to AID for its prior approval.

After a research proposal is approved by the CONICIT Board, a research contract will be executed. A model research contract will be prepared by CONICIT for Loan-funded research and will be submitted to AID, for its approval, as a condition precedent to disbursement for Loan funding for research projects. Research contracts for the first five Loan-funded research projects will be submitted to AID for its prior approval.

4) Eligible Researchers, Research Entities, and Expenses

Unless AID otherwise agrees in writing, the provisions and limitations detailed below will apply to Loan-financed research projects.

a) Research may be conducted by Costa Rican nationals or residents, universities, public sector entities, or Costa Rican non-profit scientific organizations under the effective management and control of Costa Rican nationals.

b) Joint-venture, multinational research projects involving non-Costa Rican, non-profit-making institutions are eligible for funding, but in every case in which the majority of research project funding is provided by the Loan, a Costa Rican national or resident will be the principal researcher and participating scientists would be predominantly Costa Rican. In every case such research projects will require prior AID approval.

c) Non-Costa Rican entities which may participate in research projects will normally be from a Code 941 country, or with AID concurrence from a Code 899 country, or be recognized International Research Centers or international organizations.

d) Research projects will not pay for indirect costs (overhead) of Costa Rican entities when the research project includes the purchase of research equipment for the entity's use and eventual ownership.

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e) Research projects may, under certain circumstances involving larger national interests, defray costs related to the participation of profit-making Costa Rican or Code 941 entities. All such participation will require prior AID approval.

f) Research projects may pay salaries and other direct costs of Costa Rican nationals or residents or of Code 899 nationals participating in a research project. All such salary levels in excess of \$60 per day may not, without prior AID approval, exceed by more than 10% their past salary levels or daily rates. Per diem costs may not exceed maximum AID limits.

g) Research projects may pay for the scientific equipment, supplies, and machinery required for conducting a research project. CONICIT will procure and own for eight years all loan-funded non-shelf item equipment. Normal AID source and origin rules will apply to these purchases<sup>1/</sup>. In evaluating research project equipment requirements CONICIT will take into account the likelihood that CONICIT equipment will be fully utilized by the research entity during and after the termination of the research project. If such equipment would be under-utilized and suitable equipment exists in other Costa Rican research entities, CONICIT will attempt to work out equipment-sharing arrangements. Provisions assuring research entity agreement to share under-utilized CONICIT-owned, Project-funded equipment with other research entities assuming reasonable time sharing, maintenance, and security arrangements can be worked out will be included in research contracts.

h) Research projects may pay for minor construction and remodeling if required.

i) Research projects may finance technical assistance should the research require it. Foreign exchange-funded contracts of this type will be bid by CONICIT and require AID approval.

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<sup>1/</sup> See Implementation Plan for details on the proposed procurement procedures and request for a blanket waiver.

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The above provisions and limitations will be included in CONICIT's regulations covering Loan-financed research which will be submitted to AID, for its approval, as a condition precedent to disbursement for research projects.

v. Information Searches and Formal  
Outside Evaluation of Proposals

Information is needed to carry out technology assessments and to properly evaluate research proposals. In the case of Costa Rica-specific research projects, much of this information will come from local publications, site visits, and feedback from industrial extensionists. A need also exists, however, for information about technological developments elsewhere, especially research results and ongoing research being conducted abroad. To meet this information need, formal information searches are provided for in the Project. There are several alternative sources for such searches. For instance, the System Development Corporation supplies 19 data bases which ITCR can access; the Smithsonian Scientific Information Exchange with its inventory of on-going world wide research is a public source. The cost of such formal information searches vary widely -- from as little as perhaps \$30 for computer time and a satellite hook-up or bibliography to several thousand dollars for a commercial search. The types and costs of formal information searches required for the proper evaluation of a research proposal will obviously vary from project to project and will also depend on the quality of the proposal. This Project provides funding for approximately 75 formal information searches. It is expected that approximately 25 of these would occur in the technology assessment process and that another 50 will be required for CONICIT's review of research proposals. Such a number is thought to be reasonable, given the number of research projects to be initiated during the Project period: some proposals will have sufficient information from the technology assessments; a few proposals will not require a formal international search because of the strictly local nature of the research; and some proposals will not be of the quality to merit a formal search before their rejection. Information searches that may be required in the course of a research project will be funded as part of the project.

Once the Projects Department has determined that a proposal is eligible for Project funding and

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meets the criteria for Loan funding, it may elect to forward the proposal and relevant information to an independent evaluation team after doing an information search, if required. The evaluators, normally three or four experts in the field of the research proposal, will independently write evaluations of the proposal. When no experts in the proposed field can be found in Costa Rica, CONICIT will send the proposal to experts abroad for evaluation. The independent evaluations will be sent back to the Projects Department, where they will be summarized and combined with other information. This summary and the Projects Department's recommendation will be forwarded to the Board of Directors through the Executive Secretary for a final decision. At present the outside evaluation process averages about six weeks.

The system of outside evaluators is already used by CONICIT and has proven cost-effective and efficient, and will therefore be continued. The Project provides funding for 120 such evaluations at a fee of \$50. Fifty dollars is significantly higher than the Q100 (about \$12) that CONICIT has offered in the past. This increase in the fee is justified because a greater concentration of proposals in fewer fields will occur, resulting in more evaluation requests from certain people in Costa Rica. Drawing on foreign scientists for such opinions, especially Americans, has its limitations, among which are the lack of knowledge of local circumstances and the language barrier. The use of foreign experts also presents greater difficulty in enforcing ethics. <sup>1/</sup> Moreover, expert evaluation may not be necessary in all cases.

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<sup>1/</sup> CONICIT funded published research findings are in the public domain and could legitimately be used by other researchers. However, the possible stealing of research hypotheses or methodologies is another, more sensitive, question and one that requires a certain protection of the researcher by those evaluating a research proposal because often hypotheses formulation or methodology formulation are the most creative aspects of research.

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vi. Project Coordination and In-depth Evaluation

Project coordination and two in-depth project evaluations are also outputs of this Project component. They are described in the Implementation Plan.

vii. Increased Projects Department Staff and Staff Training

CONICIT will have a significantly larger and more active role in planning and promoting research than it has in the past, as well as larger volumes of research funding and monitoring. The staff of its Projects Department therefore will have to be expanded. At present this department has a staff of three professionals. Five new professionals would be added in 1980 and another three in 1981. Projects Department employees will receive short-term training and will use office equipment and vehicles, all of which will be Project-funded. The training of CONICIT employees will focus on science and technology research assessment, planning and management and will probably be of an observational or in-service nature. Examples of institutions in which this training could take place are: Office of Technical Assessment of the U.S. Congress; Office of Science and Technology in AID; Science Advisory Board of the State of California; Indonesian Institute of Sciences (Coordination and Science Policy Bureau); São Paulo State Council of Technology, and Korean Institute of Science and Technology. Five individuals from CONICIT are expected to spend two months each with a foreign science management institution. Finally, two officials from such institutions are expected to visit and review CONICIT operations (travel and per diem could be Project-financed).

(2) Inputs

The total cost of this component is estimated at \$4,277,000, of which the AID Loan will provide \$1,901,000. The Loan will fund: (1) 15 p.m. of Costa Rican services (\$20,000) and one p.m. of non-Costa Rican short-term technical assistance (\$5,000) for the industrial sector assessment; (2) 100 p.m. of Costa Rican services (\$130,000) and 8 p.m. of non-Costa Rican short-term technical assistance (\$40,000) to carry out 13 technology assessments; (3) furniture, equipment, and vehicles

for the CONICIT Projects Department (\$65,000); (4) 10 p.m. of short-term, in-service, and observation training for CONICIT employees (\$26,000); (5) 35 information searches (\$7,000); (6) subsidies for approximately 25 research projects (\$1,500,000); (7) 60 honorariums for research proposal evaluation (\$3,000); (8) the GOCR Project Coordinator (\$90,000); and (9) 2 in-depth Project evaluations (\$15,000).

The GOCR will provide: (1) secretarial services and logistic support for the short-term technical assistance required for the industrial sector assessment and for the technology assessments (\$5,000); (2) eight new professional employees and their support costs in CONICIT's Projects Department (\$521,000); (3) 40 information searches (\$8,000); (4) subsidies for approximately 33 research projects (\$1,500,000); (5) support costs (salaries and facilities) for 58 research projects (\$300,000); (6) 60 honorariums for research proposal evaluation (\$3,000); and (7) secretarial services, transportation, other logistic support for the Project Coordinator and for two in-depth Project evaluations (\$39,000). GOCR support for the component is estimated at \$2,376,000.

b. Research Community Support

An institutional base exists in Costa Rica for carrying out research and development in industrial technology, energy, and natural resources, but it is weak. The research community -- the organizations, groups, and individuals doing or proposing research and development in the priority sectors -- is, in the main, inexperienced and insufficiently trained. This component, to be administered by CONICIT, will strengthen the capability of Costa Rican university, public sector, and non-profit research entities to carry out a greater amount of high quality research and development in the Project's priority areas. This will be accomplished by means of an increased supply of researchers with relevant graduate level scientific and technological education, short-term foreign and in-country training for researchers and research administrators, and upgraded research management practices.

(1) Outputs

i. Scientific and Technological  
Training for Researchers

In the course of Project analysis, advanced long-term graduate level education and a short-term training and researcher exchange program were identified as important for upgrading the skills of the research community.

University of Costa Rica department heads, in a Mission survey, unanimously requested short-term, on-the-job type training with foreign research institutes for Costa Rican researchers and research administrators. They thought that experience in and contact with fully functioning research centers in foreign countries would be invaluable and also suggested visits to their entities by the directors and principal researchers of foreign centers. The advantages of such a researcher exchange program are various. First, it will provide Costa Rican researchers and research administrators with intensive exposure to all aspects of research; that is, from financial planning to the latest technical developments. Secondly, visiting foreign researchers could review research in progress and research procedures and participate in technical and research methodology seminars. Thirdly, the personal and professional contacts established through researcher exchange will help forge links between Costa Rican and foreign researchers. -- These contacts will help promote joint research programs and information and experience exchange of the type that cannot fit on a computer data entry blank nor filter through in a scholarly research report. Finally, researcher exchange will be a relatively low-cost means of securing technical assistance because in many cases it will only be necessary to pay transportation and per diem to visiting researchers. Examples of institutions with which short-term training and researcher exchange could take place are the Institutional Rice Research Institute; Indian Leather Research Institute; New Alchemy Institute of Woodhole, Mass.; Denver Research Institute; Georgia Tech.; the U.S. Forest Products Laboratory, as well as many other less prestigious institutions which might be grappling with problems similar to those found here. Commercial research laboratories in the developed world will also be considered. Because short-term training and researcher exchange have as one of their objectives the establishment of links between researchers, the Mission will consider waiver requests for Code 899

source exchange <sup>1/</sup> which are well justified.

This component will fund scientific and technological education at the MS and PhD levels. Graduate level training (although not in all cases, in degree programs) is indispensable for the forming of professional researchers. Graduate level training not only deepens a researcher's substantive knowledge but also, especially at the PhD level, provides rigorous training in research. This component provides for the training of 35 actual or potential researchers in the Project's priority areas at the Master degree level and for the training of six researchers, presently with Master's degrees, at the PhD level. Masters level researchers when they return to Costa Rica will become the research community's "journeymen." With their superior research training, those with PhD degrees will not work on specific research problems but will also have a role in the direction of the research of others. The Project's Technology Extension component also provides for PhD level training (10). Under that component, PhD training is restricted to ITCR faculty members. Since most researchers in Costa Rica are also university professors, Costa Rican university faculties will also be upgraded by the graduate training of researchers. Better faculties will, in turn, produce better researchers.

UCR department deans requested long-term graduate level training for themselves and their faculties with emphasis on knowledge related to such specific areas as shrimp cultivation, heat transfer using solar collectors, photo-thermic conversion, environmental conservation, water and forest resources, bauxite and other mineral exploitation, bio-gas generation, food storage and preservation, and containerization.

CONICIT will be in charge of all training financed under the Project. CONICIT will review training applications, and make all final training selections. It will also

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<sup>1/</sup> Exchanges with "Eastern Bloc" research entities are not required because of the large numbers of scholarships being given to Costa Ricans by the Soviet Union and Rumania.

monitor academic performance. Although individual researchers may apply for scholarships, CONICIT will give preference to those nominated by research entities, in order to partially share training costs with those entities. To maximize subsequent employment in research, CONICIT will require applicants to enter into contracts with current or potential research entity employers. Training candidates will commit themselves to working in research two years for every year spent in training. It is anticipated that nearly all graduate training will take place in the United States. Thus, unless waived by the Mission, graduate level training will be restricted to Code 000 and Costa Rica (CATIE). If graduate training from other sources could be shown to be in the interest of Costa Rican science and technology development, the Mission would consider, on a case by case basis, either 941 sources or, in rare instances, those of code 899. To the extent feasible, thesis research will be carried out in Costa Rica or on topics relevant to Costa Rican development. CATIE is now carrying on a program of thesis supervision for other institutions which could be used to further such in-country thesis research. The same consideration will apply to the ITCR-restricted PhD level training.

Because of language problems, it is anticipated that a full two years will be required for MS studies, including up to six months of language training. Except for the special ITCR program, PhD training is also expected to require two years because only holders of master's degrees would be eligible and theses would, in most cases, be finished after the students' return to Costa Rica.

As in promoting research, CONICIT will take a more active role in promoting graduate science and technology training than it has in the past. In order to handle the increased work load resulting from the Project's training program, two new professionals will be added to CONICIT's Human Resources Department which presently has three professional employees. Annex II-G contains a summary of CONICIT's present regulations governing training subsidies. These regulations will be modified for the Project by CONICIT to take into account the special circumstances of AID Loan funding and Project training objectives and together with a model training contract will be submitted to AID, for its approval, as a condition precedent to disbursement for training activities.

ii. Research Management

CONICIT will undertake two activities designed to upgrade management practices of researchers and research centers: Research Methodology Workshops and Management Practices Evaluations.

Seven Research Methodology Workshops are planned over the life of the Project. Workshops will include such topics as proposal writing, evaluation techniques, statistical design, data analysis, scientific equipment use and maintenance, and financial planning. While the workshops will be open to all interested Costa Rican researchers, they will focus primarily on industrial research. Researchers in metals, woods, furniture, leather, textiles, food processing, construction, and agro-machinery will receive preference should it prove necessary to restrict attendance. CONICIT will be responsible for the selection of workshop participants. National and international expertise (through the researcher exchange program), as well as CONICIT's own staff will impart workshop subject matter.

Finally, CONICIT will fund contracts for evaluations of the management practices of at least two research entities. In particular, the evaluations will examine budgeting procedures, maintenance and procurement procedures, and literature services. CONICIT will pay for the evaluations using counterpart funds, and will bid the work locally. Because most Costa Rican research entities are connected with one or another institution of higher learning which jealously guard their autonomy, CONICIT will offer these services but will not "push" or "leverage" them.

(2) Inputs

The total cost of this component is estimated at \$1,821,000. The AID Loan will fund: (1) the training of 35 researchers at the Master's degree level (\$875,000); (2) training for six researchers at the PhD level (\$150,000); (3) 65 person-months of short-term training and researcher exchange (\$208,000); and (4) short-term technical assistance and other costs of seven research methodology workshops (\$35,000). Total AID Loan-funding of the component is estimated at \$1,268,000.

The GOCR will provide: (1) salaries of long-term and short-term participants (\$454,000); (2) two research entity management evaluations (\$20,000); (3) personnel costs and logistic support for research methodology workshops (\$25,000); and (4) two additional professionals in CONICIT's Human Resources Department (\$54,000). Total GOCR support for this component is estimated \$553,000.

c. Technology Extension

Until the recent past there was thought to be little need for technology extension in Costa Rica. Today, worldwide technology information networks provide information on useful, low-cost technologies that could be adapted to the needs of Costa Rica's small farms or small businesses. An indigenous Costa Rican technology development capacity will also require an outreach system both to promote the use of new technologies and as a feedback system to researchers to keep them focussed on people's real problems. One of the most difficult aspects of research and development is the transfer of knowledge and technology from the development stage to entrepreneurial adoption. Poor farmers and small entrepreneurs are generally reluctant to embrace new technologies unless they can either see the clear benefits of such new technologies at little or no cost, or are under some type of immediate pressure to seek out new productive methods.

In Costa Rica the institutional basis for technology extension exists at the Technical Department and Extension Division (DIDET) of the ITCR. CONICIT, whose legal mandate does not include technological extension, suggested that the ITCR's DIDET take on this Project's extension role. ITCR has a mandate to encourage technology application. Representatives of DIDET, when approached, were delighted. DIDET is an optimum choice. DIDET (treated in greater depth in the Institutional Analysis) has experience in delivery programs, handles the ITCR's international technical information network connections, does technology research, and has extension contacts with small industry associations and cooperatives. It will work closely with and provide technology inputs to the GOCR extension entities of the Ministry of Agriculture (agriculture and forestry) and the Ministry of Industry and Commerce (small business). DIDET also works closely with regional technology entities.

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To the extent that research results in energy and natural resources have immediate practical application, DIDET will also extend them or provide them to other extension entities. Even if the results of such research do not lend themselves to immediate application, they will be widely disseminated in accordance with the research proposal dissemination plan.

(1) Outputs

During the life of the Project, DIDET plans to: (1) carry out 220 in-depth technology consultations -- 30 in wood working industries, 100 in construction, 40 in metal working, and 55 in other areas; (2) prepare and publish 75 pamphlets, manuals, and guides -- 28 in wood working, 6 in construction, 13 in metal working, and 28 in other areas; (3) carry out 250 short courses and demonstrations; (4) distribute 500 NTIS bulletins per month; (5) fill 200 technical information requests annually; (6) establish direct contact with two foreign data bases; and (7) create ten data banks on such subjects as lists of firms, NTIS information, representatives of foreign companies, patents in Costa Rica, foreign trade data, the 1975 manufacturing census, and records of contacts.

In order to fulfill this ambitious plan, DIDET will have to enlarge its present extension staff, which now has the equivalent of approximately 13 or 14 full-time extensionists (only 4 are full-time extensionists; 25 others teach part-time, work on technological information, or do research). Eight full-time extensionists will be added. The Peace Corps, under the terms of a five-year cooperation agreement with ITCR, has been providing technical assistance to DIDET for about a year. While PC/Costa Rica currently is not projecting a full replacement group for the present seven-member team of PCVs at DIDET, which is scheduled to terminate in November, 1980, it is planning to use special placements and extended term volunteers in DIDET if the program proves successful and if Peace Corp's resources and programming considerations permit.

Given the various technical fields involved in technology extension (wood working, materials, metals, construction, electronics, and forestry and agricultural engineering, industrial production and management) an experienced multidisciplinary team is a must.

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In order to help the ITCR expand its outreach services, the AID Loan finances a small amount of equipment and vehicles for the extension staff's field efforts, as well as short-term technical assistance. The short-term technical assistance will serve two purposes. First, experts in technology extension and industrial information will provide approximately three person-months of services to study and make recommendations for perfecting DIDET's systems which are still in their infancy. Secondly, seventeen person-months of consultation in specific technical areas will be provided. Over a four-year period, experts in wood working, metal working, construction technology, and forestry engineering once a year would spend two weeks in Costa Rica and two weeks following up on general technological problems faced in these sub-sectors and on specific problems that ITCR extensionists were not able to resolve during the year. If the consultants did not recommend solutions, the unresolved problems might become questions for research. ICAITI is a possible source for this technical assistance.

The AID Loan will also provide PhD level training for ten, present or future, ITCR professors. One of the objectives of the ITCR is to foster and accelerate technological growth, especially in the area of industrial technology, forestry and agricultural engineering, and construction. If the ITCR is to successfully realize this objective, it must be staffed with professors who are well qualified both academically and technically to conduct research and to train future researchers and extensionists. The needed proficiency can only come from rigorous graduate level training. This component of the Project will result in the establishment of a core of highly trained individuals at ITCR. ITCR was selected because of the enterprising manner in which it has tailored its academic, research, and technology extension programs to the technology needs of Costa Rica, especially those of the artisan sub-sector. ITCR also has a research capacity in non-conventional energy and in forestry and forestry products.

The proposed graduate training would lay the basis for eventual master's degree level instruction at the ITCR in the field of industrial engineering and research; some graduate level training for faculty members in the areas of forestry and agricultural engineering will also be undertaken.

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The probable areas of concentration for PhD training would be: engineering feasibility and cost effectiveness analysis; research methodology, data collection, experimental design, and hypothesis testing; organizational change theory -- strategies for introducing engineering innovations; and decision making in the industrial firm (presentation of technical projects for management approval). It is expected that four of the ITCR faculty studying at the PhD level will have master's degrees and will only require two full additional years to complete PhD course work and that another six, without master's level training, will require a full four years.

Nominations of candidates for ITCR graduate training will be made on the basis of competitive examination by the ITCR Academic Dean with the concurrence of the ITCR Council of Deans. ITCR nominations will be approved by CONICIT. Normal employment contracts will be signed as for other graduate level training under the Project, and CONICIT procedures will apply.

(2) Inputs

The total cost of the ITCR Technology Extension component is estimated at \$1,302,000. The AID Loan will finance: (1) 20 person-months of technical assistance (\$100,000); (2) furniture, equipment, and vehicles (\$80,000); and (3) PhD level training costs for ten ITCR faculty members (\$400,000). Total AID Loan funding of this component is estimated at \$580,000.

The GOCR will provide: (1) the salary and support costs of eight new technology extensionists (\$510,000); (2) furniture, equipment, and vehicles (\$30,000); (3) secretarial services and logistic support of short-term technical assistance people (\$9,000); and (4) salary costs for ten faculty members during PhD level training (\$173,000). Total GOCR costs for this component are estimated at \$722,000.

### III. PROJECT ANALYSES

#### A. Technical Analysis

##### 1. Alternative Project Designs

The Project will establish a system for: identifying priority research opportunities related to the better use of Costa Rican resources, promoting and funding such research, and disseminating new technologies and knowledge resulting from research conducted by a strengthened local research community or imported by it and adapted to local circumstances. The technology research system established by the Project should result in a process of indigenous technological innovation and adaptation which will contribute to Costa Rica's future economic growth with equity.

The technology research system to be established will:

- a. Employ a two-phase assessment process to increase the likelihood that research and development will have socially desirable results and take into account the real needs of producers.
- b. Strengthen the national institution charged with science and technology funding and promotion and change its role from a passive to an active one in promoting socially desirable technology research.
- c. Utilize international technology information systems and proposal evaluation by experts to guard against "wheel reinvention" and "blind alley entry."
- d. Institutionalize greater international scientific contacts to assure "cross-fertilizing" information.
- e. Improve research capability and management through scientific and methodology training for researchers and technical assistance to assure better quality and increased quantity of research.

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f. Strengthen a research extension system with priority focus on the needs of small producers to promote the application of Project research; to adapt and apply imported technologies; and to supply information on unresolved small producer technology needs to the research identification system.

The Project Committee considered and rejected the following alternative approaches to science and technology development in Costa Rica:

a. The "gadget" or "trinket" approach. This approach focuses on instruments, tools, and gadgets, often of an "appropriate," "intermediate," or "light-capital" type. That this approach is very popular is evident from a recent ROCAP report on Central American appropriate technology development. Gadgets are of course attractive to tinkerers and others looking for a "quick fix" low-cost single factor foreign aid solution. Focusing on gadgets may well distract attention from more basic problems (e.g., the small tractor v. a land reform or cooperative system). Unfortunately, new gadgets, no matter how revolutionary, will not result in sustained development. Furthermore, a newer, cheaper windmill (even if it could be developed) will not work where winds do not blow regularly, nor will small, efficient turbines work where streams are dry for half the year. The gadget approach does not emphasize sufficiently the problems or activities of producers.

b. Technological information/adaptation. The DAEC IR review cable suggested that science infrastructure and a research fund might not be justified given that "with regard to many of the illustrative problems outlined in the IR it appears that (i) technologies are available from U.S. sources at low cost and without licenses and that (ii) very little adaptation to Costa Rican conditions would be required" and that therefore more cost-effective means of increasing the stock of technology such as improved information services, the purchase of technology, and its adaptation should be considered in project development. The Project Committee has incorporated into the design an emphasis on information and adaptation of technology where relevant, especially in technology assessment and extension, and has eliminated the science infrastructure component.

The Project Committee, however, discarded alternative project designs such as the information/adaptation approach which only facilitate the import of technology and which ignore indigenous technology development. A project which simply facilitates access to

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the foreign technology, be it "appropriate", capital intensive or antiquated, ignores a fundamental principle of development: development is a process which relies in large part upon the innovative capabilities of a society. A project which solely emphasizes information on adaptation of imported technology does little to promote internal capabilities. The proper role of foreign assistance in technology development is not to introduce new (or old) technological hardware, or peddle inappropriate consulting services; it is rather to facilitate the establishment a process of continuous innovation and self-sustaining growth with equity. Furthermore, even the importation and adaptation of productive technologies which use locally available resources is not possible without a technology development capability. For example, a cooperative of yucca growers recently imported a yucca freezing plant developed in the Phillipines. Unfortunately, the imported plant was not designed for freezing Costa Rican yucca, which has a higher water content than that for which the Philipino plant was designed. Major adaptation was required to make the plant function. Scientific and technological knowledge was required to adapt it -- knowledge about the design principles of freezing plants and knowledge about the moisture content of yucca grown in Costa Rica.

The plant is now capable of freezing Costa Rican yucca but is not operating for other reasons relating to the market price for frozen yucca in the U.S. and the market price for fresh yucca here. Given this marketing margin problem, it is extremely important that the yucca freezing process be as efficient as possible. Although the plant can operate, it is undoubtedly not an optimal design. Unfortunately, there is no substitute for knowledge and its creative application to well understood problems.

c. Technical Skills Import. Because appropriate knowledge on the parameters affecting local resources and productive processes is extremely difficult to find among foreign technologies who often must educate themselves on what to nationals are obvious constraints, large scale importation of technical assistance to increase the stock of technologies was considered not cost-effective. If the objective of the Project were to promote import substitution using imported technologies such an approach might have been chosen. In this Project short-term technical assistance is included but the focus of that assistance is on process review, information exchange, and specific technical backstopping of well-trained Costa Rican technologists.

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d. Technological Autarky. Although the Project design chooses to develop an indigenous technological development capacity, it emphatically rejects its extreme -- scientific and technological autarky. Technologies are not good or bad because they have been developed elsewhere, even though they are generally less than optimal. Costa Rica is a small, developing country with too few resources to spare on discovering for itself what others already know or on developing basic knowledge on the frontiers of pure science.

e. Scientific Czarism. Earlier Mission project design occasionally included an emphasis which, in the name of institutional rationality, would have given CONICIT responsibility for determining priorities of all GOCR-financed research, including that of specialized ministries and universities. This approach was rejected as institutionally unfeasible. It is also of questionable desirability. The United States experience demonstrates that science and technology pluralism is desirable. Furthermore, even though CONICIT cannot and probably should not control all GOCR-financed research activity, it does in fact have influence on the research funded by others through its role in national planning for science and technology, through persuasion, and because of its general influence.

f. Small Producers Only. The idea of limiting research to industrial or agricultural sub-sectors where only small producers exist was a tempting one. It was, however, rejected because many opportunities, and perhaps very significant opportunities, exist in larger industry to increase labor demand and improve natural resource use. The Mission believes both immediate target groups can be served without larger industry co-opting the Project's activities.

g. The Research Center Approach. In certain quarters a philosophy exists that if one can only gather together the best trained scientists, equip them, and give them a general mandate, miracles will be produced. The Project Committee discarded this approach because it does not give sufficient emphasis to contacts with real producer problems in developing applied science and can often result in a path of research which, although scientifically interesting, loses touch with the objectives of the research effort.

The Project incorporates certain aspects of the alternatives described above but basically focuses on strengthening an indigenous Costa Rican technology development capability. This approach, which in the judgement of the Project Committee is the proper one for Costa Rica's long-term development, is consistent with the United States position at the 1979 U.N. Conference on Science and Technology. The U.S. national paper prepared for that conference states: "Most development programs can only be effective in the long-run if they are supported by a wide range of indigenous research institutions and a cadre of trained manpower," and that "research and development that are locally based and oriented toward indigenous resources, needs, and demands contribute not only to the growth of self-reliant capacities but to a widening of markets and technological innovations as well." <sup>1/</sup>

## 2. Demand for Research

In order to help identify the most fruitful research ideas, the project finances technology assessments in the first year, which will be periodically updated. Even without the benefits of a systematic technology assessment, CONICIT, the Mission, and Costa Rican researchers have identified many ideas for Project funded research. Four of these have been elaborated and are presented in Annex II-C, in order to illustrate the types of research to be conducted under the Project, and to provide a basis for estimating average research project cost and duration. Eight are summarily described, and 20 appear on a list of apparently eligible research topics. The four elaborated research projects all have well qualified scientists willing to undertake them.

The supply of research proposals eligible for Loan funding exceeds the funding planned for this type of research in the first two years. With the technology assessments and the CONICIT designed research program, there should be no difficulty in identifying and promoting 13 research projects in 1982, 16 in 1983 and 16 in 1984.

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<sup>1/</sup> Department of State, Science and Technology for Development, P. 24 and P. 32.

The four detailed research projects which illustrate the type of research which Costa Rica needs more of and which can only be carried out by an improved local research capacity are summarized below.

Wood Technology -- This research will examine the physical and mechanical properties of 50 species of wood in Costa Rica for which information does not exist. The properties to be examined include durability, workability, and capacities for drying and preservation. Since inadequate information on these species exists, they are not certified by trade associations for commercial use. Thus, they are not used commercially, even though they are cut or damaged by lumbermen when taking out more marketable species or by farmers as they clear land. Increased use of these less well-known species will decrease pressure on the more expensive, widely used woods, and lead to a better utilization of the forest. Total cost of the Project is \$40,745.

Sand and Scrap for Foundries -- The foundry industry is characterized by artisan techniques which have not changed since the beginning of the century. The researchers will study and classify Costa Rican silica sands suitable for use in metal casting. Once classified, the researchers will experiment with different mixtures of identified sands and binders using equipment of a typical small-scale foundry. The researchers will then examine ways to increase the quality and quantity of manufactures of metal products from scrap. Demonstration production of new items for Costa Rican foundrymen would be held at selected foundries. Easy-to-read instructions on the production techniques would be widely circulated. Project cost is \$75,000.

Aeolian and Solar Radiation Survey -- The purpose of this project is to carry out a wind and solar radiation inventory at various isolated sites throughout Costa Rica. Researchers at the Costa Rican Meteorological Institute would operate and maintain eight wind and twelve solar radiation survey stations. Information from the research would feed into the design of future rural energy projects, and provide a more accurate basis for forecasting rural weather. Cost of the project is \$97,440.

Aquaculture -- Researchers will undertake three studies in marine farming. The principle research will be the cultivation of *Artemia salina*. *Artemia* is used as a food for the third larval stage of commercial shrimp (*Penaeus* spp., *Macrobrachium* spp.).

If feasible, Artemia cultivation will take place in the ponds of salt producers. The cultivation of Artemia could mean increased incomes for this group of primarily poor individuals. One of the first successful shrimp farms in the world (recently supported by a World Bank Loan) provides a ready market for the product. Because of the location of the proposed research, two other research activities will be conducted without increasing the research project cost. One is the cultivation of milkfish (chanos chanos) and mullet (Mugil). The other is the incubation and cultivation of Pacific sea turtles whose eggs have a great demand in Central America; because of the demand for those eggs, the turtles are an increasingly threatened species.

### 3. Costa Rican Capacity to Conduct Planned Research

The Mission has identified 70 to 80 researchers who presently conduct research in the three selected areas. About thirty-six scientists with graduate training will return to Costa Rica next year. 1/ However, only some of these people can be counted on to carry out Project-funded research. Since the level of research now being conducted will continue, the 70 to 80 now carrying out research cannot absorb all the additional research funded by the Project even though some slack exists. 2/ Also, only a few of the returning graduate students will choose to work in research and development, and thus not help fill the deficit of talent needed to conduct a level of research valued at approximately \$1.0 million a year towards the end of the Project.

Each research project needs at least one person directing it with Master's level training. Since CONICIT will be financing 29 research projects in priority areas in 1983, the return of 41 Project-trained researchers in 1982 will assure that an ade-

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1/ Costa Rican scholarship recipients affiliated with the UCR, UNAN, and ITCR who are currently studying abroad in the scientific and technological areas except for health and agriculture. Data provided by CONICIT

2/ Many of the researchers who presently only work in research less than 10 hours a week would, according to a recent CONICIT survey, be willing to increase the time devoted to research if their teaching loads could be decreased. This could be done by partial funding of their salaries.

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quate number of research scientists will be available to perform the planned levels of research.

CONICIT and the Mission chose to fund researcher training and an increased amount of research in the same Project. Funding these activities sequentially, i.e., training before research projects or vice-versa would result in problems. If individuals returning from training are to apply their scientific skills in research, they must have access to research funds. If not, they will remain idle or perhaps pursue other careers. Likewise, were the Project to provide research funds and not train additional researchers such funds would either not disburse or be employed by less than fully competent researchers. The two activities are mutually reinforcing, and must be developed together. The gradual increase over the life of Project in research funding, and the early training of scientists will guarantee an orderly undertaking of research projects and as well as offer opportunities for the employment of the scientists upon their return.

In order to carry out the increased amounts of research, additional scientific equipment and machinery will also be required. In order to avoid providing research centers and laboratories with equipment that is unnecessary or improperly dimensioned, the Project will finance equipment and materials needed by individual research projects out of the research fund. Costs and specifications of additional equipment needed for a given research project will be included in research project proposals. Small construction or minor remodeling directly related to research projects of the type illustrated in the aquaculture project presented in Annex II-C could also be financed.

Large equipment purchases and major construction of research facilities will not be Loan-financed. CONICIT could use non-Project resources for these types of expenditures (it has helped to fund a new marine science center). Moreover, CONICIT officials have assured the Mission that financing for the creation of new research centers or the expansion of existing ones is readily available. They cited, as an example, a loan that the UCR is negotiating with CABEI for the construction of the Ciudad de Investigación and the new IDB-financed facilities at ITCR.

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B. Financial Plan and Analysis

1. Financial Plan

The Financial Plan contains a Summary Cost Estimate by Source of Funding (Table III.B.1.), a Costing of Project Outputs/Inputs (Table III.B.2.), and a Disbursement Schedule by Calendar Year (Table III.B.3.).

The Project's total cost will be \$9,000,000; half of this amount will be loaned by AID. The GOCR's \$4,500,000 contribution is twice the minimum host country contribution requirement of 25% as required by Section 110 of the Foreign Assistance Act.

The financing of research projects makes up 37% (\$3.3 million) of the total Project costs; the Loan will fund 45% of research project costs. \$2,505,000 or 28% of the total cost will be spent for training and technical assistance; the Loan will defray 73% of these costs. All operating costs, consisting mainly of CONICIT and ITCR salaries, are borne by the GOCR and equal 12% of the total Project cost. Five percent of the Project's total cost will fund assessments, Project evaluation, the Project Coordinator and information searches.

Provisions for inflation and contingencies total 17.8%. The inflation and contingency provision totals 16.7% of the AID Loan and 18.9% of the GOCR counterpart. In the face of double-digit inflation in both the U.S. and Costa Rica, the provision of only 17.8% for inflation and contingencies over a five-year Project may appear too low. The Project Committee, however, expects that present inflation rates will drop during the first two years of Project implementation. Moreover, it should be noted that 17.8% of total Project cost is actually 21.6% of budgeted expenditures, a more relevant measure vis-a-vis inflation. It is projected that 45% of the Loan will be spent during 1980 and 1981 and that by the end of 1982 Loan expenditures will total 74%.

AID funding for this Project is split between two appropriation categories of the FAA: \$2.5 million will be funded from Selected Development Problems (Sec. 106), and \$2.0 million from Education and Human Resources (Sec. 105). This division was

TABLE III.B.1

SUMMARY COST ESTIMATE BY SOURCE OF FUNDING  
(in US \$000)

<u>Component</u>	<u>AID</u>			<u>GOCR</u>			<u>Project Total</u>
	<u>FX</u>	<u>LC</u>	<u>Total</u>	<u>FX</u>	<u>LC</u>	<u>Total</u>	
<u>1. R&amp;D Assessment, Planning and Promotion</u>							
Ind. & Tech. Assessments	-	150	150	-	-	-	150
Short-Term Tech. Assist.	45	-	45	-	5	5	50
Operating Expenses	-	-	-	-	521	521	521
Furniture, Equipment and Vehicles	65	-	65	-	-	-	65
Short-Term Training and Researcher Exchange	26	-	26	-	-	-	26
Information Searches	7	-	7	8	-	8	15
Honorariums for Proposal Evaluation	-	3	3	-	3	3	6
Research Projects	375	1,125	1,500	375	1,425	1,800	3,300
Project Coordinator	-	90	90	-	34	34	124
Project Evaluation	15	-	15	-	5	5	20
Sub-Total	<u>533</u>	<u>1,368</u>	<u>1,901</u>	<u>383</u>	<u>1,993</u>	<u>2,376</u>	<u>4,277</u>
<u>2. Research Community Support</u>							
Long-Term Training	1,025	-	1,025	-	422	422	1,447
Short-Term Training and Researcher Exchange	208	35	243	-	57	57	300
Research Entity Evaluations	-	-	-	-	20	20	20
Operating Expenses	-	-	-	-	54	54	54
Sub-Total	<u>1,233</u>	<u>35</u>	<u>1,268</u>	<u>-</u>	<u>553</u>	<u>553</u>	<u>1,821</u>
<u>3. Technology Extension (ITCR)</u>							
Operating Expenses	-	-	-	-	510	510	510
Furniture, Equipment and Vehicles	80	-	80	-	30	30	110
Short-Term Tech. Assist.	100	-	100	-	9	9	109
Long-Term Training	400	-	400	-	173	173	573
Sub-Total	<u>580</u>	<u>-</u>	<u>580</u>	<u>-</u>	<u>722</u>	<u>722</u>	<u>1,302</u>
Sub-Totals	<u>2,346</u>	<u>1,403</u>	<u>3,749</u>	<u>383</u>	<u>3,268</u>	<u>3,651</u>	<u>7,400</u>
Contingencies & Inflation			751 (16.7%)			849 (18.9%)	1,600 (17.8%)
TOTAL			<u>4,500</u>			<u>4,500</u>	<u>9,000</u>

TABLE III.B.2

COSTING OF PROJECT OUTPUTS/INPUTS  
(in US \$000)

<u>Project Inputs</u>	<u>R&amp;D Assessment Planning and Promotion</u>	<u>Research Community Support</u>	<u>Technology Extension</u>	<u>TOTAL</u>
<u>AID Loan</u>				
Ind. and Tech. Assessments	150	-	-	150
Short-Term Technical Assistance	45	-	-	45
Furniture, Equipment & Vehicles	65	-	100	145
Short-Term Training	26	-	80	145
Long-Term Training	-	243	-	269
Information Searches	7	1,025	400	1,425
Research Projects	1,500	-	-	7
Project Coordinator	90	-	-	1,500
Project Evaluation	15	-	-	90
Honorariums for Proposal Eval.	3	-	-	15
	<u>3</u>	<u>-</u>	<u>-</u>	<u>3</u>
Sub-Total	1,901	1,268	580	3,749
<u>GOCR</u>				
Technical Assistance	5	-	9	14
Operating Expenses	521	54	510	1,085
Short-Term Training	-	57	-	57
Long-Term Training	-	422	173	595
Information Searches	8	-	-	8
Research Projects	1,800	-	-	1,800
Furniture, Equipment & Vehicles	-	-	30	30
Project Coordinator	34	-	-	34
Project Evaluations	5	20	-	25
Honorariums for Proposal Evaluation	3	-	-	3
	<u>3</u>	<u>-</u>	<u>-</u>	<u>3</u>
Sub-Total	<u>2,376</u>	<u>553</u>	<u>722</u>	<u>3,651</u>
SUB-TOTALS	<u>4,277</u>	<u>1,821</u>	<u>1,302</u>	<u>7,400</u>
Contingency and Inflation				<u>1,600</u>
TOTAL				<u><u>9,000</u></u>

TABLE III.B.3.

DISBURSEMENT SCHEDULE BY CALENDAR YEAR  
(In US \$000)

	1980		1981		1982		1983		1984		1980-1984		<u>TOTAL</u>
	<u>AID</u>	<u>GOCR</u>	<u>AID</u>	<u>GOCR</u>									
<u>R&amp;D Assessment, Planning &amp; Promotion</u>													
Industrial Sector Assessment													
Contract with CR entity (15 PM)	20										20		20
Short-term T.A. (1 PM)	5	1									5	1	6
Technology Assessments													
Contracts with CR entities (100 PM)	100		30								130		130
Short-term T.A. (8 PM)	40	4									40	4	44
CONICIT Projects Department													
New employee salaries (8)	-	68	-	108	-	108	-	108	-	54	-	446	446
Transport and Per Diem	-	4	-	6	-	6	-	6	-	3	-	25	25
Office Space & Materials	-	8	-	12	-	12	-	12	-	6	-	50	50
Furn., Equipment & Vehicles	40	-	25	-	-	-	-	-	-	-	65	-	65
Short-term Training (10 PM)	7	-	7	-	6	-	6	-	-	-	26	-	26
Information Searches (75)	1	-	2	-	3	2	1	2	-	4	7	8	15
Honorariums for Prop. Eval. (120)	1	-	1	-	1	1	-	1	-	1	3	3	6
Research Projects (58)	120	65	330	125	450	275	420	515	180	820	1,500	1,800	3,300
Project Coordinator	20	6	20	8	20	8	20	8	10	4	90	34	124
Project Evaluations (2)	-	-	-	-	7	2	-	-	8	3	15	5	20
Sub-Total	<u>354</u>	<u>156</u>	<u>415</u>	<u>259</u>	<u>487</u>	<u>414</u>	<u>447</u>	<u>652</u>	<u>198</u>	<u>895</u>	<u>1,901</u>	<u>2,376</u>	<u>4,277</u>
<u>Research Community Support</u>													
M.S. Level Training (35)	124	48	313	120	313	120	125	48	-	-	875	336	1,211

US \$

TABLE III.B.3. (Cont.)

	1980		1981		1982		1983		1984		1980-1984		TOTAL
	AID	GOCR	AID	GOCR	AID	GOCR	AID	GOCR	AID	GOCR	AID	GOCR	
PhD. Level Training (6)	25	15	75	42	50	29	-	-	-	-	150	86	236
Short-term Training and Re- searcher Exchange (80 PM)	52	8	78	12	78	12	-	-	-	-	208	32	240
Research Entity Evaluations (2)	-	10	-	10	-	-	-	-	-	-	-	20	20
Research Methodology Workshops (7)	5	3	10	8	15	11	5	3	-	-	35	25	60
CONICIT Human Res. Depart. (2)	-	12	-	12	-	12	-	12	-	6	-	54	54
Sub-Total	<u>206</u>	<u>96</u>	<u>476</u>	<u>204</u>	<u>456</u>	<u>184</u>	<u>130</u>	<u>63</u>	<u>-</u>	<u>6</u>	<u>1,268</u>	<u>553</u>	<u>1,821</u>
<u>Technology Extension ITCR</u>													
New Employees Salaries (8 prof.)	-	100	-	100	-	100	-	100	-	50	-	450	450
Transport & Per Diem	-	7	-	7	-	7	-	7	-	2	-	30	30
Office Space & Materials	-	7	-	7	-	7	-	7	-	2	-	30	30
Furniture Equipment & Vehicles	80	30	-	-	-	-	-	-	-	-	80	30	110
Short-Term TA (20 PM)	25	2	25	2	25	2	25	3	-	-	100	9	109
PhD. Level Training	25	11	100	43	100	43	100	43	75	33	400	173	573
Sub-Total	<u>130</u>	<u>157</u>	<u>125</u>	<u>159</u>	<u>125</u>	<u>159</u>	<u>125</u>	<u>160</u>	<u>75</u>	<u>87</u>	<u>580</u>	<u>722</u>	<u>1,302</u>
Sub-Total, All Components	<u>690</u>	<u>409</u>	<u>1,016</u>	<u>622</u>	<u>1,068</u>	<u>757</u>	<u>702</u>	<u>875</u>	<u>273</u>	<u>988</u>	<u>3,749</u>	<u>3,651</u>	<u>7,400</u>
Contingencies & Inflation											<u>751</u>	<u>849</u>	<u>1,600</u>
TOTAL											<u>4,500</u>	<u>4,500</u>	<u>9,000</u>

made because high level training is more appropriately funded by Sec. 105 funds. \$1,425,000 is budgeted for degree training and \$269,000 for short-term training. The inflation and contingency provision for Loan funded training is \$306,000, or 15.3% of these costs, which are mainly incurred early in the Project.

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2. Financial Viability and Recurrent Budget Analysis

There are two principal questions about the Project's financial feasibility. First, given the GOCR's current austerity program, will the government be able to increase its budget sufficiently to meet the Project's cash counterpart requirements? And second, are the Project's recurrent costs of such a nature and magnitude that the GOCR will be able to continue the Project's activities without AID support? In order to answer these questions, the nature and timing of the GOCR contribution and its recurrent budgeting costs were analyzed.

a. Nature and Timing of GOCR Contribution

The table below compares the GOCR's new cash budgetary contributions to its total contributions over the life of the Project. It can be seen from this table that, with the exception of the first year of the Project, new GOCR budget resources required for the Project increase gradually and should be easily absorbed.

	<u>(US \$000)</u>					
	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>TOTAL</u>
New Budget Resources	304	379	485	747	861	2,776
In-kind <u>1/</u>	105	243	272	128	127	875
Inflation and Contingencies	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>849</u>
TOTAL	409	622	757	875	988	4,500

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1/ Or already budgeted

GOCR in-kind or in-budget contributions are an estimate of the worth of fixed assets and operating costs of existing GOCR research entities to Project-funded research (a conservatively estimated \$300,000) <sup>1/</sup>; salaries to be paid by Costa Rican institutions to scholarship candidates while studying; and the administrative support of technical advisors. All other GOCR contributions will be from new budget resources.

b. Recurring Budget Analysis

The principal GOCR recurring Project costs are \$960,000 p.a. for new post-Project research projects, \$100,000 p.a. for the salaries of new DIDET personnel, and \$120,000 p.a. for salaries of new CONICIT personnel. Thus CONICIT absorbs most of the Project's recurring costs. CONICIT has received assurances from OFIPLAN that GOCR budgeting transfers to it will be increased significantly during the National Development Plan's 1979-1982 period. These transfers have already doubled from 1978 to 1979.) Table No. 2 of Annex II-E shows the projected CONICIT budget over the Plan's period. CONICIT's income from GOCR budget transfers and the earmarked soft-drink tax is projected to increase from \$1,494,000 in 1979 to \$5,855,000 in 1982. Therefore CONICIT's recurring Project maintenance costs would only total 18.4% of its 1982 projected income. Even if the GOCR were only able to fulfill, for example, 25% of its planned increased support to CONICIT, recurring project costs could be easily absorbed.

3. Analysis of CONICIT's Finances

Tables N° 1 and 2 of Annex II-E contain information on sources of CONICIT income and a classification of its payments from 1975 to 1979 as well as a projection of these items from 1979 to 1982. The information, including the projections, is based on CONICIT's working documents. They reflect actual expenditures and income and the National Plan's

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<sup>1/</sup> This is a conservative estimate of the in-kind costs to be incurred by the GOCR for the research projects. For example, in the aeolian and solar inventory research project budget (Annex II-C) the only expenditure is for equipment. Maintenance and operating costs were not included in the budget.

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projected increased support but do not take the AID Loan into account. The analysis which follows is based on the Annex tables.

CONICIT's administrative costs for the 1975-1978 period (46.8% of expenditures) were almost equal to the transfers that it made for science and technology development. Although the percentage of administrative costs was high, these expenditures are only now the level which the Project Committee considers adequate to carry out CONICIT's basic functions, be it through a large or small program. The Project will require an increase of approximately \$132,000 in CONICIT's annual administrative costs for better research identification and monitoring and for training administration; however, during the life of the project administrative costs will not increase as rapidly as CONICIT transfers. In fact, in the 1979 CONICIT budget administrative costs dropped to 39% of all expenditures. In the course of Project development members of the CONICIT Board expressed considerable concern about the high percentage of administrative costs and their determination to lower this percentage. The Project Committee thinks that by the end of the Project it will be about 20%. 1/

CONICIT financing for research projects in the 1975-1978 did not increase as rapidly as its transfers for training, technical assistance, and participation in scientific events. This undoubtedly reflects CONICIT's emphasis in recent years on increasing the number and quality of Costa Rican scientists which it considers necessary in order to produce more and better research. The emphasis is not misplaced.

The prior year surplus revenue source item in Table No 2 requires clarification. It is not truly revenue and appears for two reasons.

First, since the national treasury does not transfer funds on schedule, CONICIT maintains a reserve to assure orderly

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1/ In Table No. 1 of Annex II-E a higher percentage is projected. These first-draft CONICIT working papers were not modified by the Project Committee but are thought to be in error.

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progress of its programs; CONICIT usually receives its fourth quarter allotment in late January or February. And second, because CONICIT obligates money out of its annual budget for more than one year (long-term training and some research projects), it carries obligated funds in reserve. These, then, are not funds that CONICIT was unable to spend, but rather a prudent reserve because of GOCR budget liquidation and allotment procedures

CONICIT revenues from sources other than the earmarked soft drink tax and GOCR treasury budgetary transfers are negligible. CONICIT holds less than ten patents and receives almost no income from them; its endowment is negative. The soft drink tax is extremely regressive, being a fixed amount on each bottle sold, and does not offer much growth potential. Because CONICIT sells few goods or services to the public, no potential new revenue source exists there either. The GOCR Legislative Assembly has been considering a bill to amend CONICIT's law for several years. This law would earmark more tax revenues for CONICIT, and give it percentage of Costa Rican payments for imported technologies. The prospects for passage of this law are low. <sup>1/</sup> In order to free itself from the long-term vagaries of the public trough, CONICIT is extremely interested in pursuing new sources of revenue. The potential of this Project to generate new patents for CONICIT (CONICIT by law owns all patents which result from the research it funds; see Annex II-G) is limited because many of the technologies researched will have local application or will be information of a quasi-public nature. Nevertheless, CONICIT will carefully attempt to take advantage of all opportunities this Project offers for patenting the technologies which could result from Project-funded research.

#### 4. Conclusion

The Project is a financially sound one. Counterpart funding should prove no problem and CONICIT will be able to maintain the research funding and staffing levels established by the Project.

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<sup>1/</sup> In the opinion of Mission personnel who analyzed this draft legislation, the bill does clarify CONICIT's role in Costa Rican public administration. However, it would not give CONICIT any functions it does not now exercise. Although it would strengthen CONICIT financially, the means for doing so are not administratively sound -- tied regressive taxes and a tax on payments for imported technology license and royalty payments which may have undesirable side effects.

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C. Economic Analysis

1. Technological Innovation and Economic Growth

Economic Growth occurs either from an increase in the amounts and quality of the inputs employed or as a result of higher productivity, the increase in output per unit of input. Denison, in his study of the sources of economic growth in the United States from 1929 to 1957, estimated that 68% of the U.S. growth rate over the period (2.93% compounded annual average) resulted from the increase in total inputs. He attributed 54% to the utilization of more labor, adjusted for quality change (including 22.9% attributable to higher levels of education). The greater capital stock was credited with 14.7% of the growth rate. Higher productivity accounted for 31.7%.

Economies of scale and the advance of knowledge were the most important of the factors accounting for increased productivity. Economies of scale, basically a result of larger markets and the greater specialization they brought about, accounted for 38% of the increased productivity (11.6% of the 2.93% p.a. growth rate). "Increased knowledge and its application" accounted for 62% of the higher productivity, or for about 20% of overall growth. Greater knowledge and its application was responsible for 36% of the growth in national income per person employed. <sup>1/</sup> Other researchers using production function estimates tend to confirm Denison's general findings. <sup>2/</sup> Denison's "increased knowledge and its application" includes both technological knowledge which "consists of knowledge concerning the physical properties of things, and how to make, or combine, or use them in a physical sense," and managerial knowledge, which consists of advances management and business organization. Denison does not attempt to appraise relative importance of these two types of knowledge but concedes that the technological is probably the more important.

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<sup>1/</sup> Edward F. Denison, The Sources of Economic Growth in the United States and the Alternatives Before Us, 1962 p. 266 and p. 269

<sup>2/</sup> Solow, working with data on U.S. productivity between 1909 and 1949, concluded that "gross output per man-hour doubled... 37.5% of the increase being due to 'technical change' (a residual) and 12.5% to increased use of capital" Solow, Robert M., "Technical Change and the Aggregate Production Function", Review of Economics and Statistics (August, 1957).

In short, the role of improved technology in economic growth is critical. According to Kuznets:

"Continuous technological progress and undulying it a series of new scientific discoveries are the necessary condition for a high rate of modern growth in per capita income combined with a substantial rate of growth in population". 1/

While concern with specialization of labor, resource allocation efficiency and capital accumulation continues, since the 1950's economists have placed more and more emphasis on the importance of science and technology in generating economic growth. As Scherer points out, "an output handicap of ten per cent of gross national product due to static inefficiency is surmounted in just five years if the rate of growth of output can be raised through more rapid technological change from 3 to 5 per cent per annum, or in 20 years if the growth rate can be increased from 3 to 3.5 per cent." There is also a recognition of the role of publically funded research and development: in 1966 the federal government assumed 53 per cent of the \$15.5 billion spent by private companies for research and development. 2/

## 2. The Case of Developing Countries and Costa Rica

While the importance of research and development is widely recognized for industrialized countries, theory and quantitative data on its importance to the developing world is scarce. Analysis of the value of publically financed research and development is even less frequently found. The value of indigenous agricultural research in developing countries, especially tropical ones, has, of course, long been recognized -- climate, soils, and weather are just too different to even attempt introducing temperate zone technologies.

The argument for non-agricultural indigenous research is basically a similar one as that for indigenous agricultural

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1/ Kuznets, Simon, Six Lectures on Economic Growth, Free Press New York, 1959, p. 29.

2/ Scherer, Fredrick M., Industrial Market Structure and Economic Performance, 1971, pp 346-8. Note: This analysis was used by Scherer to demonstrate the Schumpeter hypothesis that it was the rate of technological innovation and not the efficiency of resource allocation which determines the level of per capita income.

research. The technical reasons, such as better knowledge of woods, marine life, clays and aggregates leading to greater productive use of domestic resources, are more readily apparent than the economic ones. The economic reasons relate to more subtle disadvantages of technology import. Most imported new technology comes from developed countries where factor endowments and relative prices are different -- such technology is usually labor saving. When imported technology is introduced into an economic environment where labor is plentiful relative to other resources, not only is the resulting resource utilization less than optimum, but the consequences for employment, the wage level, and therefore income distribution may also be negative <sup>1/</sup>. Even when an imported technology is not absolutely labor displacing, a more appropriate technology, if available, would generate more labor demand and employment with positive impacts on the wage level and on income distribution.

Importing inappropriate foreign technologies is made much easier if an incentive structure exists for facilitating such imports. If capital is underpriced, for example, an imported capital-intensive technology will have an advantage over a technology which is more labor-intensive. Costa Rica's efforts to rationalize its factor pricing will thus give incentives to the search for and the development of more appropriate technologies.

## 2. An Attempt at Quantification

This Project is of the "institution - building" variety. It is widely recognized that quantification of economic costs and returns for this type of Project is a difficult, if not impossible, task. The system being built by this Project is designed to increase the incidence of technological innovations in the Costa Rican economy -- which is clearly a benefit stream. If one could measure it or estimate its value, it could be compared to its costs which are easier to estimate.

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<sup>1/</sup> Negative employment effects of imported technologies may frequently be exaggerated because: (1) many new technologies are capital saving, (2) many imported technologies are adapted because of relative factor proportions, and (3) certain activities, even though relatively capital-intensive, might not be feasible at all in the absence of imported technology.

Unfortunately, estimating the value of anticipated research benefits involves so many assumptions that to do so would not be very meaningful. First, a value would have to be assigned to knowledge, a semi-public good having no real market. Secondly, one would have to speculate on the frequency and economic importance of the discoveries to come out the research system. Finally, it would to be shown that innovations result in a better income distribution, and a value would have to be assigned to such a distribution.

For this analysis a different approach has been employed. The question asked is: "what would the benefits have to be in terms of increased output to justify the cost of producing those benefits?". This approach has the disadvantage of not permitting a comparison between this Project and others in which anticipated benefits can be quantified. It does, however, permit a comparison between the amount of increased output required to justify the costs and estimates of the importance of technical change to increased productivity (Denison, Solow, et. al.).

In doing this analysis the following assumptions were made:

- a. Research in industrial technology, energy, and natural resources will increase the rate of growth in GDP.
- b. Benefits from the application of research will not commence until 1986; they will add a constant factor to the growth rate in GDP until 1995,
- c. Research expenditures in the priority sectors will be maintained at the end of Project level; i.e., \$1,000,000 until 1993.
- d. It is assumed that no scrap value will exist at the end of the period.
- e. The growth of GDP would remain constant at the 1967 - 1976 rate of 6.30% p.a. in the absence of the Project.<sup>1/</sup>

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<sup>1/</sup> Earlier in this paper it was argued that the growth rate would drop in the absence of the Project. This assumption, made for ease of calculation, does not effect the argument that the growth rate will be higher with the Project than without it.

e. The opportunity cost of capital is 15%.

f. Benefits resulting from better income distribution are not counted.

Given the above assumptions, Table III.C.1 presents a projection of the increase in the GDP resulting from the application of research that would be required for the benefit/cost ratio to equal 1.0 (1.03 in our example). The present value of the cost stream is \$8.23 million. In order to generate a GDP increase over the period with a present value of \$8.47 million, the average annual rate of growth in GDP during the 1986-1995 period would have to increase from 6.30% p.a. to 6.305% p.a., an increase of only 8/100 of one percent in the growth rate.

Thus it can be seen that the positive impact of greater indigenous technological innovation and better adaptation of imported technologies on economic growth does not have to be very large at all to justify this Projects' costs. Furthermore, this increase of 8/100 of one percent in the growth rate of DGP should be considered in the context of findings such as those of Denison, which indicate that almost 20% of the historic growth rate in the U.S. can be attributed to technical change.

TABLE III.C.I

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Increase in GDP Required to Make  
B/C Ratio Equal to One (U.S. Millions)

Year	(1) Project Costs	(2) P.V. of Project Costs	(3) Without Project GDP	(4) With Project GDP	(5) P.V. of GDP Increase
1976	-	-	2,241	-	-
1977	-	-	2,382	-	-
1978	-	-	2,532	-	-
1979	-	-	2,692	-	-
1980	1,099	1.10	2,861	-	-
1981	1,638	1.42	3,041	-	-
1982	1,825	1.38	3,233	-	-
1983	1,577	1.04	3,437	-	-
1984	1,261	.72	3,653	-	-
1985	1,000	.50	3,883	-	-
1986	1,000	.43	4,128.3	4,130.3	.87
1987	1,000	.38	4,388.4	4,390.7	.87
1988	1,000	.33	4,664.9	4,667.6	.88
1989	1,000	.28	4,958.9	4,961.8	.85
1990	1,000	.25	5,271.2	5,274.7	.86
1991	1,000	.21	5,603.3	5,607.3	.86
1992	1,000	.19	5,956.2	5,960.8	.84
1993	-	-	6,331.5	6,336.6	.83
1994	-	-	6,730.3	6,736.1	.81
1995	-	-	7,154.4	7,160.9	.80

Sum of  
P.V. (at  
15%)

8.23

8.47

Benefit/Cost Ratio equals 1.03

- (1) Project cost equals disbursements plus \$1.0 million p.a. in new research projects from 1985 through 1992.
- (3) 1976 GDP projected at 6.30% p.a.
- (4) 1976 GDP projected at 6.305% p.a., from 1985 when benefits begin to 1995 when benefits from research projects initiated in 1992 will come on stream.

D. Social Analysis

1. Beneficiaries

This project will contribute to the broader goal of permanent socio-economic improvement of the Costa Rican people and particularly of the poorest elements of the population. More specifically, the project will help Costa Ricans develop a strong indigenous capacity to apply science and technology to those economic and social development problems which most affect the poor. To maintain and expand essential services to the poor, and to reduce their numbers by raising income levels, increases in production and productivity as well as expansion and diversification of exports are necessary.

The science and technology project could have a very significant impact on productivity and production by developing new technologies and introducing and adapting imported ones to local conditions. Both new and adapted technologies are expected to be used by small producers or to create employment.

The final beneficiaries of the Project will be those who: (1) use the results of science and technology research to increase their productivity and their level of income; (2) obtain employment and increased wages because of increased labor demand created by the application of research results; or (3) acquire ownership of productive assets because of their increased access to science and technology.

The Project will finance research on technologies appropriate for use by artisans and small entrepreneurs currently engaged in low productivity operations. Identification of research priorities will result from analysis of problem areas affecting the poor. The specific type of benefits expected from research to be funded under this Project for the target group is demonstrated by the illustrative research projects presented in Annex II-C. Further, the technology extension unit of ITCR will ensure that small producers have access to improved technologies designed with their needs in mind. Research project selection criteria are also designed to favor research benefitting the poor.

Some middle-class businessmen who currently own or manage industrial plants will benefit. In the first place, the knowledge will be available to all. Furthermore the potentially higher profits resulting from technology appropriate to Costa Rica's factor endowments will inevitably attract businessmen other than just those who are poor; and they will put the new technology to use.

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A national science and technology strengthening project, the aim of which is to raise the incomes of the poor cannot exclude larger enterprises. The technological structures of these enterprises are part of the problem in that they use less than optimal imported materials and technologies because only those have been available and their use was encouraged by government policy. They are part of the solution because they have the greatest potential for increasing the demand for labor and because they already have the management and organizational expertise and international contacts required to market greater production. Significant employment generation will come primarily from this modern element of the industrial sector. If technologies which use local resources, including more labor, are available and profitable, the modern sector will adopt them, either directly or as intermediate goods. Thus, while the poor are the primary beneficiaries, they should also benefit through the efforts of larger enterprises.

## 2. Social Feasibility Analysis

The willingness of people to adopt technological innovation is probably the most important socio-cultural feasibility question of this Project. In general, individuals will accept change (1) if their acceptance will increase income or (2) if there exists external pressure for change.

With regard to the first point, it is clear that entrepreneurs presented with an opportunity to modernize their business or farm will hesitate to do so unless they can be sure that the innovation will be more profitable than current methods. There is also a reluctance to pay for new technology, especially if it is not proven nor risk-free. If the innovation is low cost, the small entrepreneur is more likely to adopt it. For example, in a visit to one of the small ferrous foundries, the ITCR extension agents and AID representatives were questioned in detail by the owner of the foundry about the proposed project to inventory sands and scrap metal and how he could go about getting better inputs for his industry. This entrepreneur bemoaned the lack of pig iron and quality sands, saying that the cost of importing these inputs was prohibitive. He seemed very anxious to improve the quality of his work, which he recognized as inferior, but he repeated several times that he is a poor man and cannot afford technological improvements.

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Thus, the first requirement for change is that better technologies exist. Loan-funded research project selection criteria emphasize that anticipated technologies resulting from research should be appropriate for small producers if directed at them, thus ensuring that the Project will indeed generate this first requirement for adoption of new technologies.

Secondly, external pressure can force entrepreneurs to adopt new technologies. A case in point is that of Costa Rican enterprises producing concrete block. The great majority of these operations are family-run: the husband is the foreman, the wife is the bookkeeper, and the children provide the labor. In 1978, the government imposed standards for the concrete block industry because the risks involved in building with irregular and low-grade quality blocks. Only three domestic producers, all large, were immediately able to comply with the new standards. On its own initiative, the Technological Institute (ITCR) sought out ten small producers, offered them technical assistance, and solved their problems. Word of the ITCR's services spread and in a short time, over 300 family-run operations had approached the ITCR for assistance, so that their product quality could match that of the large manufacturers allowing them to stay in business. In this case, external pressure was very effective and so was the ITCR.

In Costa Rica there are no socio-cultural obstacles to new technology adoption.

Implicit in the target group's acceptance of change is their acceptance of the extension agents who transmit change. Technical assistance and extension has generally been very well received in Costa Rica when it has been offered; the ITCR component of the Project will assure that it is offered.

### 3. Role of Women

In general, women in Costa Rica have had equal educational opportunities, especially at the primary and secondary levels, but also at the university level. Currently, there are 422 women in total student body of 2,163 at the Technological Institute. At the University of Costa Rica, women comprise 46% of the student body (12,095 of 26,038 total students). The number of female professors in the respective institutions is 26 and of a total faculty of 176 in the former and 743 of 2,669 in the latter. Of a total of 356 researchers named in the 1977 CONICIT research inventory, 43

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(about 12%) were women. While traditionally women have been most numerous in the fields of education and the humanities, their numbers are increasing in the scientific and technical fields. This project has an important potential for attracting women to advanced training and research activities.

Women could benefit substantially from successful application of research in science and technology. The aquaculture project, for example, could generate numerous jobs for women since large numbers of women are currently employed in cleaning and preparing fish for marketing. Few women are employed, except as bookkeepers and secretaries, in the majority of industries where the work is physically demanding, such as foundries or concrete block factories. However, they are increasingly employed in light industry. Further, women are not precluded from conducting technical research in related fields or from serving as extension agents to those industries. Indeed, the head of the small business assistance unit in the Ministry of Labor is a woman, as is the Minister of Labor.

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D. Institutional Analysis

1. CONICIT

a. Functions

CONICIT was established in 1973 as an autonomous entity of the GOCR by Law No. 5048. Article 2° of that law states: "The function of the Council is to promote the development of science and technology for peaceful purposes by means of systematic research or the creative act." The Council is to give financial help to persons or entities who conduct or desire to conduct research but cannot itself undertake research. The Council can participate financially in projects or activities with other organizations as long as these contribute to its primer function. The Council is to give scientific and technological advice to the GOCR and work with OFIPLAN on developing policies relating to research or to creative work. Finally, the Law charges the Council will compiling and maintaining current an inventory of the human, material, and institutional science and technology resources.

The Legislative intent, according to a committee report was to create an entity similar to the National Research Councils of the English-speaking world, INIC in Mexico, COLCIENCIAS in Columbia, the CONICITs in Venezuela, Argentina, and Chile, and the CNPQ in Brazil.

b. Organization and Qualifications

ANNEX II-H contains background information on CONICIT's organization and the qualifications of its five directors and principal employees. The creditials and work experience of CONICIT office chiefs and directors are impressive -- almost all have advanced degrees and/or international work experience.

c. Institutional Experience

CONICIT is effective organization that has stayed small. Its employees and directors have made some notable achievements in the past few years. They have assisted the National Planning Office in planning for national science and technology development; prepared the national paper (La Situación General de la Ciencia y Tecnología) for the August 1979 United Nations Conference on Science

and Technology; subsidized the work of highly qualified Costa Rican scientists and institutions; financed research projects; given out scholarships for graduate work; supported scientific and technological information transfers; financed travel of scientists to and from Costa Rica for conferences and seminars; and promoted scientific education in the public schools. CONICIT has also established some strong international ties. It maintains cooperation agreements with Israel, the United States (National Science Foundation), Brazil, Mexico, and various international organizations (Intergovernmental Oceanographic Commission, International Geographic Union, International Union of Biological Sciences, and the International Union for the Conservation of Nature and Natural Resources).

d. Ability to Implement the Project

CONICIT has experience in many of the activities required to implement the Project: the approving and financing of scholarships, research projects, and international observation travel. Yet, the Project will be a challenge for three reasons. First, CONICIT has never, to date, handled a comparable level of activity. Secondly, the Project requires CONICIT to undertake activities with which it has no experience: it has not gone through an assessment process and designed a research program; nor has it actively sought out research and attempted to review the work of researchers and research institutions.

In order to carry a heavier work load and add the new activities CONICIT will require more people and more financing. The Project's counterpart will pay for ten new people and the Loan will pay for a Project Coordinator to be added to CONICIT's staff. According to the Financial Analysis section, CONICIT should have adequate funding to support such a staff after the Project ends. Training and short-term technical assistance will be given to CONICIT's new and existing personnel in carrying out the new activities.

2. ITCR

The ITCR, an autonomous institution of higher learning, offers courses in business administration, agronomy, technical drawing, electronics, agricultural engineering, administrative computer programming, civil engineering, electronic engineering, wood products engineering, industrial maintenance, industrial production, forestry engineering and plant management. Last year the ITCR graduated its

first 150 students. The Institute has six administrative divisions: administration, student services, industry, agro-forestry, science, and research development and extension service (More information on the ITCR's organization is found in ANNEX II-H). The last division, DIDET, with 20 employees, conducts the extension programs.

DIDET will play an important role in supervising and coordinating the delivery of research results financed under the Project. It was selected because it has a sound industrial extension Program. The Extension Office of DIDET currently operates with seven agents, and will maintain double this number by adding eight as a result of the Project. With three employees, the Production Center at the ITCR collaborates with DIDET in going some limited technical diagnostic work of industries. With four full time staff and fifteen part-time members, the Research Offices conduct research metal working, wood working, construction and energy. Finally, with two employees, the Information Center provides information support for all of the above people.

The Project will require DIDET to increase its promotion efforts. It will mean greater contact with small producers to deal with their technological problems.

To assist in solving the greater number of technological problems, DIDET will need some technical assistance. To reach the greater number of beneficiaries, it will need a larger staff. Because the Project provides for technical assistance and a larger staff, DIDET is considered capable of achieving its Project outputs and contributing to the Project Purpose.

### 3. CONCLUSION

Both CONICIT and ITCR have the legal authority and the organizational structures needed to carry out the tasks that the Project will require of them. With the additional personnel, training, and technical assistance that the Project provides, they will also have the required organizational capabilities. Both are young institutions with competent, aggressive people who inspire confidence.

#### IV. IMPLEMENTATION ARRANGEMENTS

##### A. Implementation Plan

##### 1. Schedule of Major Events

Because of the long-term training and the gradual build-up of an on-going research program, this Project is scheduled to disburse over a four and one-half year period; five years will be required from signing, which is expected to occur o/a June 30, 1979—if the Project can be authorized by June 15, 1979. Experience has shown that the ratification of the Loan Agreement by the Costa Rican Legislative Assembly and the budgeting procedures of the Costa Rican Treasury will require about six months. Conditions precedent to disbursement should therefore be met by January of 1980. The Project Assistance Completion Date (PACD) will be June 29, 1984. Between Loan signing and the meeting of conditions precedent, CONICIT should designate an interim Project Coordinator, hire two new people for the Human Resources Office, and begin 1980-1981 graduate student selection. If these steps are not taken on time the Project's Implementation Schedule will slip significantly because graduate student English training should begin during first quarter of 1980 if students are to commence graduate studies in the fall of 1980. A detailed schedule of major events is included in ANNEX II-J.

##### 2. GOCR Role and Responsibilities

CONICIT will be the GOCR implementing agency for this Project. With the exception of local currency and shelf-item procurement financed by research projects, all technical assistance and commodities that the Project requires will be procured by CONICIT. CONICIT will also be responsible for the final selection of participants and will make suitable arrangements for participant training administration. CONICIT will contract out and supervise the preparation of assessments, and conduct their updating. It will be responsible for research program preparation, research project selection and approval, organization of research methodology, workshops and researcher exchange, joint AID-GOCR in-depth Project evaluation, and all other aspects of the Project.

In order to assist CONICIT in the management and coordination of the Project, Loan-funds will be used to hire a full-time Project Coordinator. The Project Coordinator will be directly responsible to CONICIT's Executive Director and will coordinate the involvement of the various departments of CONICIT in the Project, as well as the participation of DIDET. The Project Coordinator will review all commitments, disbursements, contracts, etc., for their conformity with Loan requirements, and will assure that Loan reporting requirements are fully met.

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### 3. USAID Monitoring Responsibilities

The USAID Loan Office will have primary USAID Project Management responsibilities until the Mission's Multi-sector Office is adequately staffed. USAID officials will maintain frequent contact with the CONICIT's Project Coordinator, CONICIT's Projects and Human Resources Departments, DIDET, and participating research entities to insure compliance with the Loan Agreement and to monitor the orderly progress of the Project. Monthly Project review meetings will be held at which USAID and CONICIT will review the research projects that have been funded, procurement, the progress of graduate and short-term training, DIDET's extension activities, and all other aspects of the Project. CONICIT will submit quarterly progress reports to USAID, and will forward to USAID three copies of all Project-funded contracts, scopes of work, assessments, contractor reports, annual research programs, approved research proposals, research project progress and final reports, research result publications, participant biographic and training data, participant progress reports, and participant-prepared theses. CONICIT budgetary information, annual reports, and planning documents will also be sent to the USAID on a regular basis.

### 4. Contracting Plan

The Loan will finance 29 person-months of short-term technical assistance; CONICIT will get 9 p.m. of help for drafting scopes of work for assessment and review of draft assessments, while the ITCR's technology extension activities will receive 20 p.m. of technical assistance. The Mission will urge CONICIT to combine these technical assistance needs into one contract for start-up in January 1980. Since several research institutes have experience at supplying short-term advisors in the Project priority areas, no difficulties are foreseen. CONICIT will be responsible for procuring this technical assistance competitively. The Mission will review and approve RFPs, selection procedures (price will not be a factor in initial selection), and the actual contract. In order to encourage Costa Rican contacts with foreign scientists, the source for this assistance will be from Code 941 countries (Costa Rica will not be eligible, although joint ventures of Costa Rican and Code 941 organizations would be permitted). In order to promote contacts between this Project and ROCAP's projects with ICAITI, ICAITI will be encouraged to submit a proposal. The Mission will also take special efforts to inform qualified U.S. minority or women-owned firms of this opportunity.

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The assessments planned under the Project will not be true contracts for services but will be handled as CONICIT research projects in order to build the capabilities of Costa Rican institutions to perform economic analysis related to technology. These research projects will be limited to research entities considered qualified by CONICIT to perform the research. For each assessment at least three Costa Rican entities will be invited to submit proposals. CONICIT's selection of entities will be approved by USAID.

CONICIT will contract for any short-term technical assistance as may be required to carry out joint AID/GOCR in-depth evaluations.

5. Procurement and Disbursement Procedures

Standard GOCR procurement procedures, as modified by AID Handbook 11 and source and origin requirements, will be employed for host-country procurement. Except for local currency and shelf-item procurement financed by research projects and except that price cannot be a factor considered in technical assistance procurement, normal GOCR procurement procedures, which are generally acceptable to AID, will apply.

For research project procurement, intermediate credit institution (ICI) procedures will apply. Although no loans are involved, enough ICI characteristics exist to warrant the use of ICI procedures: researchers are separated from AID by an intermediary, CONICIT, which is utilizing an established set of criteria for allocating research grants (non-reimbursable loans, if you will), and many small institutions making many small procurements are involved. All foreign exchange (non-shelf-item) procurements for research projects will be done by CONICIT. Normal source and origin requirements will apply. 1/

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1/ In general, Loan-financed and GOCR counterpart-financed research projects will be separate ones. If 899 source and/or origin equipment was required for a research project GOCR funds could be used to procure them and an equivalent amount of Loan funds could be employed for eligible expenses of counterpart-funded research projects meeting Loan funding criteria. A liberal Mission waiver policy may also be required due to non-availability of much scientific equipment of 941 origin or because of research project special equipment requirements. The foregoing source and origin discussion would not be relevant if the blanket waiver that the Mission is requesting were granted. (See discussion below).

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Standard foreign exchange and local currency disbursement procedures will be employed and a rotating fund for CONICIT local currency expenses will be established if needed. CONICIT may make advances from Loan funds for up to three months of cash needs to researchers or research entities for research projects but will have to refund or defray with counterpart any ineligible expenditures or unliquidated advances.

Research project contracts will detail disbursement methods to be used by CONICIT, research entity record keeping requirements, arrangements for CONICIT property transfers and CONICIT and AID inspection and audit rights.

B. Evaluation Plan

1. In-depth Evaluations

During the life of the Project, the Loan will finance two purpose level evaluations. The first will take place in August of 1982, a time when enough of the major Project activities will have been carried out to allow such an evaluation: all initial assessments will have been completed; a research program designed; a hefty percentage of the researchers receiving scholarships will have returned; and a significant number of research projects will have been initiated. Two outside evaluators will be brought in for approximately three weeks. They will review CONICIT, ITCR and AID records and make visits to review research and extension sites.

The first in-depth evaluation will allow the GOCR and the Mission enough time before the PACD to make fundamental changes, if needed, in the execution of the Project. The second Loan-funded in-depth evaluation will take place in June of 1984, at the end of the Project. It too will attempt to measure purpose achievement, and require the services of two outside experts for three weeks. Funding is provided for these outside experts in the Loan; AID/W direct-hire participation would also be useful. Funding could also cover the costs of a small data gathering effort, if required.

CONICIT recently contracted out a comprehensive survey of Costa Rican research and researchers. Unfortunately, only preliminary results of this survey were available to the Project Committee during the course of Project development. A first draft of the survey results and their analysis is now circulating

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for comment. This study will be excellent baseline material for subsequent evaluation.

In-depth purpose level evaluation will make use of Logical Framework objective indicators. More important than these, however, will be the informed judgements of experts in relation to factors which are more difficult to quantify but no doubt more important. Some of these types of questions might be: Is Project research of high quality and well focussed to real needs? Are CONICIT procedures, assessments, etc., really useful in focusing research? Has the Project's sectoral and application emphasis been too narrow? Are there significant applications of worthwhile findings?

The full effects of the Science and Technology Project on permanent socio-economic improvement of Costa Ricans and especially the poor will not be apparent until several years beyond the PACD. The long-run goal level effects of the Project probably can be measured; non-Project AID funds should be used five years and again ten years after the Project PACD to evaluate them.

## 2. Annual Evaluation

Joint annual evaluations will be held in 1981 and 1983. In addition to examining the achievement of the Project's output level indicators, the annual evaluations will assess the relevancy and effectiveness of the technical assistance, the effectiveness of the Project's coordination and management, and the progress the GOCR is making in institutionalizing the system.

## 3. Evaluation Schedule

1. Second quarter 1981 Annual Evaluation (Aug.)
2. Third quarter 1982 In-depth Evaluation
3. Third quarter 1983 Annual Evaluation
4. Second quarter 1984 In-depth Evaluation -  
Final (June)

C. Conditions, Covenants, Waivers, and Negotiating Status

1. Conditions Precedent to Disbursement

a. Conditions Precedent to Initial Disbursement

Prior to first disbursement under the Loan or the issuance by AID of documentation pursuant to which disbursement will be made for any other than technical assistance or the Project Coordinator, the Borrower will, except as the Parties may otherwise agree in writing, furnish to AID in form and substance satisfactory to AID:

i. an inter-institutional agreement with ITCR describing the roles of CONICIT and ITCR and the relationship between them with Project-financed research project results; graduate training of ITCR faculty; equipment, machinery, and vehicles; and new DIDET personnel to carry out an expanded technology extension effort;

ii. evidence that a Project Coordinator, acceptable to both Parties, has been named;

iii. a general Project implementation plan for the life of the Project and a detailed first year implementation plan.

b. Conditions Precedent to Initial Disbursement for Research Projects and Scholarships

Prior to disbursement under the Loan for research projects and training, or to the issuance by AID of documentation pursuant to which disbursement will be made, the Borrower will, except as the Parties may otherwise agree in writing, furnish to AID in form and substance satisfactory to AID:

i. a copy of its research project and participant training regulations as they will apply to Loan-funded research and training, including selection criteria for research proposals, a description of researchers and research entity eligibility, eligible research, dispositions regarding ownership, use and transfer of commodities funded by research projects, and selection criteria and other rules for scholarships; and

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ii. model contracts for Project research and scholarship grants which incorporate provisions of the pertinent regulations.

c. Condition Precedent to Disbursement for More than \$600,000 Loan-Funded Research Projects

Prior to disbursement of more than \$600,000 <sup>1/</sup> under the Loan for research projects, or to the issuance by AID of documentation pursuant to which disbursement will be made, the Borrower will, except as the Parties may otherwise agree in writing, furnish to AID in form, substance, and quantity satisfactory to AID, a completed industrial sector assessment and one technology assessment in six or more industrial sub-sectors, as well as two each in energy and natural resources.

2. Special Covenants

The Parties agree that in addition to CONICIT's normal research selection criteria: (1) all research involving radioactive substances and all research on recombining DNA will require prior AID approval; and (2) no research involving weather modification will be Loan-funded.

3. Waivers

The Mission is seeking a waiver to AID Geographic Code 935 eligibility for the procurement of \$500,000 worth of scientific equipment and services. This waiver is sought to facilitate the achievement of the Project's purpose and is justified in detail by separate cable (STATE ).

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<sup>1/</sup> The \$600,000 limit represents 20% of all Project-funded research, an amount for which demand currently exists in the form of identified research projects which will be started during the first two years of the Loan. The assessment process is expected to take eighteen months. Thus the limitation will assure that 80% of all research will be benefit from the assessments.

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4. Negotiating Status

This Project Paper has been developed and drafted in close coordination with employees of CONICIT. They are familiar with the Project's purpose, its sectoral restrictions, and limitations on the use of Loan funding. These restrictions and limitations could have a certain sensitivity in the scientific and university community. Thus negotiations with CONICIT regarding such matters as marking requirements, co-mingling with "bloc"- provided assistance and the specific phrasing of restrictions on the use of Loan funds in research contracts, project publicity requirements, and the text of the Loan Agreement Project Description Annex will have to be carefully handled. The exact working of Project selection criteria, for example, has yet to be negotiated with CONICIT. However, the planned Project activities and general approach have been discussed and approved in principle by CONICIT's Board of Directors, as have been specific provisions and selection criteria. Therefore, no delays are expected in Loan negotiation and it should be possible to sign the Project Agreement fifteen working days after authorization.



*República de Costa Rica*  
*Ministerio de Hacienda*

San José, 25 de mayo de 1979

Señor  
Stephen P. Knaebel, Director  
Agencia Internacional para el Desarrollo  
Embajada Americana  
S. O.

Estimado señor Knaebel:

El Gobierno de Costa Rica desea propiciar el desarrollo científico del país, por lo que en su Plan Nacional de Desarrollo destaca la importancia de la investigación para permitir a la comunidad científica nacional el poner a la ciencia y la tecnología al servicio del desarrollo económico y social de todo el pueblo costarricense, y que a la vez tome un rol más activo en el progreso científico universal. En el logro de estos objetivos, el Consejo Nacional de Investigaciones Científicas y Tecnológicas y la Agencia para el Desarrollo Internacional (A.I.D.) han elaborado, en estrecha colaboración, un Proyecto de Ciencia y Tecnología.

Durante la ejecución de este Proyecto, cuya duración se estima en cinco años y su costo total en US \$9.000.000,00, se espera que se diseñen programas de investigación; se ponga a disposición de los científicos y tecnólogos nacionales un programa de adiestramiento en el exterior de corto y largo plazos; se haga un mayor número de investigaciones en campos prioritarios para el país; y se amplíen los servicios de extensión de la División de Investigación, Desarrollo y Extensión Tecnológica del Instituto Tecnológico de Costa Rica.

En mi calidad de Representante Autorizado del Gobierno de Costa Rica, me permito por este medio hacer formal solicitud ante la Agencia para el Desarrollo Internacional, para que esta Agencia le conceda un préstamo de U.S.\$4.500.000.00 a mi Gobierno para llevar a cabo el citado Proyecto de Ciencia y Tecnología.

El Préstamo de la A.I.D. financiaría la asistencia técnica, el adiestramiento en el exterior, ciertas investigaciones, y adquisición de e-

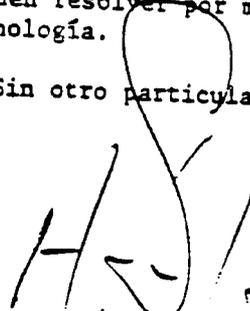


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quipo, mobiliario y vehículos. El propósito de las investigaciones que se financien bajo este Proyecto es el de aumentar el uso de los recursos nacionales, incluyendo mano de obra en los procesos de producción, para lo cual se tiene planeado realizar investigaciones en los campos de energía, recursos naturales e investigación industrial.

Confiamos en obtener una respuesta favorable a esta solicitud, por las mejoras económicas que este Proyecto podría ofrecer al pueblo costarricense, en especial a los grupos marginados, y porque servirá de magnífico ejemplo para demostrar que ciertos problemas del desarrollo se pueden resolver por medio de la aplicación oportuna de la ciencia y la tecnología.

Sin otro particular, suscribo de usted muy atentamente,

  
HERNAN SAENZ JIMENEZ  
MINISTRO DE HACIENDA



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

I, Stephen P. Knaebel, 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 in Costa Rica previously financed or assisted by the United States, do hereby certify that in my judgement Costa Rica has both the financial capability and the human resources capability to effectively maintain and utilize the Project: SCIENCE AND TECHNOLOGY.



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Stephen P. Knaebel  
Director, USAID/costa Rica

5C(1) - COUNTRY CHECKLIST

Listed Below are, first, statutory criteria applicable generally to FAA funds, and then criteria applicable to individual fund sources: Development Assistance and Economic Support Fund.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights?  
It cannot be demonstrated that this Project will directly benefit the needy. The Department of State has not so determined.
2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?  
No.
3. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?  
Yes.
4. FAA Sec. 620(c). If assistance is to a government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods  
No.

or services furnished or ordered where  
(a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?

5. FAA Sec. 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No.
6. FAA Sec. 620 (a), 620 (f); FY 79 App. Act Sec. 108, 114 and 606. Is recipient country a Communist country? Will assistance be provided to the Socialist Republic of Vietnam, Cambodia, Laos, Cuba, Uganda, Mozambique, or Angola? No.
7. FAA Sec. 620 (i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? No.
8. FAA Sec. 620 (j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property? No.
9. FAA Sec. 620(1). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility of confiscation, has the AID The Administrator has not considered denying assistance to Costa Rica.

Administrator within the past year considered denying assistance to such government for this reason?

10. FAA Sec. 620(o); Fishermen's Protective Act of 1967, as amended, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters,
- a. has any deduction required by the Fishermen's Protective Act been made? No.
- b. has complete denial of assistance been considered by AID Administrator? N/A
11. FAA Sec. 620; FY 79 App. Act Sec. 603. (a) Is the government of the recipient country in default for more than six months on interest or principal of any AID loan to the country? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds? No.
12. FAA Sec. 620(s). If contemplated assistance is development loan or from Economic Support Fund, has the Administrator taken into account the percentage of the country's budget which is for military expenditures, the amount of foreign exchange spent on military equipment and the amount spent for the purchase of sophisticated weapons systems? (An affirmative answer may refer to the record of the annual "Taking Into Consideration" memo: "Yes, as reported in annual report on implementation of Sec. 620(s)."  
This report is prepared at time of approval by the Administrator of the Operational Year Budget can can be Yes, as reported in annual report on implementation of Section 620(s)

the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

13. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? No.
14. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? Costa Rica has no problems in meeting its U.N. obligations.
15. FAA Sec. 620A, FY 79 App. Act, Sec. 607. Has the country granted sanctuary from prosecution on any individual or group which has committed an act of international terrorism? No.
16. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA? No.
17. FAA Sec. 669, 670. Has the country, after August 3, 1977, delivered or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements or safeguards? Has it detonated a nuclear device after August 3, 1977, although not a "nuclear-weapon State" under the nonproliferation treaty? No.

**B. FUNDING CRITERIA FOR COUNTRY ELIGIBILITY**

**1. Development Assistance Country Criteria.**

a. FAA Sec. 102(b) (4). Have criteria been established and taken into account to assess commitment progress of country in effectively involving the poor in development, on such indexes as: (1) increase in agricultural productivity through small-farm labor intensive agriculture, (2) reduced infant mortality, (3) control of population growth, (4) equality of income distribution, (5) reduction of unemployment, and (6) increased literacy. **Yes.**

b. FAA Sec. 104(d) (1). If appropriate, is this development (including Sahel) activity designed to build motivation for smaller families through modification of economic and social conditions supportive of the desire for large families in programs such as education in and out of school, nutrition, disease control, maternal and child health services, agricultural production, rural development, and assistance to urban poor? **No.**

**2. Economic Support Fund Country Criteria.**

a. FAA Sec. 502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights? **N/A**

b. FAA Sec. 533(b). Will assistance under the Southern Africa program be provided to Mozambique, Angola, Tanzania, or Zambia? If so, has President determined ( and reported to the Congress) that such assistance will further U.S. foreign policy interests? **N/A**

- c. 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
  
- d. FY 79 App. Act Sec. 113. Will assistance be provided for the purpose of aiding directly 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? N/A
  
- e. FAA Sec. 620B. Will security supporting assistance be furnished to Argentina after September 30, 1978? N/A

5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual fund sources: Development Assistance (with a subcategory for criteria applicable only to loans); and Economic Support Fund.

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

A. GENERAL CRITERIA FOR PROJECT

1. FY 79 App. Act Unnumbered; Faa Sec. 653(b); Sec. 634A. (a) Describe how Committees on Appropriations 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 figure)?

The Committees on appropriations of Senate and House were notified of this Project through the Congressional Presentation, and a Congressional Notification advising of AID's intention to increase the size of the loan.
2. FAA Sec. 611(a) (1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

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?

The only further action needed is the legislative ratification. This action has never hindered the orderly accomplishment of project purposes to date.
4. FAA Sec. 611(b); FY 79 App. Act Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per the Principles and Standards for Planning Water and

N/A

Related Land Resources dated  
October 25, 1973?

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? N/A
6. FAA Sec. 209. Is project susceptible of 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. No.
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; (c) encourage development and use of cooperatives, 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. The Loan should aid directly all of the items mentioned with the exception of (F).
8. FAA Sec. 601(b). Information and conclusion 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). It is anticipated that much of the technical assistance and training for the project will be procured from U.S. private sources. In addition, the majority of equipment used will have a U.S. origin.

Normal Project disbursement  
procedures assure this.

9. AA Sec. 612(b); Sec. 636(h).  
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 to meet the cost of  
contractual and other services.

No.

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?

Yes.

11. FAA Sec. 601(e). Will the  
project utilize competitive  
selection procedures for  
the awarding of contracts,  
except where applicable procure-  
ment rules allow otherwise?

No.

12. FY 79 App. Act Sec. 608. If  
assistance is for the produc-  
tion 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?

3. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project  
Criteria

a. FAA Sec. 102(b); 111; 113;  
281a. Extent to which  
activity will (a) effectively  
involve the poor in development

The Project is designed to  
benefit all residents of Costa  
Rica, especially its rural and  
urban poor. The Project will

by extending access to economy at local level, increasing labor-intensive production and the use 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 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?

strengthen Costa Rica's capacity to plan, conduct and apply to its production processes scientific and technological research which takes into account the needs of Costa Rica's poorest groups and the rational use of its natural resources. The Project will directly promote the issues listed in (a) through (e).

- b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: (include only applicable paragraph which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source).

(1) (103) for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; (103A) if for agricultural research, is full account taken of needs of small farmers;

N/A

(2) (104) for population planning under sec. 104(b) or health under sec. 104(c); if so, extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children, using paramedical and auxiliary medical personnel, clinics and health posts, commercial distribution systems and other modes of community research.

N/A

(3) (105) for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;

Long and short-term training in the fields of energy, natural resources, and industrial research will strengthen the capacity scientific and technological institutes to focus on problems affecting the poor and the development of Costa Rica.

(4) (106) for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:

(i) Technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;

Formal arrangements between U.S. and foreign research institutes are expected as a result of the Project.

(ii) to help alleviate energy problems;

Research will be conducted to ameliorate Costa Rica's energy problems.

(iii) research into, and evaluation of, economic development processes and techniques;

Project financed assessments of industrial, energy and natural resource sectors will examine relevant economic development processes.

- (iv) reconstruction after natural or manmade disaster; N/A
- (v) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance; N/A
- (vi) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development. N/A
- c. (107) is appropriate effort placed on use of appropriate technology? The Project will examine, explore, develop and adapt technologies appropriate for Costa Rica.
- d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been 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"? No.
- f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes The Project recognizes the particular needs of Costa Rica, and utilizes the country's intellectual resources to promote institutional development.

the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental and political processes essential to self-government.

- g. 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.**

2. Development Assistance Project Criteria (Loans Only)

- a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects. **The country appears capable of repaying the Loan.**

- b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, 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**

3. Project Criteria Solely for Economic Support Fund

- a. FAA Sec. 531(a). Will this assistance support promote economic or political stability? **N/A**

To the extent possible, does it reflect the policy directions of section 102?

- b. FAA Sec. 533. Will assistance under this chapter be used for military, or paramilitary activities?

N/A

5C(3) - STANDARD ITEM CHECKLIST

Listed below are 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 goods and services financed? **Yes.**
  
2. FAA Sec. 604(a). Will all commodity procurement financed 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 U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed? **Yes.**
  
4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? **N/A**
  
5. FAA Sec. 608(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items? **Yes.**

6. FAA Sec. 603. (a) 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. **Yes.**
7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized, are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs? **Yes.**
8. International Air Transport. Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available? **Yes.**
9. FY 79 App. Act. Sec. 105. Does the contract for procurement contain a provision authorizing the termination of such contract for the convenience of the United States? **Yes.**

B. Construction

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest? N/A
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? N/A

C. Other Restrictions

1. FAA Sec. 122(e). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter? Yes.
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? N/A
3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-bloc countries, contrary to the best interests of the U.S.? Yes.

4. FAA S-c. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S., or guaranty of such transaction? **Yes.**
5. Will arrangements preclude use of financing:
- a. FAA Sec. 104(f). To pay for performance of abortions or to motivate or coerce persons to practice abortions, to pay for performance of involuntary sterilization, or to coerce or provide financial incentive to any person to undergo sterilization? **Yes.**
  - b. FAA Sec. 620(g). To compensate owners for expropriated nationalized property? **Yes.**
  - c. FAA Sec. 660. To finance police training or other law enforcement assistance, except for narcotics programs? **Yes.**
  - d. FAA Sec. 662. For CIA activities? **Yes.**
  - e. FY 79 App. Act Sec. 104. To pay pensions, etc., for military personnel? **Yes.**
  - f. FY 79 App. Act Sec. 106. To pay U.N. assessments? **Yes.**
  - g. FY 79 App. Act Sec. 107. To carry out provisions of FAA sections 209(d) and 251(h)? (Transfer of FAA funds to multilateral organizations for lending). **Yes.**

- h. FY 79 App. Act Sec. 112.  
To finance the export of  
nuclear equipment, fuel, or  
technology or to train foreign  
nations in nuclear fields? **Yes.**
  
- i. FY 79 App. Act Sec. 601.  
To be used for publicity on  
propaganda purposes within  
U.S. not authorized by Congress? **Yes.**

AGENCY FOR INTERNATIONAL DEVELOPMENT

UNITED STATES A.I.D. MISSION TO COSTA RICA



U.S.A.I.D.

UNITED STATES EMBASSY  
SAN JOSE, COSTA RICA

ANNEX I-D  
Page 1 of 4  
UNCLASSIFIED

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

Name of Country : Costa Rica  
Name of Project : Science & Technology  
Number of Project: 515-W-030  
515-V-030

Pursuant to Part I, Chapter I, Sections 105 and 106 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Loan to The Republic of Costa Rica the "Cooperating Country" of not to exceed Four Million Five Hundred Thousand United States Dollars (\$4,500,000) the ("Authorized Amount") to help in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph. The project consists of the establishment of a system for:

- i) identifying priority research opportunities related to the better use of Costa Rican human and natural resources;
- ii) promoting and funding such research and;
- iii) disseminating the new technologies and knowledge resulting from that research and from adapted foreign technologies.

(hereinafter referred to as the "Project"). The entire amount of the A.I.D. financing herein authorized for the project will be obligated when the Project Agreement is executed.

I hereby authorize the initiation of negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority subject of the following essential terms and covenants and major conditions; together with such other terms and conditions as A.I.D. may deem appropriate:

UNCLASSIFIED

a. Interest Rate and Terms of Repayment

The Cooperating Country shall repay the Loan to A.I.D. in United States Dollars within twenty (20) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. The Cooperating Country shall pay to A.I.D. in United States Dollars interest from the date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

b. Source and Origin of Goods and Services

Except for Ocean Shipping goods and services financed by A.I.D. under the project shall have their source and origin in the Central American Common Market or in countries included in A.I.D. Geographic Code 941 except as A.I.D. may otherwise agree in writing. Ocean Shipping financed under the Loan shall be procured in countries which are members of the Central American Common Market or in the United States.

c. Conditions Precedent to Initial Disbursement

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement, Borrower shall furnish in form and substance satisfactory to A.I.D.:

- i) an interinstitutional agreement between the Technology Institute of Costa Rica (ITCR) delineating the roles and relationships between The Costa Rican National Council for Scientific and Technological Research (CONICIT) and ITCR relating to the Division of Investigation, Development and Technological Extension's (DIDET) dissemination of project-financed research results; graduate training of ITCR faculty; machinery and vehicle lists and identification of new DIDET personnel to execute an expanded technology extension effort;
- ii) evidence that a Project Coordinator, acceptable to both Parties, has been named and;
- iii) a general Project-Implementation Plan for the life of the Project and a detailed first year implementation plan.

d. Conditions Precedent to Initial Disbursement for  
Research Projects and Scholarships

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement to finance Research Projects and/or Scholarships, Borrower shall furnish in form and substance satisfactory to A.I.D.:

- i) a copy of its research project and participant training regulations applicable to loan-funded research and training. This will include selection criteria for research proposals, a description of researcher and research-entity eligibility, eligible research costs, dispositions regarding use, ownership and transfer and commodities funded by research projects, and the selection criteria and other rules regarding scholarships and;
- ii) model contracts for Project research and scholarship grants which incorporate provisions of the pertinent regulations.

e. Condition Precedent to Disbursement for More than  
\$600,000 for Loan-Funded Research Projects

Prior to any disbursement, or the issuance of any commitment documents under the project Agreement to finance any Loan-funded research project in excess of \$600,000. Borrower shall furnish in form and substance satisfactory to A.I.D. one completed industrial sector assessment and technological assessments for six or more industrial sub-sectors as well as two technological assessments in energy and two in natural resources.

f. Special Covenants

Borrower shall covenant that in addition to CONICIT's normal research and selection criteria:

- i) all research involving radioactive substances and all research recombining DNA (deoxyribonucleic acid) will require prior AID approval; and

ii) no research involving weather modification will be project funded.

g. The following waiver to A.I.D. regulations is hereby approved. A.I.D. Geographic Code 935 may be used to procure up to \$500,000 worth of scientific equipment and services.

\_\_\_\_\_  
Dated

\_\_\_\_\_  
AA/LAC  
Assistant Administrator for Latin  
American and the Caribbean

INITIAL ENVIRONMENTAL EXAMINATION

PROJECT LOCATION: Costa Rica

PROJECT TITLE: Science and Technology

FUNDING: FY 1979 Development Loan \$3,000,000

LIFE OF PROJECT: Four (4) years

IEE PREPARED BY: Heriberto Rodríguez  
General Engineer

DATE: November, 1977

ENVIRONMENTAL ACTION  
RECOMMENDED: That the project will not have a  
significant effect on the environment  
and therefore a negative determin-  
ation is appropriate.

CONCURRENCE:  Stephen Knaebel  
Mission Director USAID/Costa Rica

DATE: November, 1977

This Project provides increased funding to CONICIT's General Research Fund and institutional support to CONICIT. First priority will be given to research which develops appropriate technology, either through original research or adaptation. In order to accomplish its objectives, the project will finance research projects related to development problems, as well as workshops, seminars, and training.

The Project should lead to activities designed to have a beneficial effect on the environment. This Project itself, however, will include only education and training programs, experimentation, research, and workshops in agreement with regulation 16, sections 216.2(a), 216.2(b), and 216.2(c), and will not normally require the filing of an Environmental Impact statement or the preparation of an Environmental Assessment.

IMPACT IDENTIFICATION AND EVALUATION FORM

<u>Impact Areas and Sub-areas</u> 1/	<u>Impact Identification and Evaluation</u> 2/
<b>A. LAND USE</b>	
1. Changing the character of the land through:	
a. Increasing the population _____	N _____
b. Extracting natural resources _____	N _____
c. Land clearing _____	N _____
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>B. WATER QUALITY</b>	
1. Physical state of water _____	N _____
2. Chemical and biological states _____	N _____
3. Ecological balance _____	N _____
4. Other factors	
_____	_____
_____	_____

1/ See Explanatory Notes for this form

2/ Use the following symbols: N - No environmental impact  
L - Little environmental impact  
M - Moderate environmental impact  
H - High environmental impact  
U - Unknown environmental impact

IMPACT IDENTIFICATION AND EVALUATION FORM

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. Dilution of cultural traditions _____ | N _____ |
| 3. Other factors _____                   | _____   |
| _____                                    | _____   |
| _____                                    | _____   |

F. SOCIOECONOMIC

- |  |         |
|--|---------|
| 1. Changes in economic/employment patterns _____ | N _____ |
| 2. Changes in population _____                   | N _____ |
| 3. Changes in cultural patterns _____            | N _____ |
| 4. Other factors _____                           | _____   |
| _____  | _____   |

IMPACT IDENTIFICATION AND EVALUATION FORM

G. HEALTH

- |   |         |
|---|---------|
| 1. Changing a natural environment _____   | N _____ |
| 2. Eliminating an ecosystem element _____ | N _____ |
| 3. Other factors _____                    | _____   |
| _____                                     | _____   |
| _____                                     | _____   |

H. GENERAL

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

I. OTHER POSSIBLE IMPACTS (not listed above)

_____	_____
_____	_____
_____	_____

See attached Discussion of Impacts.

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Life of Project:  
From FY 1979 to FY 1984  
Total U. S. Funding \$4,500,000  
Date Prepared: May 17, 1979

Project Title & Number: Science and Technology

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes: (A-1)</p> <p>Permanent socio-economic improvement of Costa Rica's population, especially its poorest groups, through increased access to and more productive use of the means of production.</p>	<p>Measures of Goal Achievement: (A-2)</p> <ol style="list-style-type: none"> <li>1. Increases in real income for the poor.</li> <li>2. Continued equitable distribution of income.</li> <li>3. Wider ownership of productive assets.</li> <li>4. Increases in real wage level.</li> </ol>	<p>(A-3)</p> <p>102 (d) indicators.</p>	<p>Assumptions for achieving goal targets: (A-4)</p> <ol style="list-style-type: none"> <li>1. Factors exogenous to the AID program permit continued economic growth.</li> <li>2. Continued political stability.</li> <li>3. GOCR policies continue to stress growth with equity.</li> </ol>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project: 1979 to 1984  
From FY 1979 to FY 1984  
Total U.S. Funding: \$4,500,000  
Date Prepared: May 17, 1979

Project Title & Number: Science and Technology

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose: (B-1)</p> <p>To strengthen Costa Rica's capacity to plan, conduct and apply to its productive processes scientific and technological research which takes into account the needs of Costa Rica's poorest groups, and the rational use of its natural resources.</p>	<p>Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)</p> <p><u>CONICIT Capability</u></p> <ol style="list-style-type: none"> <li>CONICIT using industrial sector assessment and sub-sectoral technology assessment to identify priority research problems, to promote research on them, and to assist researchers in structuring responsive research proposals.</li> <li>CONICIT is monitoring more closely research it supports by means of site progress reports.</li> <li>GOCR budgetary contributions to CONICIT have increased from \$1.5 million in 1979 to \$5 million in 1984.</li> <li>CONICIT's annual budget transfers for science and technology increase from \$750,000 in 1979 to \$3.0 million in 1984; at least \$1,000,000 will be for R&amp;D subsidies in the priority areas.</li> </ol>	<p>(B-3)</p> <p>Project Evaluation</p> <p><u>CONICIT</u></p> <p>Site Evaluations CONICIT Records CONICIT Annual Budget</p>	<p>Assumptions for achieving purpose. (B-4)</p> <ol style="list-style-type: none"> <li>The incentive structure will be such that a significant number of well qualified and well trained Costa Ricans will wish to continue the pursuit of an R&amp;D career;</li> <li>Costa Rica's shift in policy direction toward an elimination of capital subsidies (and consequent subsidy of imported capital intensive technologies) is not reversed;</li> <li>agregate demand and credit availability will be sufficient to permit the adoption of new production technologies.</li> </ol>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:  
From FY 1979 to FY 1984  
Total U.S. Funding \$4,500,000  
Date Prepared May 1, 1979

Project Title & Number: Science & Technology

PAGE 2

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose: (B-1)</p>	<p>Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)</p> <p><u>Research Community Capability</u></p> <ol style="list-style-type: none"> <li>1. Number of graduate level trained researches working in project priority areas increases by 40 by 1984.</li> <li>2. Research institutes able to initiate at least 16 new R&amp;D projects a year in priority areas, valued at \$960,000.</li> <li>3. Qualitative, improvement has taken place in research proposals.</li> </ol> <p><u>ITCR Capability</u></p> <ol style="list-style-type: none"> <li>1. Technology extensionists are providing systematic input to CONICIT project identification.</li> <li>2. ITCR technology extensionists are working effectively with small producer associations and GOCR extension services.</li> <li>3. Number of ITCR extensionists increased by 8 from the equivalent of 8 in 1979 to the equivalent of 16 in 1983 (12 full-time, 8 half-time).</li> <li>4. 25% of the Project's completed research projects have identifiable effects on Costa Rica productive processes (estimated at 6 or 7 by 1984).</li> </ol>	<p>(B-3)</p> <p><u>Research Institution Capability</u></p> <p>CONICIT records; survey of research projects and researchers.</p> <p><u>ITCR Capability</u></p> <p>Site inspections CONICIT records</p>	<p>Assumptions for achieving purpose. (B-4)</p>

ANNEX II-A  
Page 3 of 6  
UNCLASSIFIED

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:  
From FY 1979 to FY 1984  
Total U.S. Funding \$4,500,000  
Date Prepared: May 17, 1979

Project Title & Number: Science and Technology

PAGE 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs: (C-1)</p> <p><u>Research and Development Assessment, Planning and Promotion</u></p> <p>Industry Sector Assessment Technology Assessments Information Searches Research and Development Projects</p> <p>Strengthened &amp; more effective CONICIT Projects Office.</p> <p><u>Research Community Support</u></p> <p>Trained researchers</p> <p>Management Evaluations of Research Entities</p> <p>Research Methodology</p> <p>Strengthened and more effective CONICIT Human Resources Office.</p>	<p>Magnitude of Outputs: (C-2)</p> <p>1 completed. 13 completed. 75 conducted. 58 funded. 7 new staff members.</p> <p>35 Costa Ricans with Master's level training in priority sectors. 6 Costa Ricans with PhD Level Training in priority sectors. 80 Person-months of short-term training. 2 completed.</p> <p>150 persons trained in proposal writing, research methodology, etc. 2 new staff members.</p>	<p>(C-3)</p> <p>CONICIT Records</p>	<p>Assumptions for achieving outputs: (C-4)</p> <p>Changes on the CONICIT board of directors does not effect CONICIT commitment to Project.</p> <p>Returning Researchers will continue to pursue science and technology research careers.</p> <p>Research Institutes will be receptive to research management evaluations.</p>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:  
From FY 1979 to FY 1984  
Total U. S. Funding \$4,500,000  
Date Prepared: May 11, 1979

Project Title & Number: Science and Technology

PAGE 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Outputs: (C-1)	Magnitude of Outputs: (C-2)	(C-3)	Assumptions for achieving outputs: (C-4)
<p><u>Technology Extension</u></p> <p>Consultations with small entrepreneurs</p> <p>Technology information pamphlets, manuals and guides published and distributed.</p> <p>Short courses and technology demonstrations</p> <p>NTIS Bulletins</p> <p>Technology information requests filled</p> <p>Data Banks</p> <p>Direct contact established with foreign data bases</p> <p>Strengthened and more effective Extension Office</p> <p>ITCR Faculty trained in Industrial Research</p>	<p>220 - 30 in wood working industries 100 in construction 40 in metal working 55 in other</p> <p>75 - 28 in wood working 6 in construction 13 in metal working 28 in others</p> <p>250</p> <p>500 distributed monthly</p> <p>200 annually</p> <p>10 created</p> <p>Access to 2 commercial sources.</p> <p>8 new staff members</p> <p>10 at PhD level</p>	<p>ITCR records Site visits</p>	<p>ITCR academic and research standards sufficiently accepted by best of research community to permit necessary close collaboration.</p>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:  
From FY 1979 to FY 1984  
Total U. S. Funding \$4,500,000  
Date Prepared: May 17, 1979

Project Title & Number: Science and Technology

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS			MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs: (D-1)	Implementation Target (Type and Quantity) (D-2) (\$000)			(D-3)	Assumptions for providing inputs: (D-4)
	<u>AID</u>	<u>GOCR</u>	<u>TOTAL</u>		
Operating Expenses	-	1,085	1,085	CONICIT Records ITCR Records USAID Records	Qualified T.A. available.  Signing and ratification of Loan Agreement on schedule.
Ind. and Tech. Assessments	150	-	150		
Short-term technical assistance	145	114	159		
Short-term training and research exchange	269	57	326		
Long-term training	1,425	595	2,020		
Information searches	7	8	15		
Honorariums for proposal evaluations	3	3	6		
Research projects	1,500	1,800	3,300		
Furniture, equipment and vehicles	145	30	175		
Project coordinator	90	34	124		
Project evaluation	15	5	20		
Research entity evaluation	-	20	20		
Sub Total	<u>3,749</u>	<u>3,651</u>	<u>7,400</u>		
Contingencies and Inflation	<u>751</u>	<u>849</u>	<u>1,600</u>		
TOTAL	<u><u>4,500</u></u>	<u><u>4,500</u></u>	<u><u>9,000</u></u>		

INFO:  
AMB  
DCM  
~~AD~~  
AD  
CONT  
CHRON  
RF  
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ENG

AMERICAN EMBASSY SAN JOSE

# TELEGRAM

ANNEX II-B  
Page 1 of 4  
UNCLASSIFIED

**UNCLASSIFIED**

*Classification*

P 140311Z FEB 79  
FM SECSTATE WASHDC  
TO AMEMBASSY SAN JOSE PRIORITY 6487-88  
BT

UNCLAS STATE 038060/

AIDAC

E.O. 12065: N/A

TAGS:

SUBJECT: SCIENCE AND TECHNOLOGY INTERIM REPORT

1. THE SUBJECT REPORT WAS INFORMALLY REVIEWED BY THE DAEC ON MONDAY, JANUARY 22. BECAUSE THE PID WAS SUBMITTED PRIOR TO THE REDELEGATION OF AUTHORITY TO APPROVE PROJECTS WITH AN LOP OF UP TO DOLS 5 MILLION, AND BECAUSE A NUMBER OF QUESTIONS HAVE BEEN RAISED CONCERNING THE BASIC PROJECT RATIONALE AND SOME PROPOSED PROJECT ACTIVITIES, THE PP SHOULD BE SUBMITTED TO AID/W FOR APPROVAL. COMMENTS AND SPECIFIC GUIDANCE FOR PREPARING THE PROJECT PAPER FOLLOW.

2. PROJECT RATIONALE:

A. GENERAL: ALTHOUGH THE IR IDENTIFIES A NUMBER OF ILLUSTRATIVE PROBLEMS WHICH MIGHT BE RESOLVED THROUGH SCIENCE AND TECHNOLOGY RESEARCH, NEITHER IT NOR THE PID HAVE ADEQUATELY DEMONSTRATED THE NEED OR DEMAND FOR A STRENGTHENED SCIENCE INFRASTRUCTURE (NEW RESEARCH CENTERS IN PARTICULAR) OR A FUND FOR RESEARCH AND STUDIES. WITH REGARD TO MANY OF THE ILLUSTRATIVE PROBLEMS OUTLINED IN THE IR, IT APPEARS THAT (I) TECHNOLOGIES ARE AVAILABLE FROM U.S. SOURCES AT LOW COST AND WITHOUT LICENSES AND THAT (II) VERY LITTLE ADAPTATION TO COSTA RICAN CONDITIONS WOULD BE REQUIRED. IF

THIS BE THE CASE, THE NEED FOR CREATING AND UPGRADING RESEARCH CENTERS AND FOR INCREASING THE AVAILABILITY OF R&D FUNDS MAY NOT BE STRONG. THE PP THEREFORE SHOULD EXAMINE OTHER MORE COST EFFECTIVE MEANS OF INCREASING THE STOCK OF TECHNOLOGY SUCH AS IMPROVING INFORMATION SERVICES THROUGH PURCHASE AND ADAPTATION OF EXISTING TECHNOLOGIES AS ALTERNATIVES TO CREATING NEW RESEARCH CENTERS. WHILE THE SOLUTION IS NOT AN EITHER-OR ONE, THE PP WILL NEED TO CLEARLY DEMONSTRATE HOW THE PROPOSED PROJECT ACTIVITIES FLOW FROM THE STATEMENT OF PROBLEMS TO BE ADDRESSED.

**UNCLASSIFIED**

(B) RESEARCH AND STUDIES: THE PP SHOULD PROVIDE AS MUCH INFORMATION AS POSSIBLE ON TECHNOLOGY CONSTRAINTS LIKELY TO BE ADDRESSED, AS WELL AS VERIFY THE NEED FOR INCREASED R&D FUNDS. THE NATURE OF THE PRESENT R&D SYSTEM IN COSTA RICA AND THE GAPS OR WEAKNESSES INHERENT IN THAT SYSTEM SHOULD BE DESCRIBED. THE AMOUNT OF PROJECT FINANCING FOR RESEARCH AND STUDIES SHOULD BE CLEARLY JUSTIFIED BASED ON AN ASSESSMENT OF UNFULFILLED RESEARCH NEEDS. IN THE ABSENCE OF A DETAILED R&D DEMAND ANALYSIS, AND IN RECOGNITION THAT THE MERE AVAILABILITY OF R&D FUNDS WILL GENERATE NEW DEMAND, THE PP SHOULD: 1) PRESENT AN ILLUSTRATIVE LIST OF POTENTIAL RESEARCH AND STUDY TOPICS TO BE ADDRESSED UNDER THE PROJECT; 2) FULLY ANALYZE AND DESCRIBE AT LEAST THREE SPECIFIC RESEARCH PROPOSALS TO BE FINANCED AS PART OF THE PROJECT; AND 3) DESCRIBE HOW THE SYSTEM TO BE ESTABLISHED UNDER THE PROJECT WILL DETERMINE DEMAND AND PRIORITIES FOR FUTURE R&D, AS WELL AS IDENTIFY, EVALUATE AND APPROVE PROPOSALS AND STUDIES FOR FINANCING UNDER THE PROJECT.

(C) SCIENCE INFRASTRUCTURE: THE IR DOES NOT CLEARLY IDENTIFY THE NEED FOR UPGRADING OR ESTABLISHING RESEARCH CENTERS. THE PP SHOULD PROVIDE A STRONGER JUSTIFICATION FOR THIS PROJECT ELEMENT BASED ON IDENTIFIED TECHNOLOGY CONSTRAINTS AND THE DEMAND FOR R&D; AND RELATE THE CENTERS TO THE OVERALL PROGRAM AND THE RESEARCH SUB-PROJECTS TO BE FINANCED UNDER THE PROJECT. IN ADDITION, THE PP SHOULD (I) IDENTIFY SPECIFIC CENTERS TO BE CREATED OR UPGRADED; (II) PRESENT RELATIVELY DETAILED COST ESTIMATES; AND (III) DESCRIBE THE MANAGEMENT STRUCTURE OF THESE CENTERS, THEIR RELATIONSHIP TO CONICIT, ITCR, UCR AND INDICATE THE MANPOWER AND TRAINING REQUIRED TO RUN THEM.

3. LONG-TERM FINANCING OF R&D: IN ORDER TO ENSURE THE CONTINUED EXISTENCE OF AN R&D SYSTEM FOLLOWING PROJECT COMPLETION, THE PP SHOULD DISCUSS LONG-TERM FINANCING POSSIBILITIES FOR R&D. AS A MINIMUM, THE MISSION SHOULD CONSIDER INCLUDING TECHNICAL ASSISTANCE AND STUDIES TO

HELP CONICIT AND THE GOCR IDENTIFY AND INSTITUTE PROCEDURES TO MAINTAIN ADEQUATE R&D FUNDING LEVELS. PREFERABLY THE PP SHOULD SHOW AID CONTRIBUTIONS FOR RESEARCH STUDIES DECLINING OVER TIME AND COSTA RICAN CONTRIBUTIONS INCREASING. THE PP SHOULD ALSO DISCUSS ALTERNATIVE WAYS TO FUND R&D EFFORTS OVER THE LONG RUN -- E.G., THROUGH INCREASED GOVERNMENT'S TRANSFERS, OR THROUGH A REVOLVING CAPITAL FUND WHICH IS REPLENISHED BY PRIVATE CONTRIBUTIONS OR FEES PAID BY ENTERPRISES PURCHASING RESEARCH RESULTS.

4. OPERATIONAL COSTS: CONCERN WAS EXPRESSED WITH THE LEVEL OF AID RESOURCES WHICH WILL BE USED TO FINANCE SALARY SUPPLEMENTS AND OPERATIONAL COSTS. THE MISSION SHOULD SEEK, TO THE EXTENT FEASIBLE, TO SHIFT SOME OF THESE COSTS TO THE GOCR AND CORRESPONDINGLY INCREASE AID FINANCING FOR T.A. AND TRAINING ACTIVITIES. THOSE OPERATIONAL COSTS RECOMMENDED FOR AID FINANCING SHOULD BE FULLY JUSTIFIED.

5. BENEFICIARIES AND SUBPROJECT SELECTION CRITERIA: IN ORDER TO MAXIMIZE THE POTENTIAL IMPACT OF THIS PROJECT ON

THE POOR AND AT THE SAME TIME TO AVOID AN UNDULY NARROW PROJECT FOCUS, CAREFUL ATTENTION SHOULD BE GIVEN TO THE RESEARCH PROJECT SELECTION CRITERIA. WE SUGGEST A TIERED SYSTEM IN WHICH ALL SUBPROJECTS WOULD HAVE TO MEET CERTAIN GENERAL CRITERIA. THE IMMEDIATE RECIPIENTS OF THE TECHNOLOGY WOULD THEN BE CLASSIFIED -- AND SPECIFIC CRITERIA APPROPRIATE TO THAT TYPOLOGY APPLIED. FOR EXAMPLE, RESEARCH PROJECTS SELECTED WOULD HAVE TO (I) IMPACT BENEFICALLY (DIRECTLY OR INDIRECTLY) ON THE POOR; (II) COINCIDE WITH RATIONAL DEVELOPMENT OBJECTIVES; (III) RANK IN THE TOP HALF OF THE NEEDS OR PROBLEMS LISTED IN THE DE; AND ANALYSIS; (IV) COST LESS THAN DOLS 100,000; AND (V) BE JUDGED METHODOLOGICALLY SOUND. ONCE THE GENERAL CRITERIA WERE MET, THE RESEARCH PROJECT COULD BE JUDGED AGAINST THE ADDITIONAL SPECIFIC CRITERIA, DEPENDING UPON WHETHER THE IMMEDIATE RECIPIENT WAS A SMALL-SCALE FIRM, LARGER FIRM, OR FARM FAMILY. NOTE THAT NOT ALL OF THE CRITERIA WOULD BE APPLICABLE FOR EVERY RESEARCH SUBPROJECT, AND THAT THE PRESENCE OF SOME MIGHT COMPENSATE FOR THE ABSENCE OF OTHERS.

5. DELIVERY SYSTEM: THE IR PROPOSES A DELIVERY SYSTEM IN WHICH CONICIT ASSIGNS MAJOR EXTENSION RESPONSIBILITY TO THE ITCR. HOWEVER, THE IR PROVIDES ONLY A BRIEF DESCRIPTION OF HOW THIS SYSTEM WILL WORK. THE PP SHOULD FOCUS MAJOR ATTENTION ON THIS ELEMENT OF THE PROJECT, PARTICULARLY ON THE RELATIONSHIPS BETWEEN CONICIT, ITCR, AND POTENTIAL USERS.

7. INSTITUTIONAL ANALYSIS: SINCE CONICIT IS A RELATIVELY SMALL AND YOUNG ORGANIZATION, ITS CAPABILITY TO IMPLEMENT THE PROJECT IS NOT ENTIRELY CLEAR. THE PP SHOULD INCLUDE AN INSTITUTIONAL ANALYSIS OF CONICIT, AS WELL AS OTHER PROPOSED IMPLEMENTING ORGANIZATIONS, AND DESCRIBE HOW THEY WILL RELATE TO ONE ANOTHER. INFORMATION ON RESEARCH FINANCED BY OTHER GOVERNMENT INSTITUTIONS WILL ALSO HELP TO PUT CONICIT'S ROLE IN BETTER PERSPECTIVE.

8. ROCAP AND OTHER DONOR TECHNOLOGY PROGRAMS: THE IR STATES THAT DUPLICATION WITH THE ROCAP-ICAITI PROJECT WILL BE AVOIDED BECAUSE THE TWO PROJECTS DEAL WITH DIFFERENT TARGET GROUPS. WHILE THE PP NEED NOT DWELL ON THE DUPLICATION ISSUE, IT SHOULD DISCUSS THE RELATIONSHIPS BETWEEN THE TWO PROGRAMS, INCLUDING WAYS IN WHICH TECHNOLOGY WILL BE EXCHANGED BETWEEN THEM AND HOW CONICIT CAN DRAW UPON THE EXPERIENCE OF ICAITI. ROCAP IS NOW FORMULATING AN APPROPRIATE TECHNOLOGY R&D STRATEGY WHICH ENVISIONS A FOLLOW-ON PROJECT OF SUPPORT TO ICAITI. CONSULTATION BETWEEN ROCAP AND USAID/CR SHOULD STRENGTHEN BOTH PROPOSALS. THE PP SHOULD ALSO DISCUSS WAYS IN WHICH THE PROJECT CAN RELATE TO AN ON-GOING PEACE CORPS APPROPRIATE TECHNOLOGY PROJECT WHICH IS PROVIDING VOLUNTEERS TO ITCR (INCLUDING ONE INFORMATION SPECIALIST.)

9. TECHNICAL ASSISTANCE: A CROSS-COUNTRY ANALYSIS OF INDUSTRIAL RESEARCH INSTITUTIONS IN DEVELOPING COUNTRIES. CARRIED OUT BY JAMES P. BLACKLEDGE FOR THE OFFICE OF SCIENCE AND TECHNOLOGY STRESSED THE IMPORTANCE OF TECHNICAL ASSISTANCE LINKAGES WITH DEVELOPED COUNTRY TECHNOLOGY IN SUCCESSFUL LDC R AND D EFFORTS. WE RECOMMEND THAT GREATER ATTENTION BE GIVEN TO THE ROLE OF SHORT-TERM TECHNICAL ASSISTANCE IN PROVIDING "CROSS-FERTILIZING" INFORMATION TO SUPPLEMENT OTHER LINKAGES BETWEEN CONICIT AND THE MAIN STREAM OF WORLD RESEARCH.

10. ADDITIONAL MEMOS AND BACKGROUND MATERIALS FROM AID/W REVIEW BEING CARRIED TO MISSION.

11. WE WILL ADVISE BY SEPTTEL RE TDY CONSULTANTS TO ASSIST IN PREPARATION OF PP. CHRISTOPHER

BT

#9360

DETAILED ILLUSTRATIVE RESEARCH PROJECT DESCRIPTIONS

A. Wood Technology Project

1. Project Description

The purpose of the wood technology research project is to examine the physical and mechanical properties of 50 species of woods in Costa Rica. The properties to be examined include durability, workability, and drying and preservation capacities. Reliable data on the weight, strength, and other quality characteristics of selected wood species will be obtained, and statistical analysis will be used to establish the range of variability of specific characteristics among species. By means of systematic sampling, the study will identify trees producing high quality lumber, their growth rates, and other characteristics. Information from the study will be disseminated to wood workers, builders, saw mills, and nurseries. Trees appearing to have superior genetic capabilities would be used in a forest improvement program.

In addition, the behavior of selected species will be studied with regard to the specific drying and preservation treatments deemed most economical. Use will be made of existing studies on the more common species, such as teak, cedar, laurel, virola, cipress, sabana and cativo. Drying and preservation techniques specific to Costa Rica will be developed to improve the durability and load carrying capabilities of the best commercial species. Also, researchers will ascertain the workability of these species on research specific and commonly used machinery. Finally, environmental and other effects on the quality of wood will be examined so that foresters in charge of forest management can use the information to implement tree improvement programs in the future.

2. Methodology

A wood technology expert will advise Costa Rican researchers as to which physical and mechanical properties should be examined. Physical properties might include weight, volumetric and dimensional contraction, color, texture, fiber length, lumen, and lustre. Each species will be described from both macroscopic and microscopic perspectives.

Mechanical properties to be observed might include static flexion (elasticity and rupture modulus and density), compression parallel to the grain, resistance to the cutting force parallel to grain, resistance to a driven nail, axial and lateral hardness, resistance to tension parallel to the grain, and evaluation of coupling (resistance to the extraction of nails or screws).

A technical advisor will be consulted to determine which drying and preservation techniques for the species examined might be most appropriate. Three drying processes will be tested under conditions specific to Costa Rica: air drying, the most common method; a three-speed conventional drier; and a dehumidifier using high speed air circulation with high temperatures (50-60°C) and low speed air circulation with moderate temperatures (30-40°C).

Four methods of preservation will be tested: (1) the hot-cold bath using diesel pentachlorophenol; (2) the double diffusion method on green wood with hydrosoluble salts C.C.A.; (3) immersion with pentachlorophenol; and (4) immersion with hydrosoluble salts. In each of these methods, researchers will determine the amount of liquid the wood retains and the extent of penetration. The treated samples will be kept to observe the long-term effectiveness of the treatment in meeting preservation standards for Costa Rica.

Tests complying with international standards will be used to determine the workability of the selected species. These tests include planing, molding, drilling, sanding, and lathing. The results of these tests will be evaluated, and finished specimens will be registered photographically.

Procedures used to carry out this study will be based on similar studies done in tropical areas. The standards used for the laboratory tests will be those of the American Society of Testing and Materials, modified as required by local equipment.

Sampling will proceed as follows: (1) Wood as well as fruit and flower cuttings will be taken for identification purposes. (2) The wood specimens for testing will be cut and collected at another time. (3) A registry will then be made with specimens from between five and ten trees for each species. (4) All samples will be sprayed with fungicides and placed in plastic bags for transport to the laboratory. (5) Some of the wood samples will be sawed into pieces for use in drying experiments. (6) Wood, flower,

and fruit samples of each species will be sent to the Tropical Science Center and the herbarium (tree museum) of the National Museum to corroborate the scientific name. Samples will also be sent to the Forest Products Laboratory in Madison, Wisconsin, requesting identification, bibliography on the species, and any available studies on the species studied in other areas.

From each tree, two-meter lengths will be cut both for physical, chemical, and mechanical testing and preservation testing. One-meter lengths will be used for drying tests. Logs used in mechanical testing will be sealed on the ends with paraffin or aluminum paint to avoid moisture loss.

The following species will be studied: *Vochysia ferruginea*, *Vochysia hondurensis*, *Nectandra sanguinea*, *Nectandra reticulata*, *Persea schiedeana*, *Ocotea* sp., *Anacardium excelsum*, *Minquartia guianensis*, *Hieronyma alchorneoides*, *Ceiba pentandra*, *Manilkara zapote*, *Hura crepitans*, *Pentaclethra macroloba*, *Brosimum sapiifolium*, *Brosimum utile*, *Brosimum costarricanum*, *Copaifera aromática*, *Tabebuia chysantha*, *Dialium guianensis*, *Virola Sebifera*, *Cordia nitida*, *Didymopanax morototoni*, *Jacaranda copaia*, *Virola koschny*, *Bombacopsis* sp., *Carapa* sp., *Ficus werckleana*, *Cordia Alliodora*, *Cedrela mexicana*, *Quararibea* sp., *Alnus acuminata*, *Cupressus lusitánica*, *Terminalia lúcida*, *Terminalia amazonia*, *Vantanea barbouri*, *Calphyllum brasiliense*, *Prioria copaifera*, *Vatairea* sp., *Hymenulobium*, *Lechythis costaricensis*, *Tectona grandis*, *Pterocarpus officinalis*, *Guazuma ulmifolia*, *Zantoxilum* sp., *Aspidosperma megalocarpum*, *Weinmannia pinnata*, *Poulsenia armata*, *Sapium* sp., *Tabebuia rosea*, *Magnolia poasana*.

B. A Study of Sands and Scrap for the Foundry

1. Project Description

The first activity of this research project is designed to improve the quality of locally produced manufactures. Researchers will study and classify the Costa Rican silica sands suitable for use in metal castings. Once completed, the researchers will use the equipment typical of a small scale foundry to experiment with different mixtures of these identified sands and bonders. The quality of different shape castings made with a variety of commonly used metals and alloys will be evaluated. The researchers will document the optimum mixtures of locally used

sands and bonders necessary to improve and standardize the quality of Costa Rican produced metals. These products include man-hole covers, pump casings, wood-burning stores, ornamentals, and repair parts for the small sugar refineries, for small industrial machinery, and for small agricultural machinery. The location of sand beds, and optimal mixtures of bonders and sands for sand casting will be conveyed to the metal product manufactures through extension agents attached to the Technological Institute of Costa Rica (ITCR).

The second activity will be an information search and demand analysis to expand the manufacture of metal products from scrap. Scrap metal, the major source of the raw material in Costa Rica, cannot now be used for products to meet even marginal physical standards. This problem arises from the lack of basic knowledge about chemical composition as well as physical properties of the scrap. In an information search, the researchers will identify guidelines for specifying rough estimates of composition of the scrap. The researchers will also establish guidelines to be used in the sorting of scrap into a "direct re-use" component and into a component that is returned to the foundry for processing. The use of scrap is critical in the small scale foundry where the percentage makes up a large portion of the molten pour. Also, in this activity, researchers will identify imported products such as plows which could be made from the existing scrap metal.

Finally the researchers will produce in the plants of existing foundries several of the products identified for import substitution. Tests on these products would be carried out in the research headquarters. Demonstration productions of new products, open to all, would be held at selected foundries. Easy-to-read instructions on the production of these products will be widely circulated.

## 2. Justification of the Project

Metal-working is an industry of increasing importance in Costa Rica. Progress in the industry is a key factor for the technological development of the country. During the period 1968-72, while aggregate industrial production was growing at an annual rate of 11.2%, the value added of products in the metal-working industry grew at a rate of 15.2%. The National Development Plan for 1974-78 set a goal of 17% annual production growth in the metal-working and basic metal activities. Apparently this goal has been accomplished. In the 1978-82 Plan; promotion of the industry continues to be an important concern.

While activity in the metal working sector of Costa Rica's economy has increased, the industry is still in need of dramatic improvements. The foundry industry in Costa Rica is characterized by artisan techniques which have not changed since the beginning of the century. Production has been on a piece-by-piece, request-by-request basis, resulting in wide variations in production quality. Eighteen foundries in the San Jose metropolitan area are casting with ferrous alloys. The number of non-ferrous foundries is estimated to exceed 100; there is no actual information on their number or compositions.

The foundry industry is particularly important for import-substituting industries. It is estimated that in the majority of industrial machines the weight of cast metal pieces represents between 50% and 85% of the total weight of the machine.

This project will contribute to the modification of the empirical and mechanical methods used in the metal-working industry with more modern techniques and methods. It will promote development of the country's metal-working sector by using improved technology and foundry processes to help the sector increase its capacity to supply raw materials, intermediate goods, and final products on high quality.

The Costa Rican Technological Institute (ITCR) will be able to use the results to expand and strengthen its technical assistance programs in this sector. Foundries will be provided with information on: (a) location, properties, and uses of sands and bonders; (b) methods for obtaining quality control in casting; and (c) new products and types of scrap metal to be used in their production.

### C. Aeolian and Solar Survey

#### 1. Project Description

The purpose of this project is to carry out a wind and solar radiation inventory in various sites throughout Costa Rica which currently do not have electricity and which, because they are small, isolated communities, will not have access to central power lines in the near future.

Researchers at the Costa Rican Meteorological Institute propose to establish 8 wind and 12 radiation survey stations. Wind stations will be equipped with an anemocinemograph, installed at a height of 10 meters, to measure wind velocity and direction. Solar

stations will be equipped with a global radiation meter to measure the intensity of solar radiation and a heliograph to measure the duration of the radiation.

Costs of the projects will be those for the purchase and installation of the equipment and for periodic publication of the survey findings. The Meteorological Institute has the personnel to identify the specific locations of the stations, to operate the stations and collect the readings, and to maintain the stations. Paper used in the readings will be supplied by the Institute.

Wind stations are contemplated for the following locations: Valle Tempisque, Cuenca Baja Rio Virilla, Upala, Barra Colorado, Aguas Zarcas, Paso de la Palma, Paso del Desengaño, Valle de la Estrella, Cerro Chirripó or Cerro de la Muerte, Valle Coto Brus.

Radiation stations will be built in 15 locations in the following regions: Central Valley, North Pacific, Central Pacific, and South Central. Other areas do not have sufficient sunlight to warrant a solar survey.

## 2. Project Justification

Reaching isolated, sparsely populated villages with central power lines will not be accomplished in the near future because of prohibitive costs. Diesel generators supply energy in some of these areas (which all together represent about 22% of the population), but decentralized energy sources which use renewable resources are not yet available, due both to high cost and lack of knowledge as to which non-conventional sources would be feasible and efficient for the needs of these isolated communities.

It is important to examine the potential for solar and wind energy now so that when such technology becomes feasible it can be implemented without delay. The proposed wind and radiation survey would be an important step in preparation for the use of wind and solar devices to supply energy.

### Budget - Wind and Solar Survey

Project Total	<u>\$95,440</u>
1. Wind Survey Station	
Anemocinemograph, installed at a height of 10 meters - 8	56,200

Budget - Wind and Solar Survey (Cont...)

Installation costs	\$ 4,680
2. Radiation Survey Station	
Global radiation meter (to measure intensity of radiation)	23,880
Heliograph (to measure duration of radiation)	6,480
3. Radiation Survey Station	
Installation costs	4,200

D. Use of Abandoned Salt Beds for Aquaculture

1. Project Description

The aim of this project is to determine scientifically the possibilities, requirements, and problems involved in aquaculture without altering or destroying the ecology of the area used. Three studies in marine farming will be undertaken: (1) cultivation of brine shrimp (Artemia Salina) as food for the larvae of shrimp and cultivated fish; (2) cultivation of salt water fish for commercial consumption; and (3) cultivation of turtles for preservation of the species and possible commercialization. Research will be carried out in Santa Rosa National Park in Guanacaste in an abandoned salt bed which is several hectares large and located 100 meters inland from Naranjo beach. There is a well and a house at the site. The house would need minor repairs and could be made into a small laboratory for field analysis.

Brine shrimp, Artemia salina

Cultivation of the decapod, Artemia, is one of the most recent advances made in aquaculture. This species is found in all salt lakes in the world, including those in Costa Rica. The nauplius (intermediate stage in the development of brine shrimp) has recently emerged as essential nourishment for the larvae of cultivated decapods (Penaeus spp., Macrobrachium spp.) as well as for a variety of fish larvae, milkfish (Chanos chanos), and mullet (Mugil), for example. Not only are these shrimp considered the best live food in aquaculture, but in many cases they are the only available source of living

nourishment for the majority of fish and cultivated decapods.

Commercial exploitation of Artemia cysts began in the San Francisco bay, and later in the Great Salt Lake. The cysts of brine shrimp are formed when the salinity of the water goes up. They can be collected periodically from the banks of salt lakes, and as dried cysts can be stored for years. At first, the supply of natural cysts seemed unlimited, but now demand has outstripped supply, thus providing considerable pressure for the expansion of aquaculture and also causing substantial price increases. Today 100 grams of Artemia cost about \$5.00.

Even though salt lakes populated with the species Artemia are found all over the world, including in Costa Rica, controlled production began in 1977 in Brazil and in 1978 in the Philippines. The Brazilian experiment began with 250 grams of cysts in salt flats of 6000 hectares. One year later, 10,000 kgs, of cysts were cultivated. In the Philippines, an unprofitable private salt bed of 2 hectares was converted into ponds and, from 50 grams of nauplii, was producing 25 kgs. of cysts in three months.

Since the Artemia cysts can only be produced when the salinity of the water exceeds 150‰, production is possible only in areas of little precipitation. Guanacaste, where the Santa Rosa National Park is located, has the lowest annual rainfall in the country, and thus work could continue all year long.

Study of Artemia salina and production of the cysts would proceed as follows. First, the influence of salinity, dissolved oxygen concentration, and temperature on the cultivation of Artemia and the production of cysts would be examined; the nutrient concentration optimal for feeding the nauplii and adult Artemia would also be determined. Second, the amount of fertilizer necessary to guarantee an optimal rate of production would be established. Third, an inventory would be conducted to determine whether Artemia could be cultivated elsewhere in Costa Rica.

#### Cultivation of Salt Water Fish

The milkfish is a very important fish in Southeast Asia but, is not eaten here. Since both the milkfish and mullet are herbivorous, their cultivation is rather simple. Both adapt to either salt or fresh water and could become important species for aquaculture.

The two species would have to be captured in natural schools in order to begin cultivation. Their capture, however, is not a major obstacle since both species are automatically transferred to shrimp cultivation ponds when sea water is pumped into the pools. Thus the

fish could be obtained from the shrimp growers at no cost. Study of the life cycle of these fish would permit capture at the optimal time of year.

Several activities for the cultivation of salt water fish are planned. The first would examine the salinity, temperature, and concentration of dissolved oxygen most appropriate for the cultivation of milkfish and mullet. Second, the amount of fertilizer needed to obtain optimal results would be determined. Third, research could develop a cheap, supplementary food for the milkfish and mullet which could be produced from raw materials and waste, such as coffee pulp, banana leaves, sugar cane waste, etc. Fourth, methods for the preparation and preservation of these fish would be developed so that consumer demand in the country could be met.

#### Cultivation of Turtles

Naranjo beach, 100 meters from the salt mine, is one of the major sites where turtles come to lay their eggs. These turtles are threatened by hunting, egg theft, dogs, sharks, vultures and several other predators. The possibility of incubating the eggs as a part of this project will be examined. Three activities are planned: development of a simple incubator for turtle eggs; determination of the optimal conditions for growth of the young turtles; and establishment of the nutritional requirements of the young turtles as well as formulation of a complementary artificial food.

#### 2. Project Justification

In a country with extensive seacoast on both the Atlantic and Pacific oceans, it is logical that marine resources would provide substantial wealth for the country. Yet, most of the sea's resources are still going untapped. This project is one step toward increasing knowledge and use of those resources.

Controlled production of Artemia salina is a new field and is especially promising for tropical and subtropical countries. But even though the climatic and topographic conditions in Central America are favorable, there is not one such project ongoing in the area at the present time.

Those enterprises engaged in aquaculture in Costa Rica currently rely on imports on Artemia salina cysts, primarily from the United States, to nourish shrimp larvae. At the present time,

private industry is importing one ton of the cysts annually, at a cost of \$50,000. Expected expansion of shrimp cultivation will make increased importation of cysts necessary. The quality of these cysts is not controlled (up to 50% of the cysts never hatch), and the high price of imported cysts (\$5,000 for 100 grams), raises production costs significantly. Cysts produced locally would represent a substantial savings for the commercial shrimp industry.

Experience in Brazil and the Philippines has shown that production of Artemia salina is feasible, given the necessary climatic conditions, such as water temperature between 25° and 30°C, high evaporation, salinity between 80‰ and 200‰, and use of sea water from a high productivity ecosystem. The necessary conditions appear to exist in Costa Rica. Moreover, the use of abandoned or unprofitable salt beds would provide an alternate source of production and employment in rural areas.

This project would generate the following information: the pre-requisites for choosing sites for the mass production of Artemia salina; the optimal system for production; and selection of the best breed of Artemia for cultivation in Costa Rica. The results of this pilot project could then be applied on a large scale in order to provide Artemia adults and cysts of high quality to the local market at a reasonable price. Dependence on foreign imports of Artemia would end. Better conditions for aquaculture in Costa Rica would be created. Employment would be generated since aquaculture, particularly cultivation for local consumption, is labor intensive. The possibility of expanding production for export could be explored. Whether cultivation of Artemia or the salt water fish or the turtles begins first will depend on when the project financing starts. Artemia cysts can only be cultivated during the dry season. Cultivation of the fish could start during the summer months, and incubation of turtles in October.

Financing requested for this project is approximately \$83,000.

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WOOD TECHNOLOGY - BUDGET

<u>Project Total</u>	<u>\$40,745</u>
(1) Personal Services	<u>\$19,480</u>
Wood Engineer Q7,300/mo 12 mo.	10,305
Field assistants by contract	1,175
Wood technology expert	8,000
(2) Non-Personal Services	<u>\$17,505</u>
Trips to collect samples 6000 Km a Q1.30/km	920
Transportation San Jose & Cartago 2000 Km a Q1.30/Km	305
Travel expenses (4 persons, 6 months, a Q145/day)	12,280
Mailing and identification of samples	2,000
Computer costs	235
Publication	1,765
(3) Materials and Supplies	<u>\$ 3,090</u>
Blotting paper 1 ream	30
Cardboard 1 ream	18
Stationery and printing for data-taking variable	705
Fungicides & insecticides 60 liters	85
Plastic bags 400	25
Plastic in sheets 300 m <sup>2</sup>	35
Rope (6,5 mm - 1/4 inch) 8 kg	10
Chains for motorcycle 6	170
Aluminum paint 10 gal.	120
Paraffin 10 kg.	12
Reagents (e.g. safranina, xilol, permont, acids, etc.) variable	470
Radial saw 1	70
Pentachlorophenol 100 kg.	140
Salts C.C.A. 200 kg.	150
Diesel 400 gallons	85
Connector rings (200 units) plates (300), and screws (500)	705
Paper for samples machine (for three types of cargo) 500 charts	140
Color and black and white film 12 rolls	60
Gasoline and lubricants	60
(4) Machinery	<u>\$ 670</u>
Immersion tanks for wood 6	140
Tanks for treatment, hot and cold baths, and serpentine	530

SANDS AND SCRAP FOR FOUNDRY - BUDGET

Project Total		<u>\$62,000</u>
(1) Personal services		
1 laboratory technician (fulltime at 543.55/Mo.)		<u>\$13,275</u>
(2) Non-Personal Services		
Transportation around the country		<u>\$ 6,100</u>
1 investigation of sands		590
2 investigation of scrap		590
Expenses for research trips		
1 investigation of sands		700
2 investigation of scrap		1,410
Publication to be obtained		
1 National Technical Information Service (NTIS) published searches, 5		140
2 NTIS custom searches, 5		765
3 NTIS documents, 80		490
4 Technical books and journal		200
Publications to be issued		1,020
Photographic Processing of 36 exposure rolls, 10		195
(3) Materials and supplies		<u>\$ 3,800</u>
Silicon sand		260
Coke		940
Iron scrap		1,470
Silicon		280
Bentonite		90
Sodium Carbonate		6
Graphite		7
Non-ferrous scrap		590
De-gasifiers		90
Photographic film, 35mm-36 exposures, 10		70
(4) Machinery and equipment		<u>\$50,836</u>
<u>Foundry</u>		
Crucibles, 5		290
Non-ferrous metal furnace, 1		1,156

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Sands and Scrap for Foundry - Budget (Cont...)

Cupola furnace, 1	\$ 2,313
Galvanometer, 1	185
Pyrometer, 1	46
Cope & drags, 20	90
Hand grinder, 1	100
Safety equipment, 3 sets	577
Wheelbarrow, 2	60
Crucible shanks, 2	45
Fire Extinguisher, 1	70
Molders hand tools, 1 set	70
Sand Testing Laboratory	12,000
Bausch & Lomb Research Microscope MATB3CZ	5,800
35 mm Camera Kit	460
Exposure Meter	200
Sensitive Tint Plate	15

Rapid Quantitative and Qualitative Analysis

(Perking-Elmer Corp., Norwalk, Connecticut, USA)

Atomic Absorption Spectrometer Model 560	\$15,580
with double beam duet. bkgd. correction	
Wavelength Drive Assembly	650
Line Voltage Regulator	270
Acetylene Pressure Regulator	130
Nitrous Oxide Pressure Regulator	325
Air Compressor	565
Gas Controls and Vents	445
Air Filter Assembly for Air line	150
Replacement Air Filter	42
Graphite Furnace	2,000
Nitrous Oxide Burner Head	370
Corrosion Resistant Nebulizer	350
Recorder for graphite furnace	825
Pens for recorder, 5 per pac	12
Paper for recorder, 6 rolls	45
Lamps (one for each element), 30	5,000
Lamp holders, 30	600

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Itemized Description of Sand Testing Laboratory Equipment

Laboratory balance, 1  
Balance Weights No. 250, 1  
Moisture Teller No. 276, 1  
San Rammer No. 315, 1  
Compactability Accessory No. 315-C1, 1  
Base for Sand Rammer No. 315-17, 1  
Precision Specimen Tube No. 315-9, 2  
Sand Specimen Dryer No. 316, 1  
Permmeter No. 335-A  
Base Permiability Screens No. 340, 3  
Universal Sand Strength Machine No. 400, 1  
High Dry Strength Accessory No. 410, 1  
Deformation and Toughness Accessory No. 420A, 1  
Shear Strength Attachment No. 426B, 1  
Splitting Strength Accessory No. 445, 1  
Transverse Core Stength Accessory No. 640, 1  
Green Hardness Tester B-Scale No. 473, 1  
Green Hardness Tester C-Scale No. 474, 1  
Laboratory Drying Oven No. 500, 1  
Volatiles Apparatus No. 503, 1  
Molding Sand Combustibles Test No. 504-a, 1  
Rapid Sand Washer No. 512, 1  
Hydrometer No. 516, 2  
Hydrometer Graduate No. 517, 2  
Sand Testing Sieves No. 530, 1  
Autoclay No. 534, 1  
M.B. Clay Tester No. 535A  
Ultrasonic M.B. Accessory No. 536, 1  
Combs Laboratory Sifter No. 540, 1  
Core Hardness Tester No. 674, 1  
Density Indicator No. 850-A, 1  
Rinsing Bottle for sand washer No. 514-A, 2  
Standardization and Calibration Kit No. 8858, 1  
Mold Quality Test Pattern No. 901, 1  
Measuring Tape 30m for measuring sand sites

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AQUACULTURE - BUDGET

<u>Project Total</u>	<u>\$83,055</u>
(1) Personal Services	<u>40,000</u>
Full time assistants 2	\$ 1,200
Full time researcher 1	18,000
Part time researcher 1	9,000
(2) Non Personal Services	<u>30,000</u>
In-country travel	18,000
Foreign travel	2,000
4 wheel drive vehicle	10,000
(3) Materials and Supplies	<u>3,105</u>
Gasoline 15,000 liters	2,000
Diesel 2,500 liters	600
Artemia cysts 2.5 kg.	125
Shovels	30
Wheel borrows 2	100
Tools	125
Nets 2	125
(4) Machinery and Equipment	<u>3,950</u>
Portable ph meter 1	150
Electrodes 2	200
Measurer of dissolved oxygen 1	600
Scale 1	2,000
Refractometer 1	350
Various	350
(5) Contructions	<u>6,000</u>
Construction of dikes	3,600
Repair of dikes during project	1,200
Repair of road	600
Repair of house	600

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SUMMARY AND LISTING OF POTENTIAL RESEARCH PROJECTS

A. Evaluation of Stored Grain Losses

Every year in Costa Rica, substantial grain losses occur during storage. These losses occur in every country in the world but they are especially serious in developing countries in tropical regions.

Among those most affected by the losses are the farm families who store all or part of their harvest for their own consumption and that of their animals, and who, for lack of knowledge or better means of storage, lose a large part of this grain.

Before offering solutions -- even partial ones -- to the problem of the small farmer, we must study the magnitude and principal causes of the losses. The majority of studies on the subject do not have a solid base in fact but rather are estimates of the authors. First, it is necessary to initiate a valid information survey regarding the problem of grain losses in storage in Costa Rica, with emphasis on the grain that stays in the hands of the producers.

To obtain this kind of information, we propose a two-step research project. During the first step, a series of surveys would be made among grain producers in order to know what volumes and kinds of grains are stored by the producers in the various regions of the country, which storage practices are used, and what problems are faced.

During the second stage, a number of farmers around the country will be chosen and visited monthly so as to observe objectively the entire storage process on the farms for the duration of the storage period. At the same time, a certain amount of grain, property of the research center, will be stored under the same conditions as the farmer's grain, in order to facilitate weighing, sampling, etc., without interfering in the farmer's work.

In the second year, samples will be taken regularly for laboratory analysis to determine the deterioration due to insects, fungi, etc.

The cost of the project is estimated at \$73,770.

B. Project to Design Gaseous Concrete from Volcanic Lava

This project would design different mixes of light concrete made from light natural materials, such as volcanic lava, and also use air-entraining to lower the weight. The project would include the production of prefabricated units, such as bathrooms, walls, and façades, for low-cost housing. The approximate cost of the project would be \$32,800.

C. Study of Wood Bending Techniques

Wood bending is important in the furniture industry and in the construction of boats and sporting equipment. This technique is most widely used in making chairs. The industry could better utilize labor and raw materials by using wood bending rather than other techniques, such as lamination and band sawing. The estimated cost of this project is \$16,400.

D. Project for the Processing of Secondary Fish Species

The purpose of this project is to obtain products with greater value-added from secondary fish species, such as jurel, bagre, cuminante, agria, and shark. Researchers would test various products to find those with the best marketing possibilities. Two types of technology will be evaluated: conventional processing (canning, freezing, and salting, for example) and less-conventional (fish pulp and its derivatives).

Given the limited consumption of fish in Costa Rica and the relatively poor marketing network, the goal of this project is to obtain products of high quality and wide acceptability. Less-conventional methods of processing will be evaluated in order to expand the technological possibilities. The work would be carried out by existing fishing cooperatives.

Although experience in the processing of these secondary species is minimal, some technologies do exist. In the past 15 years, technological advances have been made worldwide in the processing of secondary species. This project would examine the developments and try to make some applications to Costa Rican fish catches.

E. Agricultural Machinery

This project is divided into three phases. The first, the

determination of priority agricultural tools and machinery in Costa Rica, would take one year to complete. The researchers would collaborate with CATIE in determining small farmer tool and machinery needs. The second phase would involve the design and production of six agricultural hand tools, three simple small farmer machines, and two pieces of heavy agricultural equipment. This phase would take three years to be completed. Finally, the research project would develop technological packages for use by extensive agents in the promotion of the research results. Promotion of the newly developed equipment would take place in conjunction with ITCO, MAG, CATIE, and OPSA. Not counting personal services, the total estimated cost of the three phases is \$360,000.

F. Timber and Cattle Management

The objective of this research project is to increase agricultural production of saw timber and beef cattle by labor intensive methods. The project will attempt to prove that small farmers can raise cattle on a food supplement made from forest slash, and preclude the need for grazing. Research indicates that treatment of wood slash and particles with sulfur dioxide under pressure for two hours at 120°C partially breaks up the lignincellulos complex of wood so that 60% of the carbohydrate becomes digestible; for ruminants, the feedstuff has a dietary equivalence of medium quality hay. Research points to be examined include: how much slash a hectare of Costa Rican forest land will produce in one year; how many beef cattle slash from one hectare support; how many hectares can one campesino manage; can the treatment process be operated economically; will certain species of trees be excluded as a food source; can the by-products in the delignification process be used for other purposes? The total estimated cost for the various phases of this research is \$375,000.

G. Classification and Processing of Kaolin

The AID Regional Analysis of Physical Resources in Central America and Panama identified five large deposits of kaolin in Costa Rica. Yet, Costa Rica imports kaolin for use in local refractory and ceramics. With proper analysis of the chemical properties of the local kaolin and an investigation of suitable processing techniques, it is possible that Costa Rica could produce enough kaolin for domestic and foreign markets. The estimated cost of the research is \$7,500.

H. Improved Small Scale Fishing

The majority of artisan fishing is done using hand lines in polluted waters close to shore, or using seines in water a bit cleaner. This research project would examine ways to increase the catch of small scale fishermen without causing substantial increases in the cost and effort. The project would investigate improved capture methods, and means of attracting and concentrating. Finally, the project would develop and test experimental fishing equipment. The estimated cost is \$60,000.

LIST OF RESEARCH TOPICS FOR COSTA RICA

1. Design of a wood classifier -- an apparatus which, without harming the wood, would classify it as to its physical characteristics.
2. Experiment with solar panels in Costa Rican industries.
3. Experiment with solar concentrators in refrigeration.
4. Design and construct a bio-mass digester which operates on waste products of coffee, sugar cane, and cattle.
5. Integrate a bio-gas digester with a low head hydro generator to supply all the energy requirements of a rural community.
6. Test the feasibility of a windmill generator in Costa Rica with the collaboration of a foreign producer of such equipment.
7. Construct small dams with turbines to produce electricity.
8. Improve physical properties of concrete products using local materials.
9. Design an integrated system for construction of door and window frames.
10. Experiment with local plant products in the construction of walls, panels, and roofs.
11. Experiment with bamboo as a reinforcing material in construction.
12. Investigate alternative methods of producing charcoal using plant material prevalent in Costa Rica.
13. Investigate the separation of coconut oil and protein by fermentation.
14. Investigate the production of food containers with reasonably simple inexpensive equipment.

15. Experiment in making raised breads without wheat.
16. Investigate ways to recycle San José's garbage.
17. Investigate low-energy preservation and processing techniques of fish and sea products.
18. Explore uses for banana fiber in rural industries.
19. Experiment with mussel culture.
20. Appropriate technology for water supply and water disposal for Costa Rica's major urban areas.

TABLE N° 1  
 CONICIT PAYMENTS, ACTUAL 1975-78  
 PROJECTED, 1979-1982 (\$000)

PAYMENTS	ACTUAL				PROJECTED			
	1975	1976	1977	1978	1979	1980	1981	1982
<u>ADMINISTRATIVE EXPENDITURES</u>	<u>136.0</u>	<u>137.0</u>	<u>266.1</u>	<u>339.9</u>	<u>559.7</u>	<u>1,171.0</u>	<u>2,049.1</u>	<u>2,341.9</u>
Personnel	80.0	132.4	152.8	217.9	265.9			
Other Services	26.5	2.0	65.5	87.2	227.7			
Materials & Supplies	8.5	1.4	27.6	25.3	51.6			
Machinery & Equipment	21.0	1.2	20.2	9.5	14.5			
<u>TRANSFERS</u>	<u>129.6</u>	<u>215.2</u>	<u>279.5</u>	<u>376.4</u>	<u>875.7</u>	<u>1,171.0</u>	<u>2,049.1</u>	<u>3,512.9</u>
<u>Current Transfers</u>	<u>129.6</u>	<u>215.2</u>	<u>279.5</u>	<u>312.1</u>	<u>661.2</u>			
Research Projects	65.8	152.7	144.8	151.6	292.7			
Graduate Student Assistance	-	10.9	20.0	17.4	39.8			
Center for Advancement of Science	-	-	29.3	12.1	23.4			
Scientist Salary Supplements	-	15.4	18.9	33.6	70.3			
In-Service Training	-	0.2	0.2	0.3	0.2			
Participation in Science Events	19.5	31.5	18.9	29.8	46.8			
Technical Assistance	-	-	6.8	17.2	21.4			
Other	44.3	4.5	40.6	50.1	166.6			
<u>Capital Transfer (including construction)</u>	-	-	-	59.5	209.9			
<u>Debt Service</u>	-	-	-	4.8	4.6			
<u>Special Allotments</u>	-	-	-	-	41.2			
<b>TOTAL</b>	<u><u>265.6</u></u>	<u><u>352.2</u></u>	<u><u>545.6</u></u>	<u><u>716.3</u></u>	<u><u>1,435.4</u></u>	<u><u>2,342.0</u></u>	<u><u>4,098.2</u></u>	<u><u>5,854.9</u></u>

Source & Note: CONICIT working paper, including global projections based on draft 1979-1982 National Plan. Expenditure classifications are the Mission's, administrative cost projection appears in error. 1979 figures are those actually budgeted.

TABLE N° 2

ACTUAL AND PROJECTED CONICIT REVENUES 1975-1982  
 (\$000)

	<u>Actual Data</u>				<u>Projected Data</u>			
	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
<u>Revenues:</u>								
Tax on soda	114.8	129.0	128.8	148.3	210.8	238.0	268.8	303.6
Interest from bonds	11.9	8.6	5.6	9.5	6.6	-	-	-
Government Transfer	78.5	340.5	407.9	505.5	1,276.3	1,990.6	3,947.1	5,269.3
Private Contributions	-	4.5	0.6	-	-	-	-	-
Foreign Contributions	12.7	6.0	14.6	8.9	-	-	-	-
Other Income	-	0.8	0.2	0.2	-	-	-	-
Prior Year Surplus	177.2	129.4	154.1	140.0	-	-	-	-
Sale of Assets	-	-	1.3	0.2	-	-	-	-
Loan Recoveries	-	-	-	0.5	-	-	-	-
	<u>305.1</u>	<u>618.8</u>	<u>713.1</u>	<u>813.1</u>	<u>1,493.7</u>	<u>2,228.6</u>	<u>4,098.2</u>	<u>5,854.9</u>

SUMMARY OF DRAFT SCIENCE AND TECHNOLOGY PROGRAM OF THE 1979-1982  
NATIONAL DEVELOPMENT PLAN

A. Objectives

The 1979-1982 National Development Plan sets the following Science and Technology Program Objectives:

1. Develop a strong national scientific and technological foundation so that Costa Rica can develop a local capacity to create its own technology and enable it to seek out, select, use, assimilate and adapt imported technology. The above should be done in close coordination with the nation's productive sectors, considering their most urgent needs.
2. Promote the national scientific research capacity in order to permit the national scientific community to place science at the service of the economic and social development of all Costa Ricans, and to enable it to participate more and more in universal scientific progress.

B. Strategy

Program development will require efforts leading to the creation of a national scientific/technical capacity dedicated to finding national solutions to national problems. This will permit a mastering of the knowledge which comes to Costa Rica from abroad, without rejecting or slighting it, and its application to the extent that it may be useful to and supportive of Costa Rican innovation.

To achieve the above stated objectives, the following measures must be taken:

1. Stimulate, increase, and rationalize medium and long-term scientific/technological educational programs on all levels to create an interest in and develop the human resources needed in the basic sciences. Also, incorporate qualified foreign experts into Costa Rican research and teaching efforts.
2. Increase demand for national scientific and technological advances, especially in the private sector.
3. Facilitate scientific policy development as well as execution and administration of scientific/technological activities by means of complementary legal, technical, and/or economic tools which will assure: (a) development of institutional capacity to formulate science and technology plans and policies and execute, control, and evaluate them; (b) improvement in the capacity to seek out, select, adapt, and assimilate technologies when local devel-

opment of those technologies is not possible; (c) efficient coordination between research activities, human resource development efforts, and production systems development demands; (d) development of an information/documentation system to meet national needs in scientific development and technological self-determination; and, (e) preparation of a long-term scientific educational plan to develop highly qualified human resources needed for scientific/technological research.

4. Research projects closely related to National Development Plan priority programs will be encouraged. These should simultaneously attempt to: (a) promote the selection and development of appropriate technologies vis-a-vis available local resources; (b) promote appropriate intermediate technology development in industry, especially in rural areas; and (c) bring about changes in technologies currently utilized in public administration and other sectors which present limitations to the country's development.

#### C. Action Plan

In order to achieve the stated objectives over the next four years, the national science and technology system should be strengthened by means of:

1. A permanent inventory of national scientific and technological resources, human as well as material; it would also include bibliographical references, research project descriptions, and information on resource utilization and behavior.

2. Permanent scientific/technological programming to be established for Costa Rica beginning in June of 1979.

3. Human resources development in the following fields: agricultural/animal husbandry sciences; marine sciences; physical sciences; natural resources; industry; agroindustry; housing; energy; health; and science teaching for all levels. This will be accomplished by means of the following measures:

a. establishment, on a permanent basis, of adequate incentives for post-graduate studies abroad or in-country by capable students;

b. creation of assistance mechanisms, on a permanent basis, which will enable Costa Rican scientists to travel to and attend short-courses, conferences, seminars, etc. being offered abroad;

c. creation of assistance mechanisms which will enable renowned foreign scientists to come to Costa Rica to undertake research activities, give lectures, teach, etc.;

d. organization, on a permanent basis, of important scientific events to be held in Costa Rica; and

e. improvement on a continuous basis, of the quality of science teaching, especially on the secondary level.

4. A sustained effort to attract and retain Costa Rican scientists by means of the following incentives:

a. adequate financing for research projects;

b. adequate remuneration; and

c. expansion of the scientific/technological infrastructure, on a permanent basis.

5. Creation of new research and teaching centers and coordinated strengthening of existing ones, on a permanent basis. Strong support should be given to CEMEC; the Marine Research Laboratory; the Physics Department of the University of Costa Rica; the Research Center for Cellular and Molecular Biology; INISA; INCIENSA; CIGRAS; the forest products laboratories of the Costa Rican Technological Institute and of the University of Costa Rica; the Clodomiro Picado Institute; and any institution working in the field of metal-mechanic activities.

6. Careful study of problems associated with technology transference and ways to resolve them (to be initiated in 1979 and updated in 1981).

7. Permanent undertaking of other activities benefitting science and technology, such as creation of a Museum of Science and Technology.

8. Restructuring of Central Government and autonomous institutions' budgetary appropriations to adequately reflect the science and technology costs of the public sector and facilitate activity programming (to be initiated in 1979 and carried through to mid-1980).

9. Creation of a national scientific/technological information system which should begin with information sub-systems on industry, agriculture and livestock, health, and economics. This is to be carried out on a permanent basis.

10. Effective scientific/technological relations with other countries on a permanent basis.

11. Rational utilization of foreign assistance to Costa Rica for science and technology by means of adequate planning and coordination between receiving institutions (to be initiated in 1979 and carried out through end of 1980).

12. Widespread communication, on an on-going basis, of what needs to be done in the scientific/technological field.

Close ties, by way of CONICIT efforts, will be formed between public or private institutions offering scientific/technological services and national companies who have a demand for those services. Furthermore, companies should be assured of benefitting from the exclusive use of patents for several years, if and when they finance research projects which develop new patented technologies. This measure would help finance and support activities of Costa Rican scientists. In order for this to happen, CONICIT must prepare in 1979 procedural rules regulating the inter-connections between the supply and demand of scientific/technological services.

Research activities will be promoted in accordance with established priority research areas outlined below. To achieve Science and Technology Program objectives and reach National Development Plan goals, CONICIT's financial resources will be increased as well as OFIPLAN's program allocations. CONICIT will receive 13 million colones (US \$1.52 million) in 1979 to be progressively increased until it reaches 45 million colones (US \$5.27 million), at 1979 prices, in 1982. These amounts will be included in the national budget each year. Beginning in 1979, OFIPLAN will also channel 25% of the A.I.D.-GOCK Two-Step Fund for the National Science and Technology Program. In order to evaluate and follow-up on the program, OFIPLAN will count on the infrastructure and existing resources of CONICIT.

#### D. Priority Research Areas

The priority research areas (general guidelines) for the draft Science and Technology Program for 1979-1982 have been identified as follows:

1. INDUSTRY
2. AGROINDUSTRY
3. MARINE RESOURCES AND FISHERIES
4. NATURAL RESOURCES
5. HOUSING
6. ENERGY
7. HEALTH
8. AGRICULTURAL SCIENCES

1. INDUSTRY

- a. Study modes of technology transfer and their impact on the economic and social development of Costa Rica.
- b. Study ways to develop local capacities to assimilate and adapt technologies.
- c. Study technologies which stimulate a greater use of manpower and national raw materials.

2. AGROINDUSTRY

- a. Study and identify agricultural products and their varieties which are suitable for industrialization.
- b. Study methods of producing and conserving fruits and vegetables.
- c. Undertake and complete microchemical and technological analyses of colorings used in agroindustry.

3. MARINE RESOURCES AND FISHERIES

- a. Undertake and complete an inventory of marine species and determine their potential uses.
- b. Initiate research on life cycles, culturing possibilities, and nutritive value of marine biological

resources most suitable for immediate utilization.

- c. Study and develop information systems on marine resources and fisheries.

4. NATURAL RESOURCES

- a. Define areas of the country, on the basis of potential land use studies, which should remain in forest cover for productive or protection functions.
- b. Study watershed management.
- c. Study wildlife management.
- d. Study reforestation (natural or artificial).
- e. Study silvicultural methods and forestry management.
- f. Study erosion control.
- g. Study forestry protection.
- h. Study changes required in existing legislation, on the basis of research findings.
- i. Study ways in which improvements can be made in the institutional structure for this sector.

5. HOUSING

- a. Formulate, on the basis of diagnostic analysis, a national policy on housing which will satisfy the most pressing needs of the population.
- b. Study the development of new housing production techniques.
- c. Study ways to reduce construction costs of low-cost housing.

6. ENERGY

- a. Update and complete the national energy resources inventory.

- b. Continue research on national geothermal resources.
- c. Initiate or continue economic and technical feasibility studies of alternative energy sources, such as alcohol, solar, wind, biomass, and others.

7. HEALTH

- a. Promote studies leading to price reductions of foodstuffs basic to an adequate diet.
- b. Carry out research to develop new nutritive food products for the Costa Rican population and/or improve the quality of existing products.
- c. Continue studies on incidence of infectious diseases and their relation to social factors and of other non-infectious diseases more commonly found in modern societies.
- d. Conduct studies on health delivery systems for lower income population groups.
- e. Establish guidelines for development of an institutional structure which would strive to make the environment a healthier one.

8. AGRICULTURAL SCIENCES

- a. Give preference to studies which would lead to increased productivity of basic grains, fruits and vegetables.
- b. Improve and complete soils maps for the country, detailing agricultural and forestry soils areas.
- c. Regionalize, on the basis of potential land use studies, the country's agricultural and livestock activity areas.
- d. Conduct a comprehensive study of the minifundio/latifundio problem.
- e. Study the more appropriate methods for agricultural technology transfer to Costa Rica.

- f. Evaluate the genetic potential of species and plant varieties which national regionalization studies show to be the most appropriate for Costa Rica in order to initiate plans for applied botany research seeking improved varieties.
- g. Study production patterns of new genetic varieties best adapted to local conditions.
- h. Intensify studies of the principal pests affecting livestock.

A SUMMARY OF THE PROCEDURAL RULES ON FINANCIAL ASSISTANCE TO SPECIFIC PROJECTS  
AND ON INTERNATIONAL AGREEMENTS OF THE NATIONAL COUNCIL ON SCIENTIFIC AND  
TECHNOLOGICAL RESEARCH (CONICIT)

A. Financial Assistance for Research Projects

1. General Provisions

CONICIT receives applications for project financing at any time and will issue its respective determinations on them with all due haste. CONICIT's board of directors hold exclusive rights to approve or reject applications for financial assistance.

In making a determination on a given application for assistance, the board of directors will consider the following factors:

- a. The scientific and/or technological nature of the proposed project.
- b. Its economic and national importance.
- c. The academic and technical background of the project participant(s) as well as his (their) experience in the respective field of study.
- d. The equipment facilities, installations, and other inputs which the petitioner(s) can offer.
- e. Availability of CONICIT funds.
- f. Project relevance to CONICIT's objectives.

2. Applications for Financial Assistance

Any person or group of persons may solicit financial assistance from CONICIT. However, if the solicitors are foreign, they must be associated with a Costa Rican group of individuals or entity. Applications must be presented using the forms supplied by CONICIT for that purpose. Notification of CONICIT approved project funding will be made in writing and will note the terms of the contract, its duration, and form of payment.

3. Obligations of Beneficiaries of Financial Assistance

Beneficiaries of CONICIT financial assistance assume the following conditions and obligations:

- a. The total amount of grant funds will be issued exclusively for the purposes described in the respective application, except for the cases contemplated in clause d);
- b. The beneficiary(ies) will be free to undertake the scientific initiatives which he(they) consider convenient to the project's success. However, they must notify CONICIT of project modifications which imply substantial changes from the original plan. Research personnel changes must be approved by CONICIT in all cases;
- c. The beneficiary(ies) must advise CONICIT of any circumstance which substantially affect the development of the project;
- d. The beneficiary(ies) may modify the budget allocations, without prior approval from CONICIT, if and when the increase or decrease for each line item does not exceed 20% of the original amount for that item. All other budgetary alterations or transfers must have CONICIT's prior approval. Requests for all budgetary transfers which result in an increase in the personal services item must be submitted to CONICIT and will require, in addition, the approval of the National Controller's office;
- e. When the beneficiary institution establishes salary increases for the personnel contracted for CONICIT funded research projects, CONICIT will not concede increases in funds approved for those projects, except for very exceptional cases;
- f. That the beneficiary(ies) is(are) obliged to submit to CONICIT concise, semiannual technical reports on the research project, make available all project information which CONICIT may request, and accede to inspections by CONICIT. At the end of a one-year period, the beneficiary(ies) will submit a more complete technical report on the research project, following the established outlines for that purpose. The above mentioned reports must be turned in without the need for prior instruction or reminder by CONICIT. CONICIT retains the right to inspect research work when it considers it opportune and necessary;

- g. That the beneficiary(ies) must inform CONICIT of any discrepancy which arises between estimated and real expenditures as soon as it occurs. In order to assure the project's progress and the continued use of the funds granted, the beneficiary(ies) must submit a quarterly financial statement, according to the guidelines set by CONICIT;
- h. Non-profit making educational and research institutions become owners of the equipment acquired with CONICIT funds if its cost is less than \$2,300. If the cost is greater, CONICIT will retain ownership of the equipment for an eight year period. During that time, the receiving institution is obliged to maintain it in good condition. After a period of eight years, the equipment will be donated to the beneficiary institution. However, any breach of contract on the part of the beneficiary institution(s) in conducting research will abrogate that institutions future claim to the CONICIT purchased equipment;
- j. At no later than sixty calendar days from the termination of the research, the beneficiary must submit a technical report and financial statement, detailing the work accomplished and the results obtained.
- k. The results of all research financed partially or totally by CONICIT will pass to the public domain; all publications arising out of CONICIT funded projects must carry the following inscription, "This work was made possible with the economic assistance of the National Council on Scientific and Technological Research";
- l. CONICIT's board of directors can revoke the funds, either partially or totally, with prior notice to the beneficiary person(s) or institution(s) to whom they have been granted, if and when the terms under which they were granted are violated, the instructions given are not complied with, or the project objectives are jeopardized. Furthermore, the beneficiary(ies) of a grant are obliged to advise CONICIT immediately of any circumstance which may impede the research project's termination;
- m. CONICIT granted funds are non-transferable. If, for whatever circumstance, a project cannot continue, and another person(s) wishes to assume responsibility for it, the substitution possibility must be presented to CONICIT by the beneficiary

and the person(s) wishing to assume project responsibility;

- n. All funds remaining at the project's conclusion must be reimbursed to CONICIT no later than sixty calendar days after project's termination;
- o. Copyrights and patents which may originate as a consequence of CONICIT total or partial project funding will become property of CONICIT. One-third of the royalties generated by the use of copyrights and patents arising out of CONICIT partial or total research project funding will be paid out to the person(s) or entity which undertook the study, and the remaining two-thirds will be distributed between CONICIT and the researcher(s) in proportion to the inputs made by each;
- p. The beneficiary(ies) of CONICIT project funding will bear the sole responsibility for damages to third parties caused by the project's undertaking; and
- q. CONICIT assumes no responsibility for labor matters concerning the researcher(s) or other project participant(s);
- r. CONICIT reserves the right to draw up special obligations when it feels a research project warrants them.

B. Financial Assistance for Short-Term Visits to Costa Rica by Scientists, Researchers, and Professionals.

1. General Provisions

Preference will be given to foreign scientists wishing to participate in research, and not just engage in a teaching activity. The maximum length of a visit is one year. CONICIT will finance up to 75% of the total costs. CONICIT's board of directors will consider the following factors in making a determination on the granting of financial assistance:

- a. Meritorious qualifications of the candidate(s).
- b. Attributes of the petitioning institution.
- c. Scientific value of the proposed project.

d. Activity's importance to Costa Rica.

2. Applications for Financial Assistance

All applications must be received by CONICIT at least three months prior to the initiation of the activity for which the participation of the visiting scientist is being petitioned. The applications must detail a work program, the proposed visitor's curriculum vitae and personal references, the name of the petitioning institution, and the name of the institution's coordinator for the visiting scientist's activities.

3. Obligations of Visiting Participants and Their Institutions

CONICIT may request the visitor's participation in seminars, lectures and/or talks on or about his specialty. The petitioning institution shall submit a report to CONICIT of the visitors' accomplishments. Any publications which resulting from the work done by the participating visitor should acknowledge CONICIT's contribution.

C. Financial Assistance for Travel to and Attendance of Scientific Events

1. General Provisions

CONICIT finances up to 50% of the total costs associated with attendance of a scientific event; it will consider granting a larger percentage in exceptional cases. Petitioners are eligible to receive financial assistance for this activity only once in a given fiscal year.

CONICIT's board of directors will consider the following factors in making a determination on an application for this type of financial assistance:

- a. Meritorious qualifications of the candidate(s).
- b. Candidate's experience in the field of study.
- c. Potential scientific value of the event.

2. Applications for Financial Assistance

All applications must be received by CONICIT at least one month

prior to the initiation of the event which is to be attended.

For attendance of congresses, symposiums, or seminars, all applications must outline the topics to be discussed or presented by the petitioner, and include the petitioner's acceptance to the event by the event's organizing committee. Applications for financial assistance for attendance to short courses must include the course outline.

Furthermore, all applications must include the petitioner's curriculum vitae, his personal references, and a letter from the institution which he would represent. Institutions of higher learning sponsoring a candidate must furnish written approval from the Vice-rector of Research, or its equivalent; other government institutions or ministries must provide approval from their respective highest technical authority.

### 3. Obligations of Participants

The beneficiary of this financial assistance must present a report of the accomplishments and results of the event he attended within one month of his return. He is also obliged to participate in informative talks, lectures, etc. which CONICIT may request. In addition, acknowledgement of CONICIT's contribution must be made in the studies presented at the scientific events as well as in any subsequent publications resulting as a consequence of the event.

## D. Financial Assistance for Post-Graduate Studies

### 1. General Provisions

CONICIT receives applications at any time for financial assistance of post-graduate studies. CONICIT's board of directors, exclusively, will approve or reject applications for financial assistance.

### 2. Applications for Financial Assistance

Any Costa Rican individual may apply for financial assistance from CONICIT. His application must have the endorsement of the highest authority of the institution where he works. Applications must be presented using the forms supplied by CONICIT for that purpose and must be filled out according to instructions. If the applicant does not work in a governmental or autonomous institution, his application will be considered a "special case." Applications which have the backing of governmental or autonomous institutions have preference.

Notification of CONICIT approved financial assistance will be made in writing and will note the terms of the contract, its duration and form of payment.

Applicants should make personal delivery of the documents listed below to CONICIT's offices or mail them to: Departamento de Planificación y Recursos Humanos, CONICIT, Apartado 10.318, San José:

- a. Curriculum vitae (using CONICIT's form).
- b. One passport-type photograph.
- c. Transcripts of all university-level studies completed.
- d. Recommendation letters (using CONICIT's forms).
- e. Photostatic copy(ies) of university diploma(s), record of professional exam(s), certificate of conclusion of professional studies, or other equivalents.
- f. Official acceptance as a full-time graduate student from the institution where applicant wishes to study.
- g. A copy of said institution's official bulletin which clearly specifies tuition, laboratory, student health insurance, and food and housing costs.
- h. If possible, a brief summary of the thesis or dissertation.
- i. The studies program (attach official documentation on courses and subjects if possible).
- j. Supporting documents from the institution where applicant works establishing its endorsement of the candidate and guaranteeing its utilization of applicant's newly acquired skills and training upon his return. In addition, the institution must vouch for the provision of any technical facilities which the returned student may need in developing or applying his new knowledge.
- k. Proof of institutional contribution to candidates expenses and

the exact amount(s).

1. Candidate's publications.
- m. Proof of foreign language proficiency required for his studies abroad or information about language training which he will receive to acquire the appropriate language skills.

The candidate will be called in for an interview by CONICIT subject to presentation of the documents stipulated above.

For those cases in which national, foreign, or international institutions give financial aid to the candidate, CONICIT may give complementary assistance if and when the requirements established by the institutions involved are satisfied.

3. Obligations of Beneficiaries

- a. Upon arrival at the chosen study center, the beneficiary will notify CONICIT of completion of enrollment.
- b. The beneficiary will also render semester reports to CONICIT using the appropriate forms provided by the latter. Noncompliance with these rules on the part of the beneficiary will result in the cancellation of CONICIT's aid.
- c. At any given moment, CONICIT may request reports on the beneficiary from the endorsing institution(s) or directly from him. CONICIT will also evaluate how the beneficiary applies his training after he returns to Costa Rica.
- d. Upon completion of his studies, the beneficiary is bound to continue rendering his services to the institution which endorsed him within his specialty, for a period of time equivalent to two years for every year of study. The beneficiary may work in another government institution, subject to agreement by the parties involved, which will assume all the respective obligations and responsibilities. The beneficiary's transfer in no way affects compliance with his contractual obligations.

- e. Noncompliance with any of the conditions and obligations incumbent on the beneficiary will result in the suspension of the on-going financial assistance or the cancellation of future assistance and will obligate repayment by the beneficiary of CONICIT's total investment made in his studies up to the date of assistance cancellation.

#### 4. Post-Graduate Student Grants

Eligibility for non-refundable student grants will be determined by CONICIT's consideration of the applicant's professional or scientific aptitude, experience, and competence relative to the studies he wishes to undertake. His area of study must fall within the priorities established by the National Plan on Science and Technology. The amount of the grant will be determined by CONICIT's board of directors.

#### 5. Post-Graduate Student Loans

CONICIT's board of directors will determine whether the financial assistance being solicited by a candidate is to be channeled through the Comisión Nacional de Préstamos para la Educación (CONAPE) or through CONICIT's student loan or grant programs.

Eligibility for CONICIT's student loans will be determined in the same manner and on the same basis as that for CONICIT's student grants.

Total repayment of CONICIT student loans must be made within a period of not more than two years beginning with the beneficiary's return to work in the institution which sponsored him for the post-graduate studies. CONICIT post-graduate student loans will draw interest at the rate of 6% per annum, beginning with the date of beneficiary's return to work in the sponsoring institution. The applicant will sign the necessary documents to this effect.

#### 6. Interruption of Studies

An interruption of studies signifies any significant change in the previously established study program not authorized by the educational institution where the studies are being undertaken. Moreover, abandonment of or lack of due attention to the study program will also be understood to mean an interruption of studies. These cases will signify a breach of contract, and

CONICIT then will act accordingly. Only under very limited conditions can an interruption of studies be deemed acceptable and only with prior expressed authorization from the sponsoring institution. Written notification must be made immediately to CONICIT.

E. Financial Assistance for Short-Term Courses and Intensive Training Programs

1. General Provisions

Any Costa Rican or foreign national working in Costa Rica wishing to attend short-term courses or intensive training in Costa Rica or abroad is eligible for CONICIT financial assistance. Short courses, for this purpose, will signify those lasting less than one year, and intensive training will be understood as that lasting less than six months.

CONICIT will finance up to 100% of the total expenses incurred in these activities. For those cases in which national, foreign, or international institutions give partial financial aid to the candidate, CONICIT may complement that assistance. A given candidate may receive CONICIT financial aid only once in a given calendar year.

In making a determination on a given application, CONICIT's board of directors will consider the following factors:

- a. The applicant's qualifications.
- b. The justification for the training presented by the sponsoring institution.
- c. The chosen field of study vis-a-vis CONICIT's priorities, the needs of the country and of the national research or development institutions.
- d. The scientific value of the program with respect to research advancement or technology transference.

2. Applications for Financial Assistance

CONICIT will receive applications for financial assistance for short-term courses and intensive training programs at any time. They must be

delivered to CONICIT, however, at least one month prior to the initiation of the training program to be attended. Applicants must utilize the appropriate forms supplied by CONICIT for this purpose. Preference will be given to those applications bearing the support of governmental or autonomous institutions.

The following documents must be included in the application:

- a. Applicant's curriculum vitae (utilizing CONICIT's forms).
- b. One passport-type photograph.
- c. Official acceptance of the candidate to the course or training program.
- d. Study program (attach official documentation on courses and subjects, if possible).
- e. Certificates of studies completed.
- f. Supporting documents from the institution where applicant works establishing its endorsement of the candidate and guaranteeing its utilization of applicant's newly acquired skills and training upon his return. In addition, the institution must vouch for the provision of technical facilities which the returned student may need in developing or applying his new knowledge.
- g. Proof of the sponsoring institution's contribution to candidate's expenses and the exact amount(s), if such were the case.

3. Obligations of the Beneficiary

The beneficiary of this financial assistance must present a report to CONICIT of the results and accomplishments of the course and/or training in which he participated within one month of his return. He is also obliged to participate in informative talks, lectures, etc., which CONICIT may request.

## INSTITUTIONAL BACKGROUND

### A. CONICIT

CONICIT has 30 full-time employees and a 5-member Board of Directors. The departments within the CONICIT structure which will be involved with the AID/CONICIT Project are the Department of Administration and Finances, the Department of National and International Projects, the Human Resources Department, the Office of the Executive Secretary, Legal Assistance, and Board of Directors. The functions and qualifications of these departments are as follows:

#### 1. Department of Administration and Finances

This department maintains 12 full-time employees. The head of the office is finishing his degree in Public Administration at the University of Costa Rica. This department handles the accounting and administrative matters of CONICIT.

#### 2. Department of National and International Projects

This Office employs 3 individuals who are responsible for research project development. The chief of this office, Jorge Ramírez, holds a B.A. and a M.S. in Zoology. He has completed all requirements for a PhD in Zoology from Ohio State University except for writing his dissertation. After his office deems a proposal sound, it prepares a profile of the proposal for review by the Executive Secretary and the Board of Directors. It also prepares a summary of the evaluations of proposals prepared by independent evaluators for the Board of Directors to use in final project evaluation. Further, the office evaluates the projects financed by CONICIT, coordinates ad hoc commissions set up by CONICIT, and monitors international accords between CONICIT and other institutions. Eight of the ten new employees at CONICIT will work in the Project's Office.

#### 3. Human Resources Department

The Human Resources Department is directed by Federico Vargas. Mr. Vargas holds a PhD in Economics from the University of Colorado. In addition to this position, Mr. Vargas is on the Board of Directors at the University of Costa Rica. Prior to this

position, Mr. Vargas was the Treasurer of Costa Rica. This Office, in charge of short and long-term training, will add two new employees (currently it has three) to assist it in meeting its Project responsibilities. The Office has been in charge of financing post graduate studies, subsidizing the work of Costa Rican scientists who have achieved world prominence, and financed the travel of Costa Rican scientists to international seminars and international scientists to Costa Rica.

4. Executive Secretary

The Executive Secretary, Mariano Ramírez, holds a degree in Economics with a specialty in Statistics. He worked for five years for the Organization of American States in the Office of Scientific Matters. For four years he was the Director of the Planning Department at the University of Costa Rica. The Executive Secretary manages all the offices of CONICIT and reports to the Board of Directors.

5. Legal Assistance

CONICIT uses Dr. Manuel Francisco Umaña, well known for his work in collective bargaining, to assist with contracts and other legal matters.

6. Board of Directors

The Board of Directors makes the final decision on whether to fund a project or not. Their decision relies heavily on the recommendations of the independent evaluators, the Executive Secretary and the Department of National and International Projects. The members of the Board and their specialists are:

Rodrigo Zeledón Araya - D. Sc. Johns Hopkins; President of the Board of Directors; Professor at the University of Costa Rica.

Roberto Murillo Zamora - Ph.D. Philosophy; Dean of the School of Theology at the U.C.R.

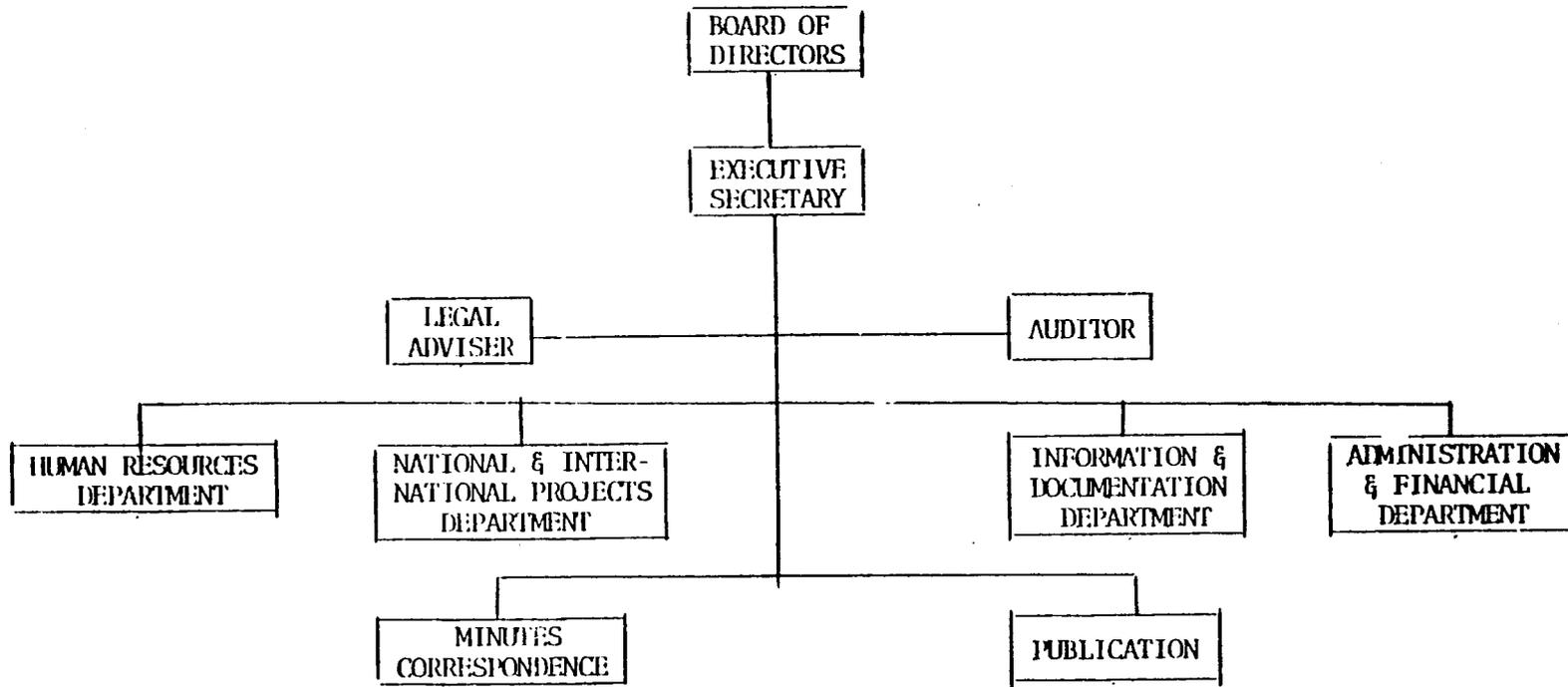
Luis A. Fournier Criggi - Ph.D. Biology; Professor U.C.R.

Ernesto Macaya Ortiz - Chemical Engineer; Consultant to RECOPE (National Refinery).

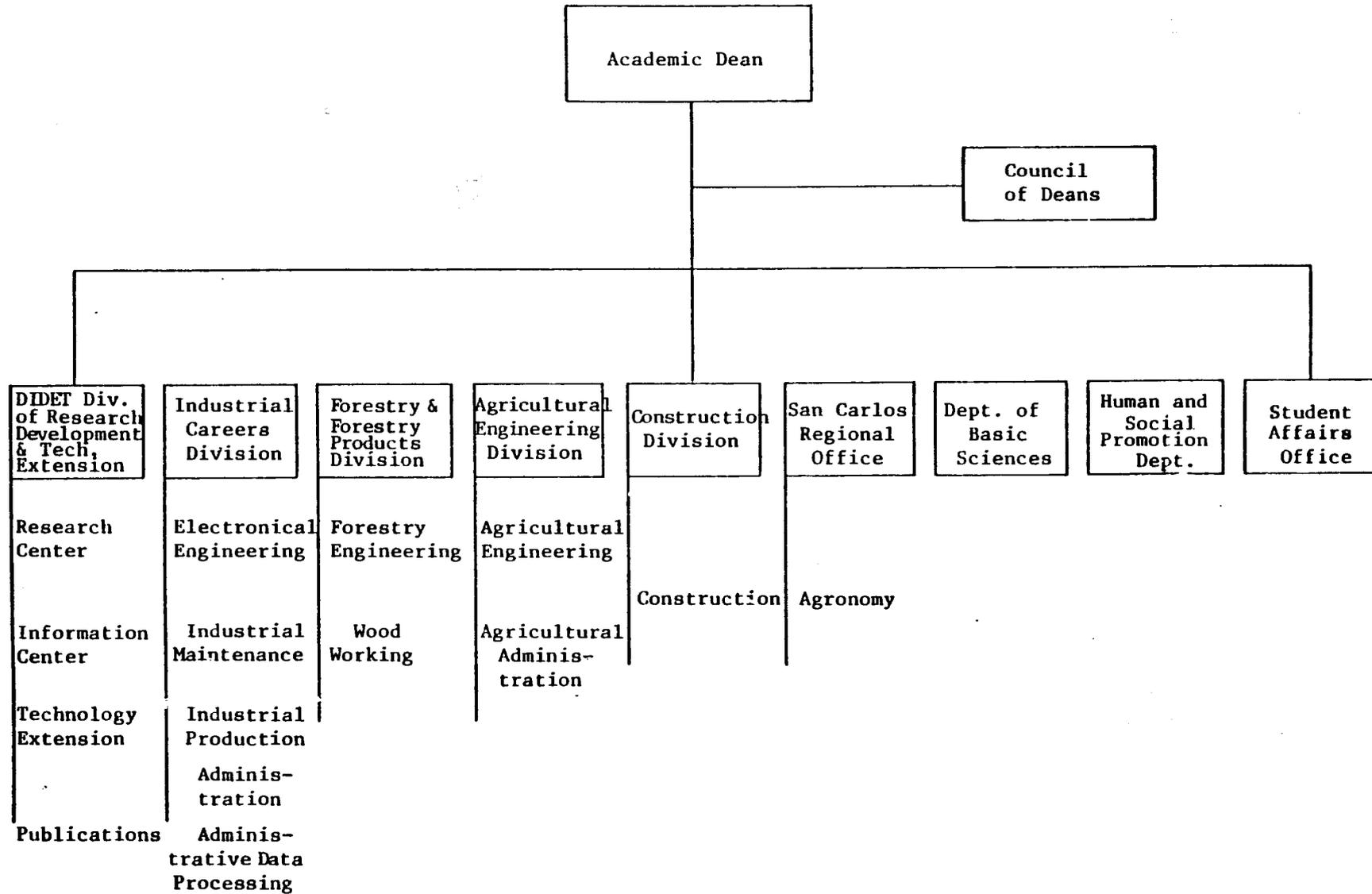
Edgar Mohs Villalta - M.D.; Director of the Children's  
Hospital.

CONICIT was created to establish scientific and technological priorities in the national goals, and to encourage and direct the development of science and technology in Costa Rica. It functions like a combination of the U.S. National Research Council and the National Science Foundation.

ORGANIZATION OF  
NATIONAL COUNCIL FOR SCIENTIFIC AND TECHNOLOGICAL RESEARCH



ORGANIZATION OF THE TECHNOLOGY INSTITUTE OF COSTA RICA



ITCR PERSONNEL

<u>Type</u>	<u>Number</u>	<u>Percentage</u>
Executive office	33	9
Professors	97	25
Non-Teaching Professional Staff	29	7
Technical Staff	41	10
Administrative Staff	28	7
Clerical Staff	32	8
Secretaries	34	9
General Services	<u>98</u>	<u>25</u>
TOTAL EMPLOYED	392	100

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RELATIONSHIP OF THE PROJECT TO ROCAP/ICAITI  
TRANSFER OF TECHNOLOGY PROJECT

Even though ICAITI activities in Costa Rica are quite limited, most of its work being concentrated in Guatemala and El Salvador, good communication channels exist between ICAITI and the principal executing agencies of the Project, ITCR and CONICIT. ICAITI also maintains close ties to its more traditional Costa Rican counterpart, the UCR's Food Research Institute (CITA). In its evaluation of research proposals, CONICIT will routinely check with ICAITI on the research projects it has underway, which may have relationships to the projects CONICIT is considering. The ICAITI representative in Costa Rica routinely coordinates ICAITI small business activities with the ITCR.

The Science and Technology Project will strengthen ICAITI's technology transfer system by improving the identification of technology needs in Costa Rica. A larger extension program at the ITCR and the series of assessments for industrial activities will provide all entities involved in this area with a clearer sense of direction. ICAITI's Costa Rica representative will be requested to comment on the industrial and technology assessments and on the annual CONICIT sectoral research programs. ICAITI's review of the assessments and research programs should help to sharpen the focus of its activities in Costa Rica.

The current ROCAP/ICAITI Transfer of Technology Project as well as the possible future ROCAP/ICAITI appropriate technology activity should attempt to maximize technical backstopping and support for national programs of the type that this Project will establish. The Project has many areas ranging from technology assessment to the backstopping of ITCR extension activities which could benefit from the types of specific expertise that ICAITI may be able to supply.

Schedule of Major Events

<u>DATE</u> <u>1979</u>	<u>ACTIVITY</u>
June	-AID/W authorizes Project.
June	-Project Agreement signed.
July	-CONICIT appoints interim Project Coordinator.
August	-CONICIT hires two new employees for its Human Resources Office.
September	-CONICIT begins graduate student selection process for 1980-1981 school year.
November	-Loan ratified.
December	-CONICIT and GOCR submit CP documentation; CPs met.
<u>1980</u>	
1st. Qtr.	-CONICIT hires permanent Project Coordinator. -CONICIT contracts for Project T.A. -CONICIT hires 5 for Projects Office. -CONICIT begins procurement. -Graduate student English training begins. -ITCR hires 8 new professionals for DIDET.
2nd. Qtr.	-Selection of graduate students commences for 1981-1982. -T.A. arrives and assists in writing scopes of work for industry sector assessment and two technology assessments each in energy and natural resources. -Research projects initiated (4). -Five assessments begin.
3rd. Qtr.	-Five draft assessments reviewed. -Scopes of work written for three assessments.

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- 4th. Qtr.
- Short-term overseas training begins.
  - Three additional assessments begun.
- Scopes of work for 3 assessments written.
- Assessments completed (3).
  - Assessments begun (3).
  - Evaluation of a research entity begins (1).
  - Research Methodology Workshop #1.
  - Assessments completed and reviewed (3).

1981

- 1st. Qtr.
- CONICIT begins design of its research program.
  - CONICIT hires three new people for its Project's Office.
  - Scopes of work for two final assessments written and assessments begun.
  - Selection of 1982-1983 scholarship students.
- 2nd Qtr.
- Research projects initiated (9).
  - Research Methodology Workshop #2.
- 3rd. Qtr.
- Evaluation of research entity.
  - Research Methodology Workshop #3.

1982

- 1st. Qtr.
- Research projects initiated (13).
  - Research Methodology Workshop #4.
- 3rd. Qtr.
- Research Methodology Workshop #5.
  - In-depth Project Evaluation.
  - Research Methodology Workshop #6.

1983

- 1st. Qtr.
- Research projects initiated (16).
  - Assessment updates/re-design of research program.
  - Research Methodology Workshop #7.

1984

1st. Qtr.

-Research projects initiated (16).

2nd. Qtr.

-In-depth end of Project Evaluation.  
-Project Assistance Completion Date  
(June 29).

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