PD-AAI-150

527-0244

UNCLASSIFIED

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

PERU

PROJECT PAPER

UPPER HUALLAGA AGRICULTURAL DEVELOPMENT

AID/LAC/P-082

Loan Number: 527-T-077
Project Number: 527-0244

UNCLASSIFIED

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

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

Amendment Number: ______

DOCUMENT CODE: 3

2. COUNTRY/ENTITY: PERU

3. PROJECT NUMBER: 527-0244

4. BUREAU/OFFICE: LA 05

5. PROJECT TITLE (maximum 40 characters): Upper Huallaga Agricultural Development

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM DD YY — 9 30 86

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)

A. Initial FY 81 B. Quarter 4 C. Final FY 86

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

A. FUNDING SOURCE	FIRST FY 81 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	5,058	10,692	15,750	7,211	10,789	18,000
(Grant)	(750)	(-)	(750)	(2,903)	(97)	(3,000)
(Loan)	(4,308)	(10,692)	( )	(4,308)	(10,692)	(15,000)
Other U.S. 1.						
Other U.S. 2.						
Host Country	-	8,500	8,500		8,500	8,500
Other Donor(s)						
TOTALS	5,058	19,192	24,250	7,211	19,289	26,500

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	C. 2. Loan	D. OBLIGATIONS TO DATE 1. Grant	D. 2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	E. 2. Loan	F. LIFE OF PROJECT 1. Grant	F. 2. Loan
(1) FN	233		000			750	15,000	3,000	15,000
(2)									
(3)									
(4)									
TOTALS						750	15,000	3,000	15,000

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 010 | 060 | 080

11. SECONDARY PURPOSE CODE

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

A. Code	BR	BF	BS				
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

To strengthen public sector agricultural support services and to develop and test agricultural production packages in the upper Huallaga region of the Peruvian high jungle.

14. SCHEDULED EVALUATIONS

Interim MM YY 12 82, MM YY 12 83; Final MM YY 8 86

15. SOURCE/ORIGIN OF GOODS AND SERVICES

[X] 000 [X] 941 [X] Local [ ] Other (Specify) ______

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

17. APPROVED BY

Signature: Howard Lusk

Title: Acting Director

Date Signed: MM DD YY 8 13 81

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

AID 1330-4 (8-79)

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT

LAC/PR-P-082

PROJECT AUTHORIZATION

Name of Country:	Peru
Name of Project:	Upper Huallaga Area Development
Number of Project:	527-0244
Number of Loan:	527-T-077

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Upper Huallaga Area Development project for Peru (the "Cooperating Country") involving planned obligations of not to exceed Fifteen Million United States Dollars ($15,000,0000) in loan funds ("Loan") and Two Million United States Dollars ($2,000,000) in grant funds ("Grant"), over a six (6) year period from date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project.

2. The project ("Project") consists of developing and applying agricultural production packages and strengthening public sector agricultural support services, in coordination with the Peruvian coca-eradication program in the Upper Huallaga region of the Peruvian high jungle. The Project elements consist of (i) carrying out adaptive research to determine the agronomic, economic and socio-cultural feasibility of agricultural technology packages; (ii) expanding and upgrading existing extension services; (iii) upgrading the National Agrarian University of the Jungle (UNAS) training capacity for agricultural scientists; (iv) providing short and medium-term credit; (v) strengthening farm production activities, such as establishment and improvement of land registration activities, grain storage facilities, and agriculture and resource information; (vi) improvement of road maintenance; and (vii) provision of potable water and related sanitary facilities.

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

a. Interest Rate and Terms of Repayment

The Cooperating Country shall repay the Loan to A.I.D. in U.S. Dollars within twenty-five (25) 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 U.S. Dollars interest from the date of first disbursement of the Loan at the rate of (i) two percent (2%) per annum during the first ten (10) years, and (ii) 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 (Loan)

Goods and services, except for ocean shipping, financed by A.I.D. under the Loan shall have their source and origin in the Cooperating Country or in countries included in A.I.D. Geographic Code 941, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Loan shall be financed only on flag vessels of the Cooperating Country or of countries included in A.I.D. Geographic Code 941, except as A.I.D. may otherwise agree in writing.

c. Source and Origin of Goods and Services (Grant)

Goods and services, except for ocean shipping, financed by A.I.D. under the Grant shall have their source and origin in the United States, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Grant shall be financed only on flag vessels of the United States, except as A.I.D. may otherwise agree in writing.

d. Conditions Precedent to Initial Disbursement (Loan and Grant)

(1) Prior to any disbursement or to the issuance of commitment documents under the Project Agreement, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that

(i) it has committed itself to a coca-eradication program in the Upper Huallaga Valley satisfactory in form and substance to the United States Government; and

(ii) it has established a Special Project Office in the Office of the Prime Minister for the Upper Huallaga Area Development Project and that it has named a Project Director acceptable to A.I.D.

(2) Condition Precedent to Disbursement to Finance Research Activities

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance research activities under the Project, except those technical assistance activities necessary to prepare an operation plan for research and except for the procurement of vehicles, including trailbikes, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., an operating plan for research.

(3) Condition Precedent to Disbursement to Finance Extension Activities

Prior to any disbursement, or the issuance of commitment documents under the Project Agreement, to finance extension activities under the Project, except those technical assistance activities necessary to prepare an operation plan for extension and except the procurement of vehicles, including trailbikes, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., an operation plan for extension.

(4) Condition Precedent to Disbursement to Finance Activities for UNAS

Prior to any disbursement, or the issuance of commitment documents under the Project Agreement, to finance activities for UNAS, other than technical assistance activities necessary to prepare a procurement and training plan for UNAS, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., a procurement and training plan for UNAS.

(5) Condition Precedent to Disbursement to Finance Agricultural Credit Activities

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance agricultural credit activities except technical assistance, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence of a program in the Agrarian Bank for sublending for agricultural credit under the Project, including a description of procedures, administrative responsibilities, eligibility criteria and sublending terms and conditions.

(6) Condition Precedent to Disbursement to Finance Land Registration Activities

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance land registration activities, except for the procurement of vehicles, including trailbikes, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., an operation plan for land registration and a plan for the establishment of land registration office(s).

(7) Condition Precedent to Disbursement to Finance Grain Storage Activities

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance grain storage activities, other than technical assistance, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., engineering operation and procurement plans for grain storage facilities and an agreement between Empresa Nacional de Comercializacion de Insumos (ENCI) and the Special Project Office which shall allow the sale of fertilizer at market prices in the Project area.

(8) Condition Precedent to Disbursement to Finance Road Maintenance Activities

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance road maintenance activities under the Project, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., a procurement plan and operation plan for road maintenance.

(9) Condition Precedent to Disbursement to Finance Potable Water and Environmental Sanitation Activities

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance potable water and environmental sanitation activities except for the procurement of vehicles, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., an agreement between the Special Project Office and the Ministry of Health which includes a procurement plan and an operation plan for potable water and environmental sanitation activities under the Project.

e. Covenants

The Cooperating Country shall covenant, except as A.I.D. may otherwise agree in writing that:

(1) The principal Special Project Office shall be located in Tingo Maria.

(2) Not to exceed $5.5 million of A.I.D. loan and grant and Government of Peru counterpart funds will be spent for road maintenance activities under the Project.

(3) Not to exceed $250,000 of A.I.D. Loan and Grant and Government of Peru counterpart funds will be spent for the development and/or updating of natural resources surveys, cadaster surveys, or topographic mapping.

(4) Instituto Nacional de Investigacion y Promocion Agricola (INIPA) will make arrangements acceptable to A.I.D. for personnel from UNAS for research, extension, and training assistance.

(5) It shall maintain or cause to be maintained all infrastructure and equipment financed under the Project.

(6) It will carry out its commitments pursuant to the documentation provided in satisfaction of the Condition Precedent set forth in paragraph 3.d.(1)(i) relating to coca-eradication and otherwise use its best efforts to eradicate coca production in the Project area.

f. Waiver

The following waiver to A.I.D. regulations is hereby approved:

A.I.D. source, origin and nationality requirements are hereby waived. to allow procurement of up to 70 125 cc trailbikes, whose source and origin and nationality is in any country included in A.I.D. Geographic Code 935. In so doing, I hereby certify that exclusion of procurement from Free World countries other than the Cooperating Country and countries included in Code 941 would seriously impede attainment of U.S. foreign policy objectives and objectives of the foreign assistance program.

g. Procurement Approvals

(1) I hereby approve the proprietary procurement of up to 70 Honda trailbikes for the Project pursuant to the authority in 41 C.F.R. Sec. 7-3.101-50(b)(3).

(2) I hereby approve proprietary procurement of vehicles and road maintenance equipment financed under the Project, after an initial competitive procurement to assure interchangeability and standardization of vehicles and of equipment, pursuant to the authority in 41 C.F.R. Sec. 7-3.101-50(b)(3).

M. Peter McPherson
Administrator

Sept 8, 81
Date

Clearances:

GC:JRBolton: ____ date 9/15/81
AAA/LAC:DLazar: ____ date ____
A/AA/PPC:LSmucker: ____ date ____
AAA/SER:JFOwens: ____ date ____

GC/LAC:BVeret:ckg:8/27/81:x23272

PROJECT PAPER

UPPER HUALLAGA AGRICULTURAL DEVELOPMENT

Table of Contents

Page

Page

ANNEXES

I. Legal Exhibits
  A. 611(e) Certification
  B. Application Letter
  C. Draft Authorization
  D. Statutory Checklist
  E. I.E.E.

II. Technical Exhibits
  A. The Development of Tropical Lands
  B. Log Frame
  C. Implementation Plan
  D. Potable Water and Environmental Sanitation
  E. Environmental Assessment
  F. Road Maintenance
  G. Data Tables and Related Notes
  H. Agricultural Credit
  I. Institutional Analysis
  J. Grain Storage

III. Unattached Exhibits (On file USAID/Peru and LAC/DR)
  A. PID Approval Cable
  B. F.N.C. Final Report
  C. INM Eradication Project
  D. Social Analysis Background

ABBREVIATIONS USED IN THIS PAPER

ASF - Area Sample Frame
BANCOOP - National Cooperative Bank
CAP - Agricultural Production Cooperative
CAS - Agricultural Services Cooperative
CEPLAC - Brazilian Cacao Research Center
CIAT - International Tropical Agriculture Center
CIMMYT - International Center for Improvement of Corn and Wheat
CIP - International Potato Center
CIPA - Agricultural Research and Promotion Center
COFIDE - Development Finance Corporation
DSE - Office of Sanitary Engineering
EA - Environmental Assessment
ECASA - Rice Marketing Enterprise
ELECTROPERU - Electricity Enterprise of Peru
ENACO - National Coca Marketing Enterprise
ENCI - National Agricultural Input Marketing Enterprise
ENDEPALMA - National Palm Oil Marketing Enterprise
FAS - Foreign Agricultural Service
FDN - Foundation for National Development
ICO - International Coffee Organization
IDB - Interamerican Development Bank
INAF - National Institute for Development of the Agricultural Frontier
INDA - National Institute for Agroindustrial Development
INIPA - National Agrarian Research and Promotion Institute
INFOR - National Institute of Forestry
INM - International Narcotics Matters
LASPAU - Latin American Scholarship Program for American Universities
MA - Ministry of Agriculture
MTC - Ministry of Transportation and Communications
MOH - Ministry of Health
OGCR - National Rural Cadaster Office
ONERN - National Office of Natural Resource Evaluation
OSE - Ministry of Agriculture, Sector Statistics Office
PEAH - Upper Huallaga Special Project Office
PIP - Peruvian Investigative Police
REDINAA - Agricultural Research Network for the Amazon
SAN - National Aerial Photographic Service
SCIF - Interamerican Cooperative Support Service
USDA - United States Department of Agriculture
UNAS - National Agrarian University of the Jungle
UNDP - United Nations Development Program

PART I. PROJECT SUMMARY AND RECOMMENDATIONS

A. Face Sheet (attached)

B. Recommendations

1. It is recommended that a loan be authorized to the Government of Peru (GOP) in the amount of $15,000,000 with a 25-year term including a 10-year grace period, and at 2% interest during the grace period and 3% thereafter.

2. It is recommended that a grant be approved in the amount of $3,000,000 to be incrementally obligated as follows:

a. FY 82 - $750,000

b. FY 83 - $750,000

c. FY 84 - $500,000

d. FY 85 - $500,000

e. FY 86 - $500,000

C. Summary Background

1. Area and Population

The Project Area is located in the central high jungle and is principally between the towns of Tingo Maria, in the department of Huanuco, and Puerto Pizana which is 180 Km downriver in the department of San Martin. The land area is estimated to be about 875,000 ha some 3,400 square miles; it is estimated that 70,000 ha are suitable for intensive agricultural activity.

In 1972, a censal year, the total population of the area was 76,606. The 1981 population, based upon intercensal period growth projections and observations of migration patterns, is about 120,000 persons. This will be confirmed when 1981 census data are available.

2. Agricultural Systems

The valley lands are cultivated primarily in crops (plantains, cassava, citrus, palm and pastures), or are in fallow for soil fertility restoration and/or pest control. The sloping soils of the surrounding terraces and hills are cultivated in a patch-work pattern of annual and perennial crops (including coca) and natural forest. Further east and west, away from the Huallaga River valley floor, steeply sloping soils remain predominantly in forest cover.

Survey data and direct observations suggest five distinct types of agricultural systems in the Project Area. These are: (a) small to medium-sized entrepreneurial farms of six hectares or more, invariably situated on the most fertile and level soils, which focus on intensive cultivation of rice, corn, plantains, cacao, citrus and coffee; (b) livestock (beef) production; (c) plantations (palm oil and tea); (d) forest extraction; and (e) a sub-group of coca producers (cocaleros) who do not plant this crop in association with other significant farm activities.

A wide range of estimates of area in coca leaf cultivation exists. The Project Committee, examining available data, believes that the maximum figure is about 12,000 ha. The implications of this estimate are about 4,000 ha of coca within the area which were sub-divided and titled as a result of previous colonization and about 8,000 ha outside of the titled area. Survey evidence suggests that coca cultivators within the titled areas plant coca as part of a diversified farming system, whereas cultivators outside the titled areas, which are more remote and steeper lands, tend to plant coca as a monoculture.

3. Agricultural Services

Services provided either by the GOP or private sector are generally deficient in the upper Huallaga area. While there exists evidence that in fact this is a nationwide phenomenon and not peculiar to the Project Area, it is nonetheless vital to Project implementation that these services be upgraded.

a. Output Marketing

Two GOP entities, the National Agricultural Input Marketing Enterprise (ENCI) and the National Rice Marketing Enterprise (ECASA), are charged with the purchasing of corn/soybeans and rice, respectively. Both organizations pay farmers after delivery and delays in payment are up to two months. Storage facilities for grains are clearly inadequate, and an estimated 15-21% of grain is lost due to insects or fungus, or rejected by purchasing agents due to high moisture content. The major marketer of coffee and cacao is the Naranjillo Agricultural Services Cooperative, located in Tingo Maria. In the case of coffee, Naranjillo sends the product to the Central Cooperative in Lima which undertakes final processing. ENCI then is charged with final marketing, and Naranjillo receives payment about three months after export. In regard to beef, the area has no refrigerated storage, feed-lot operations, nor an organized market for beef. Most other crops appear to be exported from the region by means of independent truckers and without a system of well-organized marketing information.

b. Input Marketing

The demand for purchased inputs other than labor is generally low in the area. For example, survey results indicate that seed or plantstock are purchased by 27% of the corn farmers, 38% of rice farmers and 16% of cassava farmers. Other annual and perennial crops show similar trends. The lack of demand for purchased inputs is reflected in the small number of outlets for agricultural inputs. In Tingo Maria, there are three private input suppliers. The CAS[1] Naranjillo, and ENCI supply fertilizers.

c. Credit

The Agrarian Bank of Peru, the state agricultural development bank, has a full-service branch office in Tingo Maria with agency offices in Aucayacu and Tocache. In 1980 the Bank, made 1280 loans with a total value of about US$4.8 million for financing 6,653 ha of crops and other agricultural purposes. An informal credit system functions mainly among those farmers just beginning to produce coca. Interested buyers reportedly finance start-up costs at no interest. This financing is probably repaid in an assured supply of coca leaf to cocaine paste producers.

d. Extension and Research

Both of these activities suffered a great deal of neglect during the twelve years of military government. With an estimated 6,000 farm families in the area, the ratio of extension personnel to farmers is approximately one extension agent to 128 farmers. Extension outreach has been further hampered by the lack of vehicles and operating expenses for gasoline and other costs, a lack of extension materials, and a lack of in-service training programs to upgrade the extension agent's limited skills.

The Tulumayo Experimental Station, located about midway between Tingo Maria and Aucayacu, contains some 10 ha planted in experimental crops. It currently operates with a reduced staff of five researchers, four technicians and a crew of laborers. It does not have adequate research laboratory facilities nor field equipment.

The National Agrarian University of the Jungle (UNAS), while lacking adequate teaching laboratory and research facilities, has been working to upgrade their applied research and extension program over the past two years with the assistance of a U.S. Embassy/INM grant. Under this grant, UNAS is conducting an adaptive research/extension program at eleven pilot centers in the Project Area. INM is also financing a program under which UNAS provides cacao and citrus seedlings to farmers interested in switching from coca to other crops.

1/ Agricultural Services Cooperative

4. The Coca Inquiry

Coca is a perennial shrub grown on well drained soils in the upper Huallaga region. It is an extremely hardy plant which can grow on poor soils at elevations up to 1,000 meters. Coca seeds are planted in seedbeds and tended for about three months prior to being transplanted to the field. Production begins when the plants are approximately 18 months old. Coca fields as old as 40 years have been reported, but the age of maximum production is believed to be between three and seven years. Available information suggests wide variations in price, costs of production, and productivity of coca leaf. While there have been major fluctuations in all of these, prevailing estimates indicate an annual gross value of production of $4,000 per ha, a profit of $2,000 per ha ($800 an acre), and an annual return to capital of about US$3,000. Additional benefits for coca producers are that it grows on lands not suited agronomically nor economically to non-forest crops and the final product is easy to transport.

In 1962, it is estimated that less than 1,500 ha were planted in coca. By 1972, coca cultivation was still less than 3,000 ha. During the 1973-75 period, a major expansion was underway as laborers contracted by stable farm operations to pick and cultivate coca began entering the Project Area to grow their own coca. Rapid expansion of coca cultivation during the 1970's brought about immigration of people to the Project Area. Higher incomes as a result of coca, accompanied by increased purchasing power, have provided a major boom to the regional economy, as witnessed by strong expansion of commercial activity in the towns of Tingo Maria and Aucayacu.

D. Summary Rationale/Strategy/Constraints

1. Summary Rationale

The Project rationale consists of financing a development effort in the upper Huallaga region as part of AID's overall high jungle strategy, and to minimize the negative social and economic effects of an INM-financed program of coca eradication. The AID development Project will be carried out concurrently, but separately, from the eradication program, and has been designed to meet normal AID Project development criteria, i.e. environmental, social, financial, economic and technical requirements. The direct beneficiaries of the Project are the 6,000 farm families on the valley floor of the Project Area, of which approximately one third are presently growing coca.

During the intensive Project review, information was developed that clearly demonstrated that expansion and diversification of the region's agricultural production base have been constrained by the lack of developed crop and crop system technologies. It was determined that a project which emphasized research and testing of these technologies and crops, as well as adequate extension and other agricultural support services, would be needed to address these constraints and allow for a shift from current production patterns to new sustainable agricultural production technologies suitable not only for the Project Area but for other high jungle areas of Peru as well. Thus the rationale is significant for the immediate Project Area, and for the entire high jungle, where, following the Mission's CDSS strategy it is believed that the development of much-needed zone-specific agricultural production information will lead to significant GOP investment in developing agricultural infrastructure.

2. Summary Strategy

The CDSS cites the promotion of sierra and high jungle economic growth as one of the key components of the Mission's overall development strategy, and in recent years AID has strongly supported the GOP's efforts to provide critical infrastructure, research, and human resources which are needed to upgrade the high jungle. These efforts, which include the Sub-Tropical Lands (Huallaga Central) and the proposed Central Selva Resource Management Development Projects, are directed toward increasing real levels of food production as well as increasing Peru's productive base, which currently supports one of the lowest per capita ratios of arable land to inhabitant in the hemisphere. The proposed Project seeks to complement ongoing high jungle development projects by adding to the knowledge of production technologies appropriate to the particular ecological and agronomic conditions of these areas. Simultaneously it will complement GOP and USG efforts to eradicate illicit coca production by providing upper Huallaga area farmers with the means of generating income and employment through increased agricultural production.

3. Constraints to Regional Development

A series of constraints to regional economic development exist, and must be addressed if the various Project sub-components are to be carried out in an expeditious and rational manner. These are discussed in the Project Paper, and include: (a) constraints related to physical environment and location; (b) constraints related to the agronomics, market conditions, and state of public sector agricultural services; (c) constraints associated with the expansion of agricultural production; (d) lack of trained human capital in the region; and, (e) social constraints which will be occasioned by the disruption of the current mainstay of the region's economy, i.e. coca production and marketing. While the Project Committee is fully cognizant of the implications of all of these constraints, it believes that the Project as now designed will be able to deal with them in an effective way, and that goals and purposes will be achieved.

E. Summary Project Description

1. Project Goal and Purposes

The goal of the Project is to increase and diversify agricultural production in the Peruvian high jungle.

The purpose is to strengthen public sector agricultural support services and to develop and test agricultural production packages in the Upper Huallaga region of the Peruvian high jungle.

2. Project Activities

The Project consists of developing and applying agricultural production packages and strengthening public sector agricultural support services, in coordination with the Peruvian coca-eradication program in the Upper Huallaga region of the Peruvian high jungle. The voluntary coca eradication program is currently underway, and the INM financed compulsory program will start early FY 82 and will be complemented by the AID development effort also scheduled to begin during early FY 82. Project activities detailed below will be supervised and coordinated by the Upper Huallaga Special Project Office which will operate under an administrative mechanism similar to that of the Project Office for the AID-funded Sub-Tropical Lands Development Project (as described in the Institutional Analysis, Section IV. B.1). In order to carry out various elements of the Project, the Upper Huallaga Special Project Office will enter into agreements with several agencies of the GOP.

a. Research, Extension, and Training

The Project will finance activities designed to redevelop the human resources of institutions involved in agricultural research, extension and training in the upper Huallaga area. Professionals will be prepared, research activities resumed, and an effective extension program established to increase agricultural production. Research and extension centers will generate new technical information, interchange that information with other research centers of the jungle collaborate on research to reduce duplication, and improve the delivery of technological packages and assistance to the farmer. The Project will finance adaptive research by INIPA, to be centered at the existing Tulumayo Experimental Station. Two sub-stations within the Project Area will be reinforced to carry out adaptive research on sub-region specific crops. New personnel will be brought in at all these levels. In order to link INIPA more closely to the professional pool at UNAS, 15 UNAS professors will participate in the research planning, experimental design and implementation.

The extension component will be organized so as to facilitate the rate of adaption of new farming methods both existing and those to be developed under the research program. The main extension office will be based at the Tulumayo Experimental Station to promote interaction between the research and extension staffs located there. Extension teams will be recruited and trained to work on specific commodities, and will be responsible for establishing demonstration plots to test fertility levels and improved crop varieties, introduce new cultural practices, provide technical assistance, and develop a profitable livestock program. Eight UNAS profesors will participate in the extension program as commodity specialists.

The objective of the training program is to strengthen the capacity of UNAS to prepare professionals with appropriate skills for employment in the Tingo Maria area as well as other parts of the jungle. The major emphasis will be to improve the basic science program and four academic degree programs. This will be accomplished through advanced degree and short-term non-degree training for UNAS faculty members, short-term technical assistance to the university, upgrading of teaching laboratories and the library, involving students in ongoing INIPA research programs, and supporting student clubs (e.g. agronomy club) which allow students to gain practical experience in areas of common interest.

b. Agricultural Credit

The Project will establish an agricultural credit fund for the upper Huallaga area to be implemented primarily through the Agrarian Bank. Credit funds to form a special account for lending in the area will be made available to the Agrarian Bank as a direct transfer by the GOP to the Bank's working capital. Reflows will go back into this account and the GOP will covenant to maintain the value of the fund at the original dollar level.

c. Farm Production Services

The Project will finance activities in land registration and input and output marketing. The current land tenure situation in the area is complex and disorganized. Land titling activities have been carried out on several opportunities. The Project will establish land registry offices in the Project Area which will have the initial function of regularizing documents for landholders who do not have the proper documents. Continuing functions will include recording changes of title and the gradual incorporation of untitled land units.

The objective of the input and output marketing services component is to insure that farmers' needs are served more efficiently, on the grounds that a system that provides fair, secure and rapid payments to farmers and which makes critical inputs available in a timely manner will help provide an appropriate incentive structure for the adoption of technologies recommended by extension agents. Four specific activities will be undertaken: (a) improvement of grain storage and handling capacities; (b) an input marketing center will be established in Tocache in conjunction with ENCI's existing storage facilities; (c) a rice certification program will be established to make improved seed varieties more widely available in the Project Area; (d) lime, which is needed to counteract soil acidity, will be produced on an as-needed basis by the Ministry of Transport and Communications in conjunction with its road maintenance activities and, (e) an agroindustrial promotion unit.

d. Development and Interpretation of Resource Information

The objectives of this Project component are threefold: (1) to provide the basis for accurate measurement of

Project impact; (2) to provide a continual flow of information to Project managers to assist in implementation; and, (3) to provide the basis for rational future policy and investment planning. This element contains two levels of activity: basic resource information and statistical interpretation. The former will include completion of land use capability maps and a cadaster survey of areas not currently covered; the latter will include the upgrading of interpretive capability through the introduction of an area sample frame technology and other statistical measuring techniques needed to interpret basic resource data being developed.

e. Road Maintenance

The Project will provide assistance to the Ministry of Transport and Communications in three areas: (1) assistance designed to improve the MTC's ability to plan for road maintenance; (2) assistance in maintaining the Marginal Highway from Tingo Maria to Puerto Pizana and in upgrading and maintaining 290 Km of feeder roads; and (3) upgrading and equipping of the MTC maintenance center at Huaymanga, near Tocache.

f. Potable Water and Environmental Sanitation

An estimated 60 communities in the Project Area will be provided with potable water services. Where feasible, public sanitary units including basins for washing clothes, public taps, and public showers will be constructed. Latrines will be constructed in public buildings (schools, health posts, and community centers) and in individual homes. Where gravity-fed systems are not feasible, the Project will finance the installation of wells. System maintenance and community education will form an integral component of this Project element.

F. Summary Financial Plan (Thousands of U.S. Dollars)

	Total	Loan	Grant	GOP
1. RET				
A. Research	4,410	1,464	970	1,976
B. Extension	4,117	1,581	465	2,071
C. Training	2,104	853	608	643
RET Long-term Specialist	400	-	400	-
2. Agricultural Credit	5,000	4,800	200	-
3. Farm Production Services	1,276	1,088	14	174
4. Development & Interp. of Resources Information	656	164	98	394
5. Road Maintenance	5,000	3,000	-	2,000
6. Potable Water	250	250	-	-
7. Project Office	612	370	-	242
8. Inflation & Contingencies	2,625	1,430	195	1,000
	26,500	15,000	3,000	8,500

G. Summary Findings

The Project Committee has concluded that the Project is technically, economically, environmentally, and socially feasible. The GOP is committed to Project objectives of furthering high jungle development as well as minimizing potential agricultural dislocations resulting from the planned coca eradication program in the upper Huallaga area.

II. BACKGROUND

A. Country Setting

Peru is the third largest country in South America, with a land area of 1.3 million square kilometers. It is located south of the equator on the west coast of South America and is bordered by Ecuador and Colombia to the north, Brazil to the east, Bolivia and Chile to the south, and the Pacific Ocean along its 2,253 km coastline. The country is sharply divided into three geographic regions and the distinct characteristics of these regions have a pervasive influence on national life.

The coastal strip, 16-160 km wide, occupies 11% of the national territory, is arid and semiarid, and is uninhabitable and uncultivable except in river valleys that are irrigated by using the waters of the 50 rivers that flow to the Pacific. Forty % of the national population lives in these coastal river valleys; and much of the agricultural, industrial, and commercial activity is centered along the coast. Sugar cane and cotton are the major cash crops of the coastal area, but a wide variety of other crops also are cultivated in this region. Temperatures on the coast are mild, and rainfall is negligible.

The sierra region, formed by the Andes mountain chain which runs north-south through the length of Peru, is about 120 km wide, and occupies 27% of the land area. Climate varies within the sierra region, ranging from temperate to frigid. There are dry and wet seasons. Rainfall exceeds 100 inches a year on the eastern slopes of the mountains. About 50% of the population, predominantly Indian, lives in the sierra, and is engaged primarily in subsistance agriculture. The major deposits of mineral wealth are in the Andes. The sierra region poses formidable barriers to transportation and communication.

The selva region of rainforests, hills, and tropical jungle comprises over half of Peru's land area. This region is sparsely populated and largely underdeveloped. Communication and transportation within this region are extremely difficult. The area is served by airlines and the major surface transportation routes are waterways which empty into the Amazon river. The climate is tropical, humid and warm with abundant rainfall. The high jungle (ceja de selva) is more suitable for agriculture. Commercial lumbering and cultivation of coffee, bananas, yucca, cocoa, rice, corn and tropical and citrus fruits occur in this area.

B. Project Setting

1. General

a. Project Area

The Project is located in the central high jungle of Peru about 350 km northward from Lima (see Map N° 1). It is situated along the upper portion of the south-to-north flowing Huallaga River and lies principally between the towns of Tingo Maria in the Department of Huanuco and Puerto Pizana which is 180 km downriver in the Department of San Martin. The east and west limits of the Project Area follow the Huallaga Valley along the 1,000 meter and 2,000 meter contour elevations respectively. The southern limit is at a bridge 25 km south of Tingo Maria, and the northern limit is at the Puerto Pizana bridge, about 25 km north of the town of Tocache.

The land area within these irregular limits is estimated at 876,650 ha, approximately 3,400 square miles. 1/ For purposes of gathering and compiling information the Project Area was divided into five zones. These zones are listed below from south to north along with area specified in ha as follows (with area in ha in parentheses): Tingo Maria (165,500), Aucayacu (193,973), La Morada (105,000), Uchiza (259,590), and Tocache (152,587). The general location of the Project to towns in adjacent high jungle and sierra areas is shown on Map N° 2. The towns of Campanilla, Juanjui, Tarapoto, Moyobamba, and Yurimaguas lie to the north; Huanuco is to the south in the sierra, and Pucallpa is to the east in the low jungle on the Ucayali River.

b. Population

The total population of the Project Area amounts to 76,606 persons in 1972, a censal year. The 1981 population is as yet unknown; a population and a housing census was executed on June 28-30 in Peru, but the results will be unknown for some months yet. The total population, urban and rural, in 1972 estimated to conform with the Project Area as shown on Map N° 3 is as follows:

	Urban	Rural	Total
Tingo Maria	14,917	21,795	36,712
Aucayacu	4,842	15,333	20,175
La Morada	--	2,416	2,416
Uchiza	1,994	5,145	7,139
Tocache	4,372	5,792	10,164
Total	26,125	50,481	76,606

1/ Note: This area does not include 195,560 ha between Puerto Pizana and Campanilla. That was included in the PID.

Five towns accounted for 83% of urban population in 1972. Going from south to north these towns, their 1972 population and zonal locations are as follows:

Town	1972 Population	Zone
Tingo Maria	12,198	Tingo Maria
Aucayacu	3,908	Aucayacu
Nuevo Progreso	1,000	Uchiza
Uchiza	985	Uchiza
Tocache	3,484	Tocache

The only zone for which reasonably valid post - 1972 population data exist is Aucayacu. In 1978 a census conducted for educational purposes indicated a total population of 30,843, an increase of 7.3% p.a. from the 1972 population of 20,175 for the same area. Indicated growth of population from the 1961-1972 intercensal period disaggregated by zone and urban and rural components (which also involves several assumptions due to alterations in boundaries) produces a 4.7% p.a. growth rate for population in the Project area and an estimated 1980 population of 110,867 persons. Projections based upon the 1961-1972 intercensal period are probably misleading. For example, the coca boom which has affected the Tingo Maria and Aucayacu zones suggests that the 1.6% p.a. growth rate for the Tingo Maria zone is too low and that intercensal-projected 1980 estimates of urban populations in Tingo Maria (18,532) and Aucayacu (7,800) are also probably too low. 1/

C. Transportation

The four major means of transport in the region are (1) paved and unpaved roads, (2) scheduled and charter commercial aircraft, (3) river navigation, and (4) footpaths.

Roads

The Central Highway crosses the Andes linking the Amazon Basin, the Andean Altiplano, and Lima. This all-weather road, which passes through Tingo Maria, should be entirely paved within the next year. It is the principal means of transport between the Huallaga Valley and other regions of Peru. Tingo Maria is 565 km by road from

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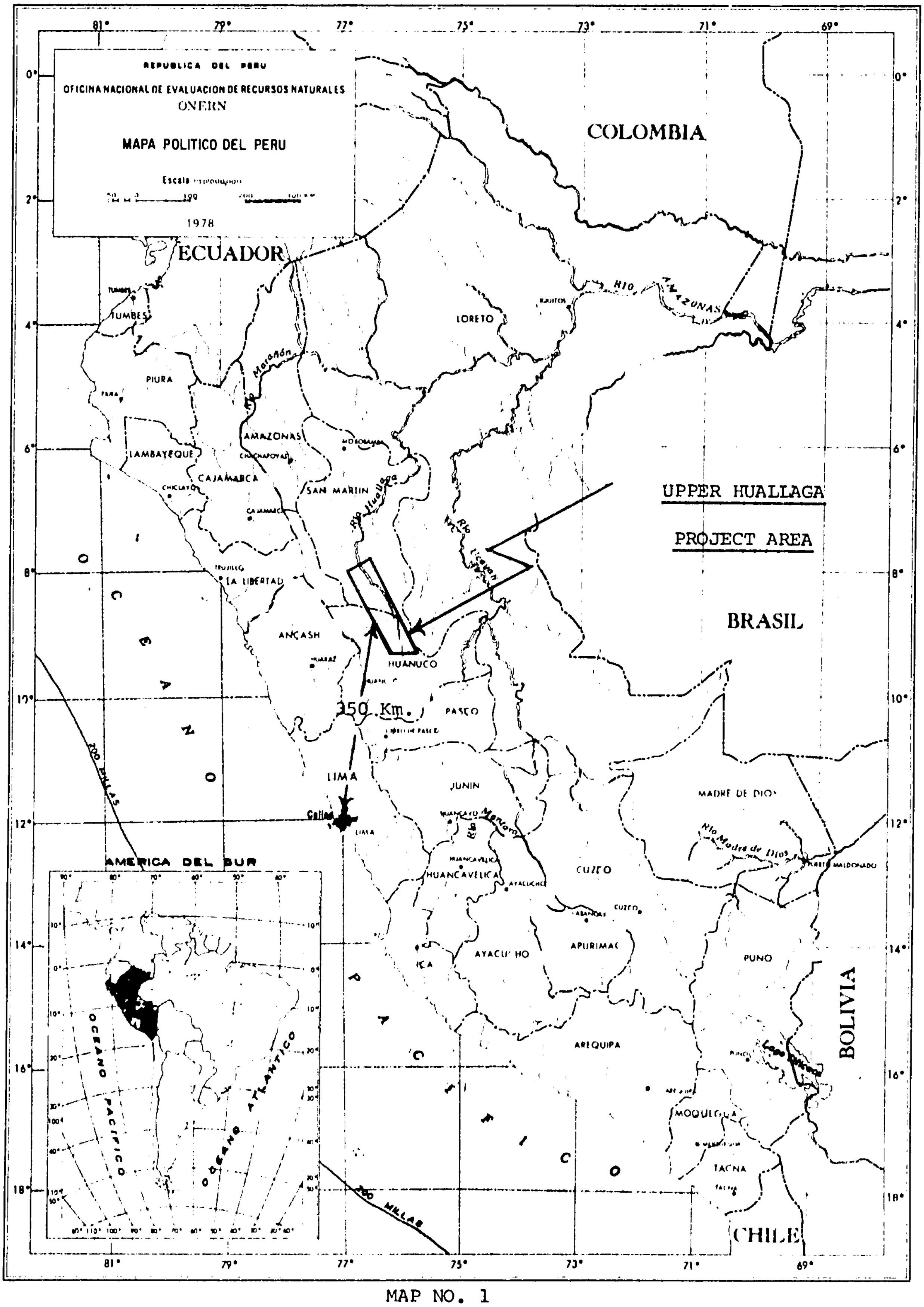
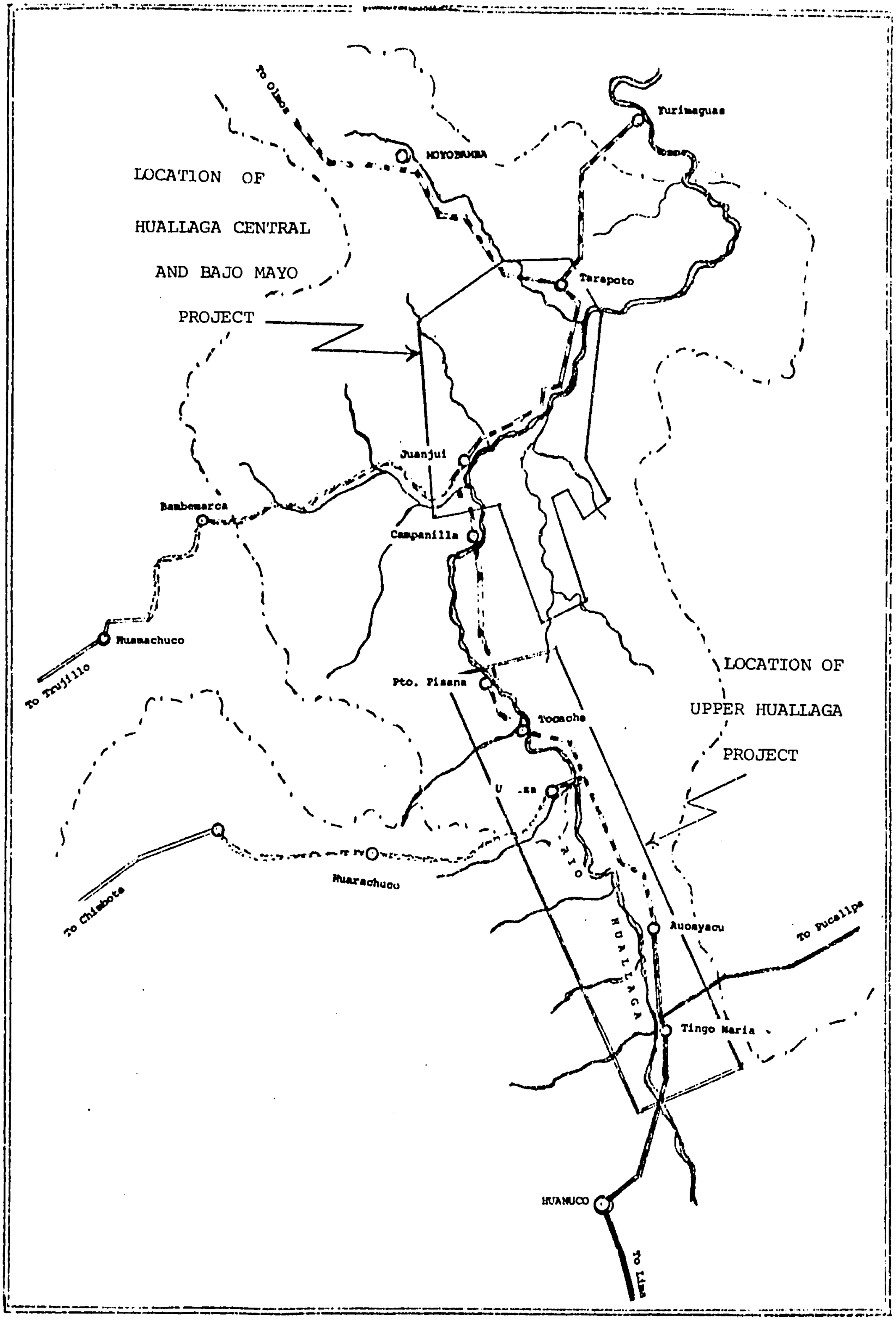
1/ Consistency checks on coca area per rural person produced an area over twice as high in Tingo Maria (which had a low projected growth rate) as in Aucayacu. Apart from substantial immigration related to increased coca cultivation, there would be little reason to expect that these two areas of older settlement would have population growth rates above 4.5% p.a.

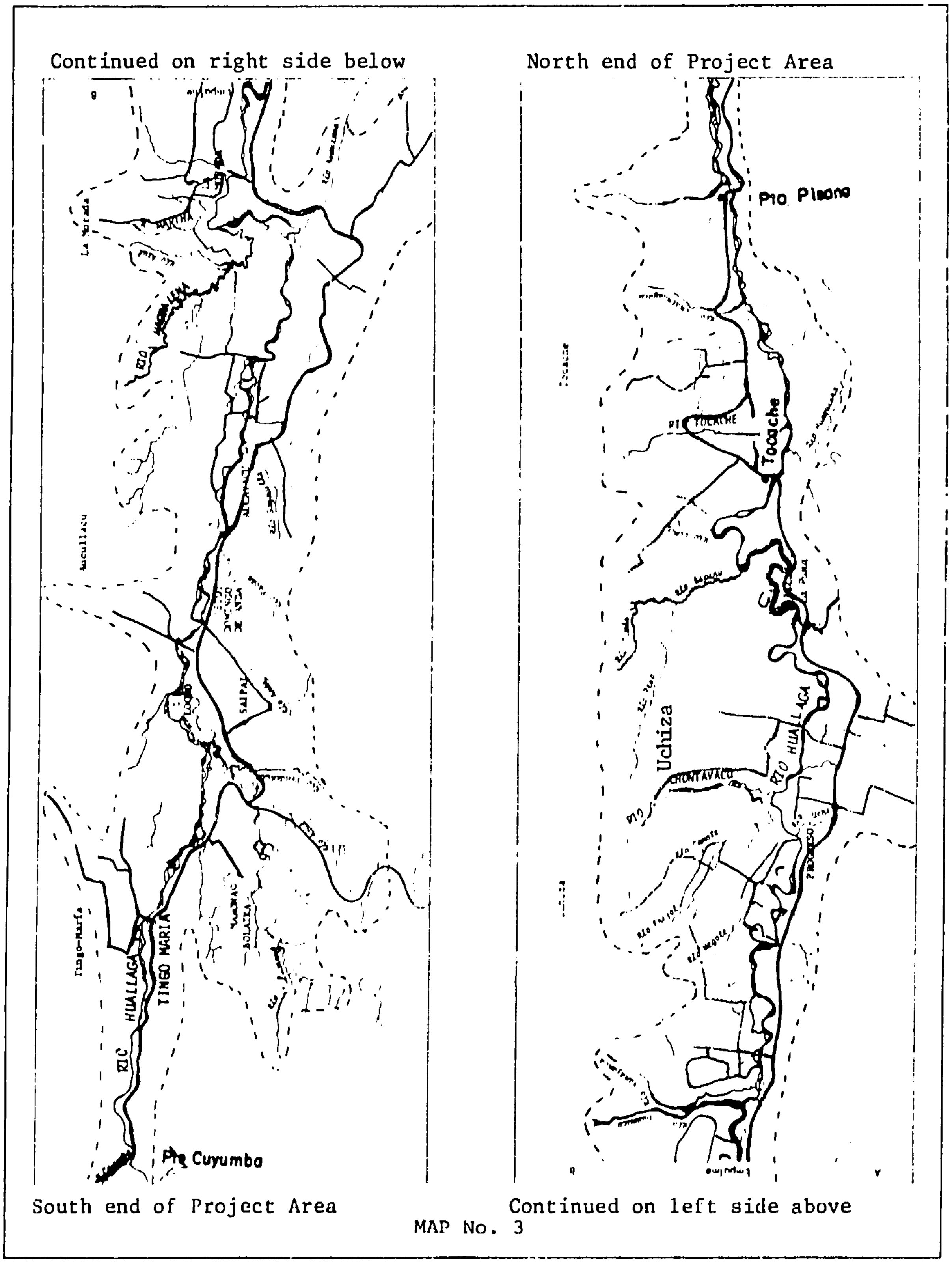

REPUBLICA DEL PERU
OFICINA NACIONAL DE EVALUACION DE RECURSOS NATURALES
ONERN
MAPA POLITICO DEL PERU
1978
COLOMBIA
ECUADOR
BRASIL
BOLIVIA
CHILE
UPPER HUALLAGA
PROJECT AREA
350 Km.
LORETO
TUMBES
PIURA
AMAZONAS
LAMBAYEQUE
CAJAMARCA
SAN MARTIN
LA LIBERTAD
ANCASH
HUANUCO
PASCO
LIMA
JUNIN
HUANCAVELICA
AYACUCHO
CUZCO
APURIMAC
MADRE DE DIOS
PUNO
AREQUIPA
MOQUEGUA
TACNA
ICA
Rio Huallaga
Rio Marañon
Rio Amazonas
Rio Madre de Dios
AMERICA DEL SUR
OCEANO PACIFICO
OCEANO ATLANTICO
200 MILLAS

MAP NO. 1



LOCATION OF
HUALLAGA CENTRAL
AND BAJO MAYO
PROJECT
LOCATION OF
UPPER HUALLAGA
PROJECT
To Olmos
MOYOBAMBA
Yurimaguas
Tarapoto
Juanjui
Bambamarca
Campanilla
Huamachuco
To Trujillo
Pto. Pisana
Tocache
Huarachuco
To Chimbote
RIO
HUALLAGA
Aucayacu
To Pucallpa
Tingo Maria
HUANUCO
To Lima

MAP NO. 2



MAP OF PROJECT AREA

Lima, and travel time from Tingo Maria to Lima is approximately 10 hours by automobile and approximately 20 hours by truck. The Marginal Highway, the main road through the Huallaga Valley, branches off from the Huanuco-Pucallpa highway 12 km north of Tingo Maria and proceeds northward down the Huallaga Valley to km 240. At that point there is a 35 km gap before it continues to Campanilla (km 304), where it joins the northern section of the Marginal Highway that was constructed southward (upriver) along the west bank from Tarapoto (km 496). The construction of the gap area to join these two sections is being given priority by the Ministry of Transportation and Communications (MTC). As shown on Map N° 3, the highway crosses the Huallaga River at Tocache, Pto. Pizana, and Campanilla. The Tocache and Pizana bridges have been built, and the Campanilla bridge is in initial stages of construction. At present, the section between Tingo Maria (km 0) and Aucayacu (km 52) is paved and is in good transit condition. Many sections of the highway have very little gravel, and drainage is generally poor because the ditches and culverts are clogged with vegetation. Also, slumping problems have drastically reduced the seven meter width in many places. The MTC is planning to rehabilitate those sections of the highway that are in poorest condition due to more than ten years without proper maintenance.

There are about 490 km of feeder roads in the area that provide access to the agricultural lands on both sides of the Huallaga River, including about 230 km of engineered roads. The remainder are simple dry-weather farm roads constructed without engineering design. Most of the engineered feeder roads, which range in width from 3.5 to 4.5 meters, are traveled year around. However, their transibility is constrained by poor maintenance and by lack of adequate ferry crossings. These roads have become depressed (concave) in the center which retards surface runoff and consequently worsens their condition. Most drain ditches are clogged with vegetation and many culverts and bridges are in need of major repair. Some sections of farm roads receive sporadic maintenance by private farmers and agricultural cooperatives. For the most part, however, they are practically impassable when wet and permit only one-way traffic during the short periods when they are dry.

River Travel and Crossings

The Huallaga River has intermittent rapids upstream of Tocache and an average velocity of three knots, making it suitable for use only by smaller craft (usually dugout canoes with outboard motors). Use of the river transportation is limited; it is more significant as a barrier to surface transportation. As shown on Map N° 3, between Tingo Maria and Tocache there are five systems of feeder roads on the opposite side of the Huallaga River from the Marginal Highway, they are joined to the highway by boats (large dugout canoes) and small ferries. Only two cable-ferries for vehicles are operating at the present time, at Madre Mia (L. Morada zone) and Huicte (Uchiza zone). River travel in the area, other than river crossings, is not significant. The boats used for freight and passenger services are small; infrastructure for anchoring is not available.

Air Transportation

The Tingo Maria airport has a gravel runway approximately 2,100 meters long and 50 meters wide. There is daily jet service to and from Lima and twice-weekly service to Tarapoto. Two single-engine charter aircraft are based at the Tingo Maria airport. Grass runways at Tocache and Uchiza are authorized only for use by light aircraft and commercial craft such as the DC-3.

Foot paths

Many farms sites, and particularly the coca farms, are remote from either roads or river; they are accessible only on foot. Additionally, some farmers cannot afford the cost of vehicular freight and transport their produce along existing roads on their backs. Human portage remains an important form of transportation within the zone. Virtually no utilization of beasts of burden was noted by observers during various field visits to the area.

Other

Postal and telephone services are centralized in Tingo Maria. Branch postal offices operates in other towns in the area. Telephone lines connect Tingo Maria with Lima but not with nearby towns; radio communication is available.

d. Energy

The only public plants providing electricity are in Tingo Maria and Aucayacu. Both plants belong to the state enterprise, ELECTROPERU. The Tingo Maria plant has an installed capacity of 2,352 kw (kilowatts) and at present it is being expanded by an additional 1,104 kw. The Aucayacu plant has an installed capacity of 292 kw. Additionally, cooperatives and sawmills have their own diesel units. Only thermal electrical generators (most of them Diesel types) exist in the project area, although there is substantial hydroelectric generation potential.

e. Climate

Moist air masses move westward across the Amazon basin until they encounter the Andes, which forces them aloft causing orographic precipitation. The Cordillera Azul on the right bank of the Huallaga is the first mountain barrier these air masses meet as they move westward, and the foothills of the Cordillera Central on the left bank of the Huallaga are the second mountain barrier. The Huallaga valley itself actually lies in a rain shadow created by the Cordillera Azul, with the intensity of the "shadow" effect dependent on the changing topographic relationships between the two mountain chains and the changing elevation of the Huallaga valley floor. Total rainfall tends to decrease moving downstream along the Huallaga River, as summarized below:

Town	Elevation (meters)	Average Annual Rainfall
Tingo Maria	670	3,325 mm (130.9 inches)
Tulumayo	670	3,165 mm (124.6 inches)
Aucayacu	650	2,014 mm (79.3 inches)
La Morada	542	3,215 mm (126.6 inches)
Tocache	450	2,408 mm (94.8 inches)
Yurimaguas	184	2,110 mm (83.1 inches)

The seasonality of rainfall of two stations on the banks of the Huallaga River is presented in Annex II, Exhibit E, figure 1.

At Tingo Maria precipitation exceeds evapotranspiration through all months except May-August. In practical terms the Project Area has high rainfall and run-off because only part of the rain can be absorbed by vegetation or percolated in the soil. Data from La Morada, about mid-way in the Project Area, indicate an average of 20-24 days with rain per month in the period October through May and 14-15 days for the period July through September. Examination of 1967-1977 data on maximum 24-hour precipitation at La Morada showed that heavy precipitation (over 80 mm per day) during this period followed the following frequency distribution:

Month:	J	F	M	A	M	J	J	A	S	O	N	D
Occurrences:	2	3	3	2	0	0	2	1	1	3	1	3

With an annual precipitation of 3.2 meters, the largest 24-hour precipitation was only 120 mm and occurred in the month of September. By comparison, in areas of the tropics affected by hurricanes, values of 24-hour precipitation in excess of 300-400 mm are common once in a 10-year period. Occurrence of large rainstorms (over 80 mm) is distributed relatively uniformly throughout the year. Thus, it appears that although some periods of the year are more prone to flooding than others, there is in fact no season which can be said to be safe from flood hazard. Residents report that portions of the valley floor, including the runway at the Tingo Maria airport, are inundated every several years. Measured stream flow of the Huallaga River for 1980 (the only complete year of flow data) indicate a maximum of nearly 1,700 cm per second (April) and minimum of about 125 cm per second (July-September). Visual evidence at Aucayacu suggests a normal variation of river level on the order of 5 meters. Cable towers for two of four cable-attached barges have been destroyed by past floods.

Because of the high rainfall, the groundwater table is probably above the river level throughout the valley and subsurface waters drain to the Huallaga River throughout the year. In many areas the water table is continuously above the land surface; these areas of continually saturated and submerged soils are characterized by the presence of the aguaje palm vegetative association. Areas of continually standing water appear to be above the normal river level, with their formation being due to restricted surface drainage.

Average monthly temperatures range from 23.6 C° to 30.4 C° and average low monthly temperatures from 17.8 C° to 19.8 C°. Little variation from these data were observed for Tulumayo, Aucayacu, and La Morada. Both the lowest and highest temperatures in the upper Huallaga Valley occur during the southern hemisphere winter. The reduced cloud cover during the "winter" dry season is the factor explaining higher average temperature during winter months.

f. Soils and Topography

In 1961-62 the Ministry of Planning and Public Works did a reconnaissance level resource study of about 290,000 ha northward from Tingo Maria along the Huallaga valley which provided the basis for the 1966 IDB-financed Tingo Maria-Tocache Project. The IDB Project undertook detailed on-the-ground soils studies and produced 1:5,000 and 1:10,000 scale soils and land use potential maps (eight classes of land) of the areas selected for colonization. These maps provided the basis for laying out the farms within each colony. All of the area in the Tingo Maria zone and some areas of the Uchiza zone do not have soil classification index sheets and do not have agrological studies due to the fact that these areas were distributed and occupied before the Colonization project started. In addition, some lands had been parceled out in unclassified areas due to migratory pressure which was accentuated in the 1970s. Thus, the land area in farm parcels is substantially higher than land with agrological classification.

Tables II-1 and II-2 present existing information on agrological classification of soils and estimates of area and farms in each such classification. A farm parcel was assigned to a soil class when the particular soil class accounted for 50% or more of the parcel. (The number of parcels in Table II-2 is smaller than the number estimated in the socio-economic survey due to subdivision of the parcels and that the were areas which had been divided into titled farm parcels but without soil mapping).

TABLE II-1

EXPLANATION OF AGROLOGICAL CLASSIFICATIONS FOR UPPER HUALLAGA

CLASS	General Characteristics	Recommended (or Probable) Use	Management Problems
II	Land appropriate for annual and perennial crops with moderate limitations. Fertile soils and of the best type in the area.	Corn, rice, soybean cassava, plantains, cacao,coffee,citrus, palm oil.	Acidic soil and some nutrient deficiency.
III	Land with restrictions on cultivation and risk of erosion. Appropriate for perennial crops. This class also includes land subject to periodic flooding and appropriate for annual crops.	Corn, rice, soybeans, plaintain, cacao, coffee, citrus, pasture.	Acidic soil; need to control erosion and/or flooding.
IV	Land with slopes of 10% to 50%; appropriate for perennial crops; high erosion risk.	Plantains, coffee cacao,dense pasture grass (coca).	Acidic soil; low fertility; erosion control.
V	Land with little danger of erosion, but very wet, shallow soil, or rocky.	Rice, corn, plaintains,pasture	Drainage or use of crops with shallow roots and tolerant of excessive water.
VII-VIII	Land not appropriate for crop production; very steep and rocky. Swamps are also include in these groups.	Forestry	High risk of erosion.

SOURCE: F.D.N., Plan de Ejecución... , op cit, p. 165;attributed to ONRA - Colonización Tingo Maria-Tocache, 1968, 1969, 1970.

TABLE II-2

AGROLOGICAL CLASSIFICATION OF SOILS OF UPPER HUALLAGA IN HECTARES AND ESTIMATED FARMS

Class	Tingo Maria	Aucayacu	La Morada	Uchiza	Tocache	TOTAL
			In Hectares			
II		4,771	2,295	2,960	6,283	16,309
III		6,828	3,537	6,563	9,628	26,555
IV		4,409	4,516	6,231	1,928	17,084
V		4,527	5,822	36,323	7,769	54,440
VI		--	--	--	--	--
VII-VIII		2,455	3,698	2,013	3,025	11,191
Total		22,989	19,867	54,090	28,633	125,579
			Estimated Number of Farms			
II		294	83	97	100	574
III		419	90	134	312	955
IV		263	75	114	30	582
V		200	105	642	211	1,158
VI		20	--	--	--	20
VII-VIII		15	--	9	53	77
Unclassified	518	388	10	301	229	1,446
Total	518	1,599	363	1,297	935	4,712

SOURCE: F.D.N. Plan de Ejecución..., op cit, p. 164-166

It should be noted that while the agrological classification corresponds to general qualitative characteristics of potential agricultural use, the system is far from perfect. Class II land is clearly the best, but beyond this assertion much depends upon finer qualitative distinctions than portrayed by the classificatory system. Class III land directly adjacent to the Huallaga River is so classified due to periodic flooding and such land adjacent to the margin of the valley is so classified due to moderate slopes. Class IV land (slopes of over 10% and up to 50%) which has slopes in excess of 15% would pose significant erosion problem for crop cultivation. Class V land is frequently found close to or surrounding swamps and drainage limits its potential use.

The areas in the region with soil classes II, III, and V approximate the more level valley lands and amount to 97,300 ha and correspond to a distance of 145 km (from the southerh boundary of the Aucayacu zone to the northern boundary of the Tocache zone); this suggests an average valley floor width of 6.7 km. As can be seen from Table II-2 the proportion of Class IV (hilly) lands is significantly lower in the Uchiza and Tocache zones than in the Aucayacu and La Morada zones. This fact relates also to topography. Beyond the La Morada zone the valley is wider, and the Huallaga River has a lower gradient with some curves and oxbows. Also related to general topography, south of Tingo Maria the Huallaga River is contained in a very narrow valley and the river gradient is high. At Tingo Maria the valley broadens to about three km. In the Tingo Maria zone a significant portion of the land would conform to Class IV as well as some of Classes II, III, and V with perhaps 8,000 ha in the hilly land category and 4,000 ha in the level land category.

Several substantial rivers from the Central Cordillera enter the Huallaga Valley from the west and each of these has associated, but relatively narrow, alluvial plains. From Tingo Maria to Tocache the Chuchurra, Magdalena, Santa Marta, Huanuco, Yanajanca, Frijol, Contayacu, and Tomas Rivers join the Huallaga from the western margin creating agricultural lands interspaced but generally isolated one from the other by foothills of the Central Cordillera. The economics of road construction has dictated the location of the Marginal Highway on the eastern side of the Huallaga (to avoid higher bridging costs associated with these tributaries) and, at the same time, has precluded bridging of the Huallaga (to provide road access to these areas). At present, only two crossings of the Huallaga are served by barges; four other crossing are served only by boats and dugout canoes. Thus, the Huallaga River Valley provides decent topography for a major road on its eastern bank but in conjunction with its western tributaries provides a costly barrier to transport. An additional related quirk of topography is also noteworthy. In the Aucayacu zone, the valley widens to 7-10 km, but north of Aucayacu, the Cordillera Azul forces the

Huallaga into a displacement to the west of about seven km. The largest share of Class II and III lands in La Morada, Uchiza, and Tocache is located on the western side of the Huallaga.

g. History

As is discussed more fully in Annex II, Exhibit A, colonization in the Tingo Maria zone began in the 1930s. An additional impetus to settlement was provided by the opening of the Huanuco-Pucallpa highway in 1940. Economic activity during the 1940s and 1950s centered around lumbering, and bananas with some cultivation of coca and tea. The southern portion of the Aucayacu zone was settled in the 1950s.

The major push to colonize the area north of the Anda River (in the Aucayacu zone) was given by the official Tingo Maria-Tocache project. This project originated in a study of natural resources on 290,000 ha in 1961-62. On the basis of this study the Agrarian Reform Office (ONRA) prepared a twenty-year plan to reorganize tenancy on 30,000 ha occupied by 2,150 families and to bring 66,000 ha of forested land into production. During the first six years 4,550 families were to be resettled or colonized at a total cost of $25 million. A $14.7 million loan from the IDB was signed on September 30, 1966, and the budget for the first four years of the project was $30.3 million. The news of the impending project and of provisions for granting titles, credit, and technical assistance also induced settlement; between 1962 and 1966 about 600 families occupied lands in the project area. When the project got underway in late 1966 there were already 5,400 settlers in the zone.

The initial program of 1964 set out four types of farms with a total area of 35,000 ha as follows:

Farm Type A - 2,000 farms of 15 ha each having 2.0 ha of rubber tress, 1.0 ha of plantains and 5.0 ha of pastures.

Farm Type B - 2,250 farms of 10 ha each having 1.5 ha of palm oil, and 1.0 ha of plantains, 1.5 ha of corn and 0.5 ha of pastures for pigs.

Farm Type C - 500 farms of 15 ha each having 2.0 ha of citrus, 1.0 ha of plantains, 3.0 ha of corn and 0.5 of pastures (principally for pigs).

Farm Type D - 500 farms of 50 ha each oriented to bovine production with 10 ha in pasture and 10 ha in corn which in 12 years should have reached 46 ha of cultivated pastures.

In practice this program was not carried out. The rubber did now grow in the areas selected, installation cost was higher than anticipated, and there was also a lack of adequate plant stock material. Palm oil planting was also limited due to the lack of plant stock and to administrative and technical factors. Citrus was not planted as much as programmed due to its long maturity period, the large investment for planting, and insecure commercialization. The production of platains, rice, corn, cassava, and pasture did take place, but without following the planned order.

h. Land in Farms and Land Farmed

There are three separate sets of information related to land in farms and land farmed in crops and pastures. As shown in Table II-3, the number of farms in the documented or titled areas was estimated by the F.D.N. based upon cadastral maps and registrations up to 1976 (with an updating in the Uchiza zone for 1980), interviews with extension agents working in the zone, and aerial reconnaissance. Starting with 2,867 farm parcels indicated on cadastral maps, the F.D.N. derived 5,088 farm parcels. By including some of the smaller livestock cooperatives and an estimated 500 farms in the Monzon valley (Tingo Maria zone) we obtain 5,713 farm parcels.

The F.D.N. also conducted a sample survey of 385 farms, i.e. approximately 1/13 of their sample universe. Data from this survey in regard to average size of farm parcel and average size of land in crops and pastures are utilized along with an estimate of farm parcels to derive total land in crops and pastures.

The latter statistic (on Table II-3, line 9) can be compared with a wholly independent check obtained from AID-contracted work by the Ministry of Agriculture (MA) on aerial reconnaissance of about half the Project Area. The correspondence between these two techniques (and considering land in the titled area in coca cultivation as used for crops) is high. The ratio of the farm parcel and survey estimate to the aerial reconnaissance statistic ranges from .88 (for the Tingo Maria zone) to 1.14 (for La Morada zone), and averages .96 for the project area as a whole. This high correspondence supports the general validity of both techniques.

The aerial reconnaissance work covered 49% of the Project Area and this portion included nearly all of the more level lands and titled farm parcels. The principal omissions were the Monzon valley (west of Tingo Maria) and an area west of Uchiza (were reportedly gunfire from cocaleros deterred the reconnaissance). Based upon maps of forestry officials the F.D.N. also constructed a complete statement of the surface area. 1/ Based upon these maps, about 62% of the

1/ F.D.N. Plan de Ejecucion, ..., op. cit., pp. 169-174.

TABLE II-3

ESTIMATES OF FARM/RANCH PARCELS (DOCUMENTED LANDS), AMOUNT OF LAND IN CROPS AND PASTURES (FROM SAMPLE SURVEY OF FARMS AND AERIAL RECONNAISSANCE), AND OTHER INDICATIONS OF LAND USE

		Tingo Maria	Aucayacu	La Morada	Uchiza	Tocache	Entire Region
		Estimate (F.D.N.)					
1.	Number of farms (Documented Area)	1,404	1,619	403	1,383	904	5,713
2.	Adjustment for three large farms (workers) (a)	880				800	1,680
3.	Farm Households (=1+2)	2,284	1,619	403	1,383	1,704	7,393
		Survey of 385 Farms (hectares)					
4.	Average Size of Farm/Ranch	17.7	26.0	39.6	28.0	30.9	27.0
5.	Amount of Land in Farms/Ranches (line 1 x line 4)	24,851	42,094	15,959	38,724	27,934	149,561
6.	Average Size of Crop and Pasture Land	7.34	9.71	18.34	10.06	10.94	10.28
7.	Amount of Land in Crops and Pasture (line 1 x line 6)	10,305	15,721	7,391	13,913	9,890	57,220
8.	Adjustment (b)	1,500	420		630	5,000	6,905
9.	Total Land in Crops and Pasture	12,709	16,141	7,391	14,543	14,890	64,125
		Aerial Reconnaissance (hectares)					
10.	Agricultural Use, Land in Non-Coca Crops and Pasture	12,945	14,936	6,319	15,070	15,284	64,555
11.	Coca on Titled Lands	1,479	1,455	140	530	328	3,932
12.	Coca on Non-Titled Lands	2,466	716	15	86	74	3,357
13.	Forest Land	80,745	71,118	22,118	83,025	91,929	348,935
14	Swamp Land	116	1,049	157	909	236	2,467
15.	Other	2,222	2,267	760	2,258	2,124	9,631
16.	Total	99,974	91,541	29,509	101,879	109,975	432,877
		Forestry Maps, Complete Area (hectares)					
17.	Protection Forests	96,523	111,150	64,700	117,070	44,732	434,177
18.	Hill Forests	9,225	11,623	2,050	50,045	32,480	105,423
19.	Residual (Agriculture, Swamps, Cut-Over)	59,750	71,200	38,250	92,475	75,375	337,050
20.	Total	156,275	193,973	105,000	259,590	152,587	876,650

SCURCE: See Text

NOTES: (a) Includes 880 members of the cooperatives Jardines de Té and Té-Café and 800 workers of ENDEPALMA.

(b) Includes half the land of the two tea cooperatives (Tingo Maria), 10 ha for each member of existing livestock cooperative in Aucayacu and Uchiza and 5,000 ha for ENDEPALMA.

area is covered by forests [illegible] this area 434,177 ha pertain to protection forests and 105,42[illegible] to managed hill forests. Forestry officials believe that the la[illegible]gnated as protection forest is too steep to log because of erosion dam[illegible]nd road construction costs would be too high. The hill forests represent forests that can be logged. The residual area includes lands that are titled and also cut-over lands. Obviously the area which is covered with forest-like vegetation is larger than the forests designated by forestry officials. For example, if all lands not designated as forest-like by aerial reconnaissance (83,778 ha) were deducted from the total, the remnant in forests and forest-like land would total 792,872 ha or 90.4% of the Project Area.

2. Agricultural Systems

a. General Indications

The valley lands are cultivated primarily in crops (plantains, cacao, cassava, citrus, palm oil, and pastures), or have been abandoned to natural forest regeneration. The sloping soils of the surrounding terraces and hills are cultivated in a patch-work pattern of annual and perennial crops (including coca) and natural forest. Further east and west, away from the Huallaga River valley floor, steeply sloping soils remain predominantly in forest cover. The more fertile and level alluvial soils have already been occupied through the original land titling scheme. The distinction between farm types in the upper Huallaga region is not as strong along the dimension of subsistence to commercial as along the dimension of shifting, semi-permanent, and permanent cultivation. Nearly all cacao, coca, coffee, tobacco, tea, and palm oil production is sold off-farm, and a high proportion of rice, plantain, and citrus production is also sold off-farm and lesser proportions of bean and cassava production. 1/

Shifting Cultivation

The upper Huallaga region was colonized in the shifting-cultivation form of traditional agriculture where short-term cropping cycles are interspersed with a longer period of forest fallow. Generally, the forest is cut and burned and immediately planted with corn or other annuals which take advantage of nutrient releases by burning and become well established prior to severe weed competition. Frequently, newly felled forest lands are cropped with corn, rice, and cassava for only one or two cropping cycles and then abandoned due to decreased yields resulting from nutrient exhaustion and increasing weed and pest competition. On the poorer quality soils in the region this form of cultivation is the most feasible.

Semi-Permanent Agriculture

Under circumstances of semi-permanent agriculture the shifting cultivator may interplant the annual crops with plantains, cacao,

1/ Annex II, Exhibit G, Table 14

coffee, or other tree crops, thereby permitting the perennial crops also to take advantage of the available nutrients and reduced weed and pest competition. While the annual crops are providing food and a cash income during the first year after forest clearing, the permanent crops are becoming established and will provide ground cover and shade; thus substituting a food forest for successional stages of natural forest regeneration. Perennial crops such as plantains can be harvested within a year after planting; whereas cacao, coffee, or forest trees will take 3-5 years to reach first harvest. The system of combining annuals and perennials provides a short-term souce of income (annuals), imitates the natural forest succession, minimizes labor and material input for weed or pest control, and establishes long-term production (perennials) at low initial cost. The substantial land in fallow as well as widespread use of perennials suggest this mode of agriculture as now predominating.

The Environmental Assessment (Annex II, Exhibit E) describes this small-farm survivor type as follows: "There are numerous small farmers cultivating 3-5 ha in the traditional system of shifting agriculture. Those farmers who obtain land title usually move quickly to permanent crops such as cacao, coffee, bananas, and citrus after the initial forest clearing. Typically yields are not very high due to limited fertilizer application, however, costs are also low. The subsistence crops and small animals including ducks, chickens, and pigs, augment the family diet, whereas a combination of annual and perennial cash crops are marketed in Tingo Maria or to truckers. That type of farmer is a survivor and has adapted his cropping pattern to the natural environment as well as the local infrastructure of markets, labor supply, credit availability, etc."

Permanent Agriculture

The survey data and direct observations suggest that about one-fifth of all farms exhibit characteristics of small entreprenurial farms, e.g. cultivating more than six ha of annual or perennial crops. These farms are invariably situated on the most fertile and level soils. Careful management of drainage problems, soil compaction, and weed control is necessary on these intensely cultivated farms. These farms focus on intensive cultivation of rice, corn, plantains, cacao, citrus, and coffee. This group of farmers could capably incorporate new intermediate level technologies to present operations.

In addition to the predominant small and medium farms, available evidence suggests four other agricultural systems in the Upper Huallaga region; they are livestock (beef) producers, plantations (palm oil and tea), forest extraction, and a sub-group of coca producers (cocaleros who do not plant this crop in association with other significant farm activities). Discussion of ranching plantations, forest extraction, and cocaleros, is taken up after discussion of general farming activities in the region. A survey of 385 farms was drawn from the region as a whole. The sample represents about 1/13 of the farms and was based upon creating 43 conglomerations with an average of 100 farm plots in each. Twenty-two of these were selected at random but to assure coverage of each of the five zones and in the correct 1/13 proportion. The final selection was based on a table of random numbers. The estimate of the farm universe for this survey was described above. It should be noted that the F.D.N. sample universe was not designed specifically to include areas never titled and at substantial distances from feeder roads.

b. Farm Data

As is shown in Table II-4 the predominant size of farm parcel ranges from 20 to 50 ha. Apart from the medium size character, with smaller size in the Tingo Maria zone, these farms have a heavy emphasis on annual and perennial crops as well as fallow land. For the region as a whole, land in crops averages 5.9 ha, land in pasture 4.4 ha, and land in fallow 8.05 ha. Land in swamps and forest averages 8.7 ha for the region as a whole and even by zones agricultural use (inclusive of fallow) ranges from 62.4% (for Aucayacu) to 71.0% (for Tocache) of the total farm parcel. In general farms are presently delimited by straight block-shaped boundaries and may include poorly drained, nutrient poor, or sloping soils (which in some cases renders the farm unit uneconomic).

Land in fallow for the region as a whole is 36% higher than land in crops and exceptions to the use of a lengthy fallow are Tingo Maria, an area of older settlement, and La Morada, which has significantly stronger emphasis on livestock production. Survey data suggest that farm operators have not encountered soil management practices that would alleviate a lengthy fallow period. A production model of existing practice, assuming a fallow period as short as three years, and a cropping pattern typical for the zone also demonstrates that on a 10 ha plot no more than 6 ha could be in production in any year. 1/

There is a small difference between the average of land in crops as calculated for all farms in the sample and as calculated on the farms having only land in crops. 2/ Only 13.2% of farmers reported no annual crops and 8.8% reported no perennial crops. Furthermore

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1/ Annex II, Exhibit G, 1.
A Note on Sequence of Annual Activities Undertaken by Typical Farmer (Tingo Maria-Aucayacu).

2/ Annex II, Exhibit G, Table 19.

TABLE II-4

DISTRIBUTION OF FARM SIZE AND FARM LAND USE (Survey of March-April, 1981)

	Tingo María	Aucayacu	La Morada	Uchiza	Tocache	Entire Region
Number of Farmers (Ranches) Interviewed	68	128	31	89	69	385
Distribution of Farm Size (%)						
less than 5.0 ha	14.7	--	--	--	--	2.6
5.01 - 10.00 ha	30.9	5.5	--	2.2	11.6	9.9
10.01 - 20.00 ha	26.5	42.2	3.2	56.2	27.5	36.9
20.01 - 50.00 ha	22.1	42.2	54.8	29.2	40.6	36.4
50.01 and over ha	5.9	10.1	42.0	12.4	20.3	14.3
	100.0	100.0	100.0	100.0	100.0	100.0
Percent of Farm Units with						
Annual Crops	78.0	85.9	87.1	87.7	95.6	86.8
Perennial Crops	98.5	96.1	80.6	84.3	88.4	91.2
Improved Pasture	17.6	17.2	80.6	40.4	37.7	31.4
Natural Pasture	22.1	31.3	35.4	52.8	13.0	31.7
Fallow Land ("Purmas")	72.1	91.4	71.0	88.8	94.2	86.2
Forest Land	54.4	71.9	71.0	60.7	73.9	66.5
Swamps	13.2	26.6	38.7	25.8	24.6	24.7
	---------- Data in Hectares ----------					
Average Size of:						
Farm (Ranch)	17.7	26.0	39.6	28.0	30.9	27.0
Land in Annual Crops	1.18	2.46	4.41	2.62	4.74	2.84
Land in Perennial Crops	4.35	3.27	2.24	2.78	2.16	3.06
Sub-Total	5.53	5.73	6.65	5.40	6.90	5.90
Land in Improved Pasture	0.63	1.34	7.87	2.15	3.67	2.34
Land In Natural Pasture	1.19	2.64	3.82	2.51	0.37	2.04
Sub-Total	1.81	3.98	11.69	4.66	4.04	4.38
Land in Fallow	4.46	8.35	6.39	8.65	11.00	8.05
Total Agricultural Use	11.80	18.05	24.73	18.70	21.94	18.33

*Source: FDN, Plan, op. cit., pp 28-56

(as shown in Table II-6) only 17.1% of farmers grow more than 4.0 ha of annual crops and only 18.2% grow more than 5.0 ha of perennial crops. However, large-scale commercial farms are a very few; only 3.1% of farm operators report more than 10.0 ha in annual crops and only 2.8% report more than 10.0 ha of perennial crops.

As is shown in Table II-5, a high proportion of farmers grow corn (67.5%), cassava (61.3%), and plantains (64.9%). Rice, cacao, coca, and coffee are also widely disseminated with percentages as follows: rice, 47.0%; cacao, 46.0%, coca, 35.3%; and coffee, 26.5%. The data reveal geographical differences within the region in regard to the distribution of annual and perennial crops. Climatic factors probably explain the stronger emphasis on corn and rice in the more northerly, drier zones of the region and the stronger showing of coffee and coca in the southerly, wetter zones of the region. Market and transport costs appear more favorable in the southern zones, and this would probably account for the stronger showing of citrus in these zones. The relatively strong emphasis on plantains in the northerly zones, which is not due to lower transport costs, may be related to relatively larger areas of the more fertile flood plain soils which favor its cultivation. The La Morada zone, which is mid-way in the region, made a stronger showing on several crops than one would expect; in part this may be related to fertile soil and in part to the existing and available barge service, which facilitates a relatively easy river crossing (most of the farms are across the river from the Marginal Highway).

Various characteristics of farmers and farm operations are exhibited in Table II-6. In regard to the principal occupation of head of the farm household, 87% of respondents stated crop growing as their principal occupation and 9% stated ranching as their principal occupation. Only 19% of farmers employ permanent paid labor and 94% utilize unpaid labor. The average familial labor force approximates 2.75 persons in the age group 16-65 years of age. The F.D.N. calculation is that the total demand for paid permanent labor amounts to 1,500 to 2,000 persons. 1/

The seasonal demand for labor is high, and 75% of farm operators employ part-time labor. Some 51% of farm operators employed 1 to 4 part-time workers; 12% employed 5-7 part-time workers and 12% employed 8 or more part-time workers. 2/ The F.D.N. estimate is 4.22 part-time workers per harvest season per farm and a seasonal demand of 15,800 workers for a period of approximately 2.5 months. 3/ The seasonal

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1/ F.D.N., Plan de Ejecución ..., op. cit., p. 86.

2/ See also Annex II, Exhibit 6, Table 5.

3/ Ibid, p. 88.

TABLE II-5

CROPS (ANNUAL AND PERENNIAL); DISSEMINATION AND INTENSITY OF CULTIVATION

Crops	Tingo María	Aucayacu	La Morada	Uchiza	Tocache	Entire Region
-- Percent of Farmers who Grow Each Crop						
Corn	54.4	65.6	74.2	71.9	75.4	67.5
Rice	26.5	37.5	48.4	51.7	78.3	47.0
Cassava	57.4	64.1	77.4	58.4	56.5	61.3
Beans	5.9	7.8	19.4	7.9	15.9	9.9
Plantains	57.4	51.6	74.2	74.2	81.2	64.9
Cacao	50.0	55.5	41.9	39.3	34.8	46.0
Citrus	20.6	20.3	9.7	10.1	17.4	16.6
Coffee	48.5	40.6	19.4	5.6	8.7	26.5
Coca	41.2	51.6	3.2	33.1	11.6	35.3
-- Average Hectares Planted Per Farm (Includes only Farms that Grow the Crop)						
Corn	1.08	1.48	3.20	2.06	3.16	
Rice	0.67	1.20	0.96	1.11	1.68	
Cassava	0.73	0.65	1.14	0.85	0.62	
Beans	0.63	0.40	0.25	0.39	0.39	
Plantains	0.95	0.98	1.19	1.69	1.27	
Cacao	1.39	1.92	2.04	1.15	1.27	
Citrus	3.14	1.83	0.42	1.03	0.52	
Coffee	2.95	1.13	0.33	0.25	0.46	
Coca	1.10	0.82	0.25	0.80	0.41	

Source: Annex II, Exhibit G, Table 2

TABLE II-6

SELECTED CHARACTERISTICS OF FARMERS RELATED TO FARM OPERATIONS

Percent of Farm Operators Who State:	Tingo María	Aucayacu	La Morada	Uchiza	Tocache	Entire Region
Occupation						
Crop-growing as principal occupation	97.0	87.5	54.8	89.9	90.0	87
Ranching as principal occupation	1.5	8.7	45.2	6.8	4.3	9
More than one occupation	29.4	34.4	61.3	27.0	37.7	35
Employ Labor						
Employ paid permanent labor	16.2	24.2	22.6	14.6	15.9	19.0
Employ paid part-time labor	69.1	77.3	71.0	70.8	82.6	74.8
Utilize unpaid labor	94.1	94.5	90.3	94.4	95.7	94.3
Familial labor force per farm (persons 16-65 years age who state that they work)	(3.05)	(2.57)	(3.03)	(2.61)	(2.86)	(2.75)
Scale Dimension						
Grow more than 4.0 ha of annual crops	2.9	14.1	38.7	13.5	31.9	17.1
Grow more than 5.0 ha of perennial crops	32.4	20.3	12.9	12.4	10.1	18.2
Use Sophisticated Inputs						
That they have received technical assistance	20.6	22.8	38.7	18.0	27.5	23
That they have used credit	20.6	19.7	45.2	12.4	31.9	22
Stability of Tenure						
That they have a recognized legal right to their land (a)	30.3	68.8	54.8	52.8	58.0	55.4
That they have a questionable right to their land (b)	28.8	17.2	25.8	18.0	30.0	22.1
That they have a very questionable right to their land (c)	36.4	14.0	19.4	29.2	11.6	21.4
That they rent land	4.5	--	--	--	1.4	1.1

Notes:

(a) Clean certificate of adjudication or possession or in process.
(b) Holder of a certificate of possession (but probably not in their name).
(c) Not a holder of a certificate of possession.

Source: Annex II, Exhibit G Tables 4,5,6,11,13,19 and Table II-4 labor demand is apparently more related to climatic conditions than to extension of land cropped. This peak labor demand is from April to June and is caused by harvest requirements for coffee, rice, cacao, and corn This seasonal labor is supplied principally from the _sierra_, particularly Huanuco.

Data on reception of technical assistance and use of credit are also of similar orders of magnitude as such indicators of larger-scale farm operations as employment of permanent labor, employment of over 4 part-time workers, larger size of land cropped (4.0 ha of annuals or 5.0 ha of perennials) and suggest that 20 to 25% of farms could be classed as commercial operations.

In regard to land tenure, 55.4% of farm operators appear to have a recognized legal right to their land (a clean certificate of adjudication or possession or one in process), 22.1% state that they hold a certificate of possession (but usually not in their name and the main reason is purchase of land). Some 21.4% have no such document even though 14.4% state that they purchased the land and 7.0% are simply land invaders. Only 1.1% of farm operators are renters. The areas where sales of land "improvements" and no documents predominate are Tingo Maria and Uchiza, and this probably relates to lands suitable for coca cultivation.

c. _Livestock (beef)_

The present population of beef cattle in the Upper Huallaga Area is estimated at approximately 23,000 head utilizing an estimated 32,000 ha of land. It has been estimated by the Ministry of Agriculture (MA) that the annual offtake of cattle in the area is 17% at an average live weight of 300 kg. Thus, the current production is approximately 1,187 MT live weight and 593 MT of carcass beef per year and the per ha yield is about 37 kg live weight. 1/ It is estimated with improved management that this yield could be increased to at least 75 kg and perhaps to 150 kg. An average of 75 kg would not justify the substantial investment required. The cattle are mostly of Zebu/Criollo ancestry, apparently the descendents of cattle imported into the valley from Nicaragua some 15 to 20 years ago. It is estimated that 80% of pastures are in a degraded condition and are largely composed of native species of grasses.

Perennial pastures may be grown on virtually all Class IV lands of moderate slope in the area. On the wet, Class V lands compaction of soil appears linked to pasture degradation. It is noted that perennial pastures quickly revert to brush, trees, and unpalatable herbaceous plants unless such useless vegetation is removed yearly

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1/ F.D.N., _Plan..._, _op. cit._, p. 208.

or biennially. In the region several observers have noted abandoned fields where planted pasture has completely disappeared and natural grasses have invaded the area due to loss of soil fertility or conditions of poor drainage. The Environmental Assessment notes "Commercial ranching is considered economically marginal and environmentally hazardous over most of the area. The most appropriate areas can be identified on land capability maps."

It is noted that the F.D.N. proposed establishment of 500 units of 20 ha each to produce dual purpose (meat and milk) cattle. The exact location of this 10,000 ha pasture was not identified but the milk processing plant was to be located in the town of Aucayacu to utilize the presently paved highway for milk collection. Pastures established on Class II or III soils in this zone would represent underutilization of the soils resource. The major areas appropriate for pasture are terraces of Class IV soils with less than 15% slope.

d. Plantations/Production Cooperatives

Plantation type agriculture in the area exists in two distinct zones and crops; they are tea in Tingo Maria and palm oil in Tocache. Both of these types are highly specialized due to the economies of scale in processing. A related sub-type is the highly-supervised credit and technical assistance program of Tabacos del Peru S.A., which has tobacco receiving stations at Aucayacu, Uchiza, Tocache and about 250 client farmers. In addition, several livestock CAPs (Agricultural Production Cooperatives) were created during the military government period and some are still functioning.

Tea

The two tea-producing cooperatives (located in the Tingo Maria zone) are the CAP Jardines de Te, with 600 members and the CAP Te-Cafe del Peru with 280 members. The former is located about 45 km from Tingo Maria on the Pucallpa highway at 1,400 meter elevation and has 2,400 ha of land of which 520 ha are in tea. The latter is located nearby and has 200 hectares of coffee and 110 ha of tea. The CAP Jardines de Te has a basic drying/classification plant at the headquarters and a packaging plant in Lima.

Livestock CAPs

Several other associative farm enterprises were also formed in the period 1969-1976 mainly around beef cattle production. Information is available on the following (with present membership, activity, and location in parentheses): CAP Arequipa (30, livestock, Uchiza), CAP Huallay (12, livestock, Santa Lucia, Aucayacu), CAP La Marginal (15, livestock, Uchiza), CAP Piura (18, livestock, Uchiza), CAP Pucate (35, livestock, Jose Crespo, Aucayacu), CAP San Humberto

(24, coffee, cacao and sawmill, Huamalies, Tingo Maria). The latter three CAPs have fewer members at present than when formed, most of these CAPS have significant debts with the Banco Agraria and their situation is, we suspect, not significantly different from the majority of CAPS in Peru; as noted by the F.D.N. analysis, "the economic crisis faced by the great majority of cooperatives is most of all the crisis of the associative model within the context of capitalist development" (i.e. production cooperatives and price-profit directed agriculture are usually incompatible).

Palm Oil

ENDEPALMA, S.A. was formed in 1973 and is a state enterprise to manage the pilot palm oil project at Tocache established under the IDB financed project. As of 1980 it had 4,850 ha of palm oil trees planted of which 3,250 ha were in production with 5,250 ha as the final goal (which should be obtained in 1981). ENDEPALMA initiated palm oil production in 1976 and is currently increasing the capacity of its extraction plant to 20 MT per hour (4 MT per hour of palm oil). Apart from this palm oil operation there are three other related projects in various stages of solidification. The Palmas El Espino project (Romero group) has a concession for 15,000 ha on the El Espino River (Uchiza zone) for a project involving 8,000 ha of palm oil trees and a seven year investment program. This company has initiated land clearing, and its loan request and feasibility study are currently under consideration by COFIDE. The Pacocha/Unilever group has a concession of 28,000 ha between the Santa Cruz and Mantencion Rivers (Uchiza zone) and a final draft investment feasibility and soils study for 8,000 ha of palm oil trees of which 3,500 ha would be operated directly and 4,500 ha by existing farmers in the area associated with the project. The expected investment of this group exceeds $40 million. Two additional proposals appear less firmed-up at present, and include a project by the Compañia Oleaginosa del Peru which has a 15,000 ha concession between the El Espino River and Tocache and a project of the David McKee Corporation (UK) which reportedly has reached tentative agreement with the GOP on a concession of 100,000 ha north of Tocache to be developed in proportions of one-third each palm oil, sugar cane, and sustained timber involving an estimated investment of $600 million. A two-year feasibility study costing $2 million is being considered.

e. Forest Extraction

Extraction of high value hardwood species has been going on in the Upper Huallaga Valley since the Huanuco-Tingo Maria-Pucallpa highway was built in 1938-40. The lumber industry continues to be the most important activity in the Pucallpa area and to a lesser extent in the Tingo Maria zone. However, the past impetus in the Huallaga Valley took place with the building of the Marginal Highway, and the feeder road network, northward along the Huallaga Valley from Tingo Maria to Campanilla. At present, there are 29 saw-mills in the valley. Several saw-mills are on the verge of moving northward, waiting for the Marginal Highway to open up new areas between Campanilla and Juanjui.

The timber activity comes under the jurisdiction of the Forest Service, Ministry of Agriculture. According to the Regional Office in Tingo Maria, the Forest Service has granted 143 permits covering 2,415 ha and 53 concessions covering 161,930 ha. A permit can vary from 1 ha to 1,000 ha and is specifically limited to the selected extractions of certain species. A forest service agent visits the site, estimates the amount of timber to be extracted, and grants a permit from one to six years. None of the 143 permits in the area have been located on a map.

Contracts or concessions, although more formal, vary in size from 1,000 ha to 5,000 ha. The interested party prepares a map showing the location and size of the concession, provides an estimate of the amount of timber, by species, to be extracted and indicates the location of proposed logging roads, etc. Again, after an initial visit the forest service has little contact with, or supervision over, the logging operation. Reforestation is required by law but is not enforced. Since permits and concessions are granted without benefit of any resource studies, it is not known if they include areas that should remain untouched as protection forests. Some permits and concessions fall within areas suitable for agriculture, which creates conflicts with colonization supervised by the Agrarian Office.

f. Cocaleros

A wide range of estimates of area in coca leaf cultivation existed prior to firmer information based upon aerial reconnaissance. The estimate based upon aerial reconnaissance, stated in Table II-3, sets a minimum. The maximums based upon reasonable judgements are as follows: (1) within the cadastral map (titled) area the omission is unlikely to exceed 500 ha (i.e. plots of less than 1/4 ha would be difficult to detect), (2) outside this area the omission is higher and we suspect that the minimum omission is on the order of 2,000 ha and the maximum on the order of 4,000 ha. The omitted areas are the Monzon Valley (west of the town of Tingo Maria) and an area west of the town of Uchiza. So the maximum global figure for the Project Area is 12,000 ha until proven false by aerial photography and/or on-ground inspection.

The implications of these estimates are about 4,000 ha of coca are within the area subdivided and titled as a result of previous colonization and about 8,000 ha are outside of that area. Survey evidence suggests that coca cultivators within the titled areas plant coca as part of a diversified farming system. It is suspected that coca cultivators outside the titled areas, which are usually on more remote and steeper lands, tend to plant coca as a monoculture, with only limited production of subsistence crops for household consumption. Opinions of local government officials concerning the true ownership patterns of the cocaleros suggest that within the titled area the coca yields belong to the title-holder. In regard to the non-titled areas, government officials believe that there is a high proportion of absentee ownership of coca plantings with the crop being tended by hired labor. Reliable information on the ownership of these numerous remote coca fields is simply not available. They may be second operations run by farmers in the original colonization scheme; they may be financed by "opportunists" from the local commercial sector or from outside of the region; they may be privately operated by former landless laborers, who were previously engaged in coca picking contracts.

As is shown in Table II-3, coca production is not spread uniformly over the project area and appears concentrated in the Tingo Maria, Aucayacu, and Uchiza zones. The ideal locations are approximated by no more than a one-day walk from a principal town, no immediate road access, and well drained soils. The agronomics and economies of coca production, the coca boom, and the role of coca cultivation in the local economy are discussed further in section II.B.4.

3. Agricultural Services

a. Output Marketing

Grains

At present ENCI (Empresa Nacional de Comercialización de Insumos) undertakes the purchasing of rice and soybeans, and ECASA (Empresa Comercializadora de Arroz, S.A.) purchases rice. Both organizations pay farmers after delivery, delays in payment of one month are usual, and sometimes the delay is up to two months. ENCI officials state that it buys (receives) corn and soybeans at its stations in the towns of Tingo Maria, Nuevo Progreso (Uchiza zone) and Tocache, but it does not sell corn in the area except on an emergency basis. A MA official in Tingo Maria indicated that ENCI has not promoted corn in the area. ENCI officials also noted that its purchases of corn depend mainly upon the availability of funds from Lima and possibly to the timing of imported corn. Comments by managers in the field suggest that ENCI purchases somewhat less than half the crop and sometimes only one-fourth of the crop. Data on purchases of corn at the Tingo Maria station indicated purchases of 237 MT during the whole year 1980 and 2,922 MT during the first six months of 1981. (These data were presented to us in the presence of inspectors of ENCI from Lima.)

ECASA buys rough (unmilled) rice at stations in Tingo Maria, Aucayacu, and Tocache. Anticipated 1981 (whole year) purchases are 310 MT in Tingo Maria, 310 MT in Aucayacu, and 2,250 MT in Tocache. Its monthly sales of milled rice in Tingo Maria-Aucayacu-Tocache are currently running about 290 MT, i.e., the annual equivalent of 5,118 MT of rough rice (using a 68% conversion from rough to milled rice). This suggests that regional production covers 56% of regional consumption. ECASA contracts with the Huallaga Central Cooperative in Aucayacu for milling rice.

There is about 10,200 MT of grain storage capacity in the region inclusive of 1,700 MT owned by the MA (which is not currently in use and needs rehabilitation), 5,000 MT of ENCI, 2,000 MT of ECASA, 250 MT of private firms, 1,455 MT of the Huallaga Central de Cooperativa (see Annex II, Exhibit G, Table 13). A recent (June 1981) inspection and analysis by a US grain storage team indicates four types of difficulties presently encountered: (a) loss in storage from heat and humidity, (b) lack of trained personnel in quality control (principally fumigation and administration), (c) lack of equipment for measuring grain quality (humidity, insects, foreign matter), and (d) pricing policies that do not permit coverage of costs of storage and handling. Based on the work of the grain storage team, an estimated 15-21% of grain is lost due to insects, funji, or rejected by purchasing agencies due to high moisture content. In addition, ENCI operates with capacity constraints during the corn harvest period while ECASA presently has excess rice storage capacity.

On-farm storage of grains usually takes place in farmers houses. Farmers complain about dockage imposed by ENCI and ECASA for humidity and impurities. Existing moisture measurement meters utilize only eight grains, have not been recalibrated in years, and thus makes the setting of price differentials haphazard at best. An important and offsetting benefit provided to farmers by ENCI and ECASA is that prices paid are set by national norms at purchasing stations. For example, ENCI paid (June 1981) S/.79 per kg for corn at Tingo Maria, Nuevo Progreso, and Tocache as compared with S/.80.5 in Lima, and the freightage only from Tingo Maria to Lima, reported to us by ENCI, was S/.14.6 per kg. (For ECASA the consumer also receives a freight subsidy as milled rice is imported from Lima and Pucallpa to cover the regional supply deficit).

Coffee and Cacao

The CAS Naranjillo (Naranjillo Agricultural Services Cooperative), located in Tingo Maria, is the major marketer of regional production of cacao and coffee. CAS Naranjillo officials estimate its purchases encompass about 80% of regional cacao production and 90% of regional coffee production. A portion of these commodities are produced outside the Project Area, i.e. along the highway to Pucallpa. Stated in quintales and MT, CAS Naranjillo purchases of these products are reported below:

	Cacao (quintal = 100 pounds)	Coffee (quintal = 122.7 pounds)	Cacao MT	Coffee MT 1/
1971	136	23,462	6.3	1,295.1
1972	731	31,526	33.6	1,740.2
1973	1,419	16,949	65.3	935.6
1974	1,236	27,038	56.9	1,492.5
1975	3,939	15,866	181.2	875.8
1976	3,852	20,822	177.2	1,149.4
1977	7,775	22,499	357.7	1,241.9
1978	8,259	22,405	379.9	1,236.8
1979	7,820	23,926	359.7	1,320.7
1980	12,123	23,344	557.7	1,288.6

CAS Naranjillo does not operate purchasing stations other than at its headquarters in Tingo Maria and its officials believe they serve a total of about 4,000 farmers (including a portion from outside the Project Area). Transportation costs which farmers bear on these products depend mainly upon location. For an 80 kg sack of cacao or a 55 kg sack of coffee, transport cost from Tocache is thought by a CAS Naranjillo official to approximate S/.3,000. In some coffee growing areas of the Tingo Maria zone not served by road, transport cost per sack to a main road can reach S/.5,000.

The current problem of marketing cacao and coffee is adverse international price movement of the past year. The coffee problem is severe. Peru's quota under the ICO assignment is 1,150,000 bags (of 120 pounds of coffee beans). At present the GOP and coffee producer cooperatives are in negotiations, and reportedly the GOP wants to assign the specific quotas to cooperatives who, in turn, want the government to buy the surplus. As with other coffee cooperatives, CAS Naranjillo sends its coffee to the Cooperative Central in Lima, which undertakes the final processing. ENCI then commercializes the coffee, and CAS Naranjillo receives payment about three months after export. Naranjillo makes an advance to members upon receipt of coffee and borrows from the Banco Agrario to cover these advances (which was described by a Naranjillo official as fine for ENCI and Banco Agrario).

1/ MT of coffee berries; 121.7 pounds of dried coffee berries equals 100 pounds of coffee beans. Data on coffee in FAS reports are stated on MT of coffee beans.

The substantial annual variation in Naranjillo coffee purchases denoted in above statistics may be explained by non-harvest of the more remote coffee in periods of low prices.

CAS Naranjillo marketing of cacao demonstrates a strong upward trend. Peru was a net importer of cacao up to 1976. It is estimated (FAS PR-1005) that Peru's 1980 cacao output totaled 7,500 MT with exports of about 4,200 MT. An increasing proportion of exports is taking the form of cacao paste. The CAS Naranjillo wants to construct a cacao processing plant and is endeavoring to raise from members one-fourth of the required capital to finance a fixed asset cost for the plant of US$1.7 million; the remainder could be borrowed.

Plantains (Platanos)

Plantains are grown throughout the region and can be planted and harvested throughout the year. During the late 1940s there was a banana "boom" in the area, but this period of prosperity was terminated by Panama and Sigatoka diseases. Data from the truck control station (garita de control) on the Tingo Maria-Huanuco highway on shipment of plantains for the period 1972-80 indicate annual shipments ranging from 25,936 MT to 45,597 MT with 3-year averages of 36,640 MT for 1972-74 and 35,336 MT for 1978-80. 1/ Some portion of this output comes from Aguaytia (on the highway to Pucallpa). The 1978-80 export noted above is equivalent to 707 MT per week (about 100 truckloads of seven MT each). A knowledgeable expert (formerly Technical Director of the IDB project) noted that 80 to 100 truckloads of plantains per week were being shipped out of the region in 1971-72. We believe that about 60-70% (60-70 trucks per week) would fairly represent current exports from the Project Area. Three types of plantains are grown in the project region: they are the platano de isla, which is smaller than a banana but also sweeter and marketed in Lima at a higher price than bananas; the palillo or guayabo which can be eaten raw or cooked; and the bellaco which must be baked or boiled and is the grown mainly for on-farm and local consumption. Typically trucker-brokers buy plantains along the main roads, transport them to the main towns, and assemble loads for shipment.

Other Crop Exports

Several other crops appear to be exported from the region by means of truck and without a system of highly-organized commercialization. Here again, tonnage data may include some production from the Aguaytia area, and it wouldbe inappropriate to push too hard

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1/ Annex II, Exhibit G, Table 14.

on weak truck control data. 1/ The average annual estimated weights from truck control data for 1978-80 are as follows in metric tons: corn (5,615), oranges (2,450), cassava (1,557), lemons (41).

Animal Products

In regard to the marketing of beef, the area has no refrigerated storage, feed-lot operations, nor an organized market for live beef. Brokers frequently buy beef animals on the basis of estimated weight and truck them to the slaughterhouse at Tingo Maria. Markets for milk, eggs, chicken, and pork in towns are supplied by local producers.

b. Input Marketing

The demand for purchased inputs other than labor is generally low in the region. The principal purchased inputs for annual crops are seed and plantstocks. According to the survey, seed or plantstock are purchased by 27% of the corn farmers, 38% of the rice farmers, and 16% of the cassava farmers. 2/ Purchases of other inputs for these activities are minimal. For perennial crops (plantains, coffee, cacao) insecticides and fungicides are the principal purchased inputs. These are purchased by 16% of the plaintain growers, 23% of the coffee growers, and 21% of the cacao growers. Other purchased inputs are minimal. In contrast, 13% of the coca growers purchase fertilizer, and 39% purchase insecticides/pesticides (but these categories may include mainly herbicides which was not specified as a survey question). The survey provided no information on amounts purchased but suggests that utilization of purchased inputs is not widespread. Private dealers in the area have noted a decrease in sales of chemical inputs since the Verde Mar anti-coca operations and this decline is consistent with the higher incidence of use associated with coca cultivation.

The lack of demand for purchased inputs is reflected in the small number of outlets for agricultural inputs. In Tingo Maria there are three private input suppliers and the CAS Naranjillo, and ENCI for fertilizer. The CAS Naranjillo is also an authorized ENCI distributor. In Aucayacu there is one input dealer. Previously, the Central Huallaga Cooperative and two private dealers operated in Aucayacu, but

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1/ The truck control data obtained by us is not wholly consistent or complete due to apparent and significant non-registration of goods owned by state enterprises, possible underregistration of high value crops, the lack of scales to weigh trucks, and exclusion of some goods for certain years by MA commercialization personnel due to smallness of volume

2/ See Annex II, Exhibit G, Table 11.

they have ceased operations. During 1980 the CAS Naranjillo sales of farm inputs totalled S/.172.4 million (approximately $600,000) with about one-fourth of this coming from fertilizer sales. Quantities of fertilizers sold by CAS Naranjillo in 1980 were as follows in metric tons: nitrogen (42.5), phosphate (30.8), and potassium (20.1). For seed and plantstock in the area north of Aucayacu, the principal supplier is the National Agrarian University of the Jungle, through its Centros Pilotos (Pilot Centers). There are ten such Pilot Centers operated by 2-3 technicians each. Their activities include developing seedbeds on individual farms and provision of technical assistance.

Fertilizer

ENCI controls all bulk fertilizer sales. Fertilizer can be purchased through the ENCI office in Tingo Maria and its two authorized agents: the CAS Naranjillo in Tingo Maria and a private distributor in Aucayacu. ENCI allows its agents a six % mark-up and subsidizes the transport cost by delivering supplies to the agents at a single standard cost. The six % margin discourages private entry into the distribution system except in areas with high volume potential. Lacking a clear high volume potential, fertilizer sales tend to be a sideline for an input supplier with other, more profitable, sales activities. The result is that there are not outlets for fertilizer north of Aucayacu, and farmers end up bearing the transport cost.

Lime

Analysis of soils (both past and recent) suggests that area soils tend to be acidic. This can be offset by the utilization of lime. The hills on the western side of the valley have fairly large dolomitic limestone deposits. On the road from Tingo Maria to Monzon, there is one lime facility. Here, lime is dug by hand on an "as needed" basis. The principal use is for construction. ENDEPALMA made one purchase, but the lime had not been crushed, and ENDEPALMA found it not adequate. At the suggestion of the MA, the owner now dries the lime, crushes it manually, and bags small quantities. Analysis of a sample by the Yurimaguas research station indicated that it is a very promising source of agricultural lime: magnesium content of 12.2% (excellent, maximum is 14%) and a calcium content of 20.8% (low). The manual crushing however does not produce a sufficiently fine product. Mechanical crushing would produce a better product and increase the availability of calcium.

Experiments at Yurimaguas suggest an application rate of one MT per ha every three crop cycles. This suggests that a small facility is all that would be required to meet area requirements. The constraints on increased utilization of liming practices appear to be high transport cost and lack of knowledge of the benefits associated with its use. Additionally, anyone transporting lime must have a special permit from the MA certifying that end use of the lime is for legitimate purposes.

Seeds

The following paragraphs discuss seeds.

(Corn) The corn seed being promoted by the Ministry and in general use by area farmers is "Cuban Yellow". This is a local, degenerated variety for which other alternatives are higher yielding (such as PNC-747, being promoted by the UNAS). Corn seed is generally saved by farmers from previous crops. Seed may also be purchased from the MA. The principal constraint on the demand for purchased corn seed is that farmers do not consider corn an important economic crop. It is used as the first crop after land clearing and is not generally planted again as a commercial crop on cleared land due to disease and pest problems.

(Rice) Data from the survey indicate that 38% of the farmers who grow rice purchase seed. Improved seed is purchased from MA certified producers in the area. At a seeding rate of 30 kg per ha, an estimated area in rice of 2,200 ha, and a yield of four MT per ha with improved varieties, only 16.5 ha are required to produce seed for the entire area currently under production. Seed storage is an on-farm activity, as rice seed is largely unaffected by the climatic conditions.

(Soybeans) Soybean seed has presented difficulties in the area due to the climatic conditions. The life of undried soybean is short, drying must be performed promptly, and storage facilities must include air-conditioning and dehumidifying units. The poor experience with soybeans in the zone is still fresh in the mind of many farmers. The MA pushed soybeans, farmers responded, but were unable to sell their product. Current soybean plantings amount to only 60 ha. Seed is not generally available in the zone.

(Cacao, Coffee) Cacao and coffee seed and plantstock are available through the UNAS nursery in Tingo Maria, the Pilot Centers, the MA nursery in Aucayacu, the Tulumayo research station, and from area farmers. According to the survey, only four % of the cacao growers and one % of the coffee growers purchased seed or plantstock from commercial or institutional sources. For farmers north of Aucayacu, the transport cost of bringing plantstock from Tingo Maria is high. Field interviews in these areas indicate that farmers are using UNAS assistance, provided through the Pilot Centers to establish seedbeds for cacao. In Tingo Maria and Aucayacu in contrast, the nurseries have little demand for cacao and coffee but an increased demand for orange tree stock. UNAS uses seed provided by the Tulumayo research station.

(Bananas) Stock for bananas is provided by area farmers.

c. Credit

Banco Agrario

The Banco Agrario del Peru, the state agricultural development bank, has a full service branch office in Tingo María with agency offices in Aucayacu and Tocache. Banco Agrario made 1,280 loans in 1980 in the Project Area with a total value of S/.1,383 million (approximately US$4.8 million) for financing 6,653 ha of crops and other agricultural purposes. The Tingo Maria branch made 606 loans or 47% of all loans made (value of S/.1,173 million equal to 85% of the value of all loans made); the Aucayacu agency office made 19% of the total loans having a value of nine % of total funds lent; and the Tocache agency office made 34% of the total loans having a value of about seven % of total funds lent.

Agricultural Bank
1980 Project Area Loans
by Type and Borrower

	Number		Amount (millions of soles)
Total Loans	1,281	(a)	1,386.066
Total to Individual Farmers	1,270		487.126
Crop Loans	1,212		355.763
Machinery, Cattle, Pastures	58		131.363
Marketing	--		--
Total to Cooperatives	11		898.940
Crop Loans	7		283.300
Machinery, Cattle, Pastures	3		99.800
Marketing	1		515.840

(a) Bank data contains one extra loan not shown in other bank statistics.

A random sample (five %) of standard crop loans made in 1980 indicated an average loan amount of S/.308.2 thousand (approximately 1,000 dollars), an average farm size of 9.5 ha and an average crop area supported by loans of 3.6 ha. The amount of time required for processing standard loans varied from three days to near one month, with two weeks being about the average period from receipt of request to the granting of the loan. These loans were generally a combination of cash and supplies, mainly fertilizer. The supply portion was provided to the borrower through a voucher mechanism where by the fertilizer dealer was authorized to make delivery to the farmer and charge the bank.

In 1980 the Banco Agrario implemented for the first time a system for providing rapid loans to prior borrowers. A client who has paid off two previous crop loans is entitled to a loan and to receive the entire amount requested within 24 hours. No inspection prior to granting the loan or after its granting is required. This recently implemented system involved about 20% of the total value of crop loans in 1980.

In regard to term maturity, in 1980 the Banco Agrario made a total of S/.231.2 million in medium-term loans -- an amount equal to about 17% of total loan value. Of this total the available data indicate that at least S/.68.7 million or five % of total loan value (or 30% of medium-term credit) was for pasture improvement loans, i.e. related to beef production. One loan totaling S/.512.8 million or 37% of the total value of all loans made in 1980 was for marketing of coffee. This is an extremely short-term credit, which normally does not exceed three months.

BANCOOP

In March 1980 the Banco Nacional de las Cooperativas del Peru, Ltda. (BANCOOP) established a branch office in Tingo Maria and an agency in Aucayacu. Within the expanded project area, BANCOOP made 331 loans with value of S/.192 million from its own funds and loans worth S/.89 million from the AID supported Rural Production Fund (project 527-174). BANCOOP also obtained savings and time accounts in the area worth S/.276.5 million in 1980. Over 90% of BANCOOP's Rural Production Fund credit was to cooperatives with short-term commercialization loans being the most important factor in its agricultural lending.

Loan Charges

During 1980 BANCOOP charged realistic rates that approached 70% per annum in real terms when its stated rates were adjusted for commissions and fees, which is about the same as commercial bank charges. At the same time, Banco Agrario was charging stated (or nominal) rates which ranged from 14% on cattle loans to 27.5% on other loans. In early 1981 these rates were adjusted upward to a maximum of 42%.

Transaction Costs

Borrowers in general will be quick to state that stated (nominal) interest and loan charges rates are too high. Further dialogue usually indicates awareness of the high transaction cost of several visits to a formal lending institution. One particularly interesting interview provided clear insight into why a farmer might prefer paying over 60% instead of 14%, the Banco Agrario's old subsidized rate on cattle loans. The 14% loans required that the bank send an official to preside at the cattle sale to release the specific collateral. Since phones are not common, the farmer stated a trip to Tingo Maria was necessary to arrange this visit. The probability that the visit cannot be scheduled for the day or time convenient to the buyer or bank is high. Even when scheduled, the risk of the visit not occurring at the set time is high. The result would be a lost opportunity to sell. In general, farmers are clearly aware of the need for timely credit which permits attending to the crop based on its specific cultural cycle to the advantage of or to avoid rains and to utilize timely weed and insect pest control. These factors were considered by farmers as more important than actual loan charges in informal conversations held with prospective borrowers in late 1979 by BANCOOP personnel and the USAID-contract credit advisor.

The Unorganized Market

An informal credit system functions mainly among those farmers just beginning to produce coca. The interested buyers reportedly finance start-up cost at zero interest rates. This financing is probably repaid in an assured supply of coca leaf to cocaine paste producers. No evidence has been detected on use of informal credit by farmers for other crops, possibly because use of inputs, both fertilizer and insecticides, is low.

d. Extension

The MA has an agricultural office in Tingo Maria and agencies in Aucayacu, Uchiza, and Tocache. The agencies in Uchiza and Tocache are formally in the XI Agricultural Region headquartered at Moyobamba and the other agencies and offices are part of the Huanuco region. It should be noted that the new Organizational Law of the agricultural sector has created INIPA, INFOR, INAF, and INDA. In the Project Area, INIPA (Instituto Nacional de Investigación y Promoción Agropecuaria) is establishing a zonal office which will report to the regional Agricultural Research and Promotion Center (CIPA) in Huanuco. INIPA is currently involved in a complete reorganization of field staffing and personnel for its extension activities. Prior to the reorganization, 18 professionals and 29 agricultural technicians (sectoristas) were assigned to four MA extension agencies in the project area:

Agency	Agronomists	Veterinarians	Technicians
Tingo Maria	7	1	8
Aucayacu	4	1	9
Uchiza	1	1	8
Tocache	2	1	4
	14	4	29

Some of these personnel are being transferred to INIPA and others are being retained by the MA General Directorate of Agriculture and Livestock to work in MA control, inspection and licensing activities. With an estimated 6,000 farm families in the area, the ratio of extension personnel to farmers was approximately one extension person to 128 farmers. The outreach of the extension service has been exacerbated by the lack of vehicles and operating funds for gasoline and other expenses. In addition to their inability to get to the field, the extension agents were also handicapped by the lack of extension materials and in-service training programs to upgrade their limited technical skills. According to the F.D.N. farm survey, only 23% of the farmers in the Project Area reported receiving technical assistance, (See Table II-6).. The term "technical assistance" was not defined, but presumably referred to visits by an extension agent in the past few years. With 47 extension agents and a sample size expansion factor of 13, it would appear that collectively they visited about 1,200 farmers. This amounts to about 25 farmers per extension agent.

e. Research Activities

INIPA operates an agricultural research station at Tulumayo, about midway between Tingo Maria and Aucayacu. The station is located on some 420 ha of flat and gently sloping ground adjacent to the Marginal Highway near the confluence of the Tulumayo and Huallaga Rivers. Some 38 ha are planted to experimental crops and 200 ha are in pasture. The station has been in existence since 1963 and is currently operating with a greatly reduced staff of five researchers and four technicians plus a crew of farm laborers. Research work is concentrated on rice, soybeans, corn, cacao, coffee, aguaje (a native palm) and pastures. The station does not have laboratories nor equipment for analyzing field experiments and soil testing. The National Agrarian University of the Jungle has provided some limited technical backstopping in soils analysis and special research projects in corn and citrus. In addition to short staffing and lack of equipment, the Tulumayo experimental station has also been seriously handicapped by budgetary limitations. The Tulumayo station also has two sub-stations located at La Divisoria in the south western section of the Project Area, and at Tocache in the northern section of the Project Area. The crop research at La Divisoria is concentrated on coffee, tea, and potatoes and at Tocache on rubber, cassava, and soybeans.

The National Agrarian University of the Jungle (UNAS) was established in 1964 occupying and expanding upon the facilities utilized by the original U.S. Government Institute of Inter-American Affairs (IIAA) Experiment Station at Tingo Maria. The UNAS has 76 faculty members with plans to increase to 100 in 1982. At present, 35 of the 76 faculty members have M.S. degrees and two are currently studying for their M.S. in the U.S. under LASPAU scholarships. The current enrollment at UNAS is approximately 900. In July 1981, some 45 students graduated including 20 agronomist, 12 animal scientists and 13 food processing engineers. Another 15 students will graduate in December 1981. The UNAS has recently added a program for a degree in Renewable Natural Resources.

The University has inadequate laboratory and research facilities and is functioning under a very limited budget. The University has been able to improve its research and extension program somewhat in the past two years with the assistance of a U.S. Embassy/INM grant. Under this grant the UNAS is conducting an adaptive research/extension program at 11 Pilot Centers in the Project Area. Each center serves an area of 20 km^2 and 15-30 farmers with one agronomist and one agricultural technician providing technical advice on demonstration plots in cacao, tea, coffee, corn, rice, bananas, cassava and papayas. INM is also financing a program under which the UNAS provides seedlings to farmers interested in switching from coca production to other crops. The UNAS has also received assistance from Canada for a livestock artificial insemination outreach program and from Hungary for a rudimentary soils laboratory and a pilot food processing plant. Additional equipment and supplies are required to make the soils laboratory reasonably functional, and the pilot food processing plant has serious limitations with respect to size and efficiency of operation.

There are two additional experimental research stations in the Huallaga River valley basin further north which can provide some support to the Project Area, "El Porvenir" in Tarapoto and Yurimaguas. The latter station is particularly important due to the active North Carolina State University (A.I.D.-funded) applied research program in management of humid tropic acid soils. Also, the Pucallpa experimental station south east of the Project Area is working on pasture management problems.

4. <u>The Coca Inquiry</u>

An important element in justifying the Project is the suppression of coca cultivation in the upper Huallaga region. There is considerable difference in professional judgement as to whether suppression of coca cultivation in this region will shift production to similar sites in Peru, the particular mechanisms that could be employed most feasibly in suppression, and the degree of consideration that should be given to growing of coca in the region for the Peruvian consumers in the sierra region. Even though these are important issues, they are not debated, resolved, or treated in this inquiry. Herein we focus on the agronomics and economics of coca cultivation, its substantial increase in the 1970s in the Project Area, and its role in the regional economy.

a. The Agronomics of Coca

Coca is a perennial shrub which is grown on well drained soils in the upper Huallaga region. It is an extremely hardy plant which can grow on poor soils, with deficiencies in phosphorous, potassium, calcium, magnesium, and trace elements, highly acidic soils, and soils with toxic concentrations of aluminium, iron, and manganese. These factors restrict the growth of most crops particularly plantains, coffee, and cacao. However, coca is also grown in fields of better fertility. The coca plant root system cannot tolerate standing water. For this reason and as demonstrated by mapping-aerial reconnaissance, there is almost no coca grown on Class V lands. (In cases where this occurs the explanatory variable is always an outcrop of elevated or hilly land). The association with Class II land is also low and the principal reason may also be drainage. Significant coca areas are found on Class III lands and substantial plantings are found on Class IV lands. The largest share of coca is grown on lands without agrological classification maps.

In regard to elevation, at least on the eastern margin of the Huallaga Valley, an area included in aerial reconnaissance, little or no growing areas are found at elevations in excess of 1,000 meters. 1/ There appears to be no similar constraint in regard to decreasing elevation, but alkaloid content of leaf reportedly decreases at lower elevations. The extent of this relationship is unknown. The gradient of slope poses no significant restriction on cultivation apart from the obvious increase in difficulty of weeding, leaf picking, and more rapid soil erosion on steep slopes. Cultivation on slopes in excess of 50% gradient is observed. Rows are usually laid out with the slope and not perpendicular to or across the slope, apparently to facilitate drainage and cultivation.

Coca seeds are planted in seedbeds and tended for approximately three months before being transplanted to the field. The common practice in the upper Huallaga valley is to plant coca seedlings in clumps of four, eventually weeding out the three weaker plants. Approximately 40,000 seedlings are needed to plant one-hectare with 10,000 mature coca plants comprising an average field. The young plant must be grown in partial shade, frequently under cassava, and weeded regularly. Production begins when the plants are approximately 18 months old. The plants are mature, approximately one meter tall, at an age of three years. Coca fields as old as 40 years have been reported but the

1/ However, according to the literature, coca can be grown at an altitude of up to 2,000 meters.

age of maximum production in the upper Huallaga is believed to be between three and seven years. Leaf production of older plants can be increased by pruning but this does not appear to be a common practice in the upper Huallaga. Apart from weed control, cultivation with a special tool to cut (prune) the coca root system appears essential for maintenance of vigorous leaf growth. This pruning and hilling called the aporque is undertaken once or twice a year and is performed with a hoz (a stick with a sickle-shaped blade) which is pulled toward the user through the ground.

Once established, coca is a hardy shrub. Several diseases are known which may effect production but none that kill the plant. Insects are controlled with pesticides. Frequent weeding is required either by hand or with paraquat ("liquid machete" in the venacular of the valley). Foliar fertilizers to stimulate leaf growth are also used by some growers.

Harvest usually takes place when the leaves are maximum size. If left unharvested, mature leaves begin to fall on the ground after about eight days. Leaves are harvested three to six times a year. The picking does not involve leaf selection but rather a total stripping of leaves from the bush. The harvest cycle appears related mainly to the time of the previous harvest, and fields in all stages of leaf generation exist simultaneously. Leaves are dried in the sun or in wood-fired dryers, which is a definite benefit during the rainy season. Drying of leaves for the production of cocaine paste is not required but is frequently done to prevent the leaves from rotting.

b. The Economics of Coca

Available information and data suggest wide variation in price, cost of production, and productivity of coca leaf. Farmgate leaf prices are usually quoted in arrobas (11.2 kg of dried leaf), and as of June 1981 the reported blackmarket (predominant) arroba price ranged from S/.12,000 to S/.30,000 with S/.23,000 (or S/.2,000 per kg) as a reasonable estimate of an average price for average quality dried coca leaf. Prices of blackmarket dried coca leaf have been declining in real terms since 1979. During 1979 the average price was about S/.20,000 per arroba and ranged as high as S/.40,000; a price equivalent to the S/.20,000 price of 1979 for mid 1981 would approximate S/.55,000. After the Verde Mar operation in late 1979 and March 1980, the price of illicit leaf declined. During March and April 1981, the price ranged from only S/.4,000 to S/.8,000 per arroba. This period of low price was contemporaneous with closure of the Peru-Ecuador border and with disruption of essential processing supplies due to the closure of land transport from Lima by landslides.

The F.D.N. survey of 385 farms was also carried out during this period (March-April 1981) when farmgate prices were lower than usual. From a tabulation of 49 farmers growing coca, the following per farm averages were derived:

Ha harvested	:	0.992
Yield per ha	:	783 kg (dried leaf)
Quantity	:	775 kg (dried leaf)
Price	:	S/.925 per kg (US$2.31)
Value	:	S/.717,000 (US$1,792)

The yield per ha statistic is interesting. MA officials in Tingo Maria believe average yield is 1,200 kg per ha with a maximum of 1,800 kg and minimum of 800 kg. The average of the six highest yields in the F.D.N. survey (composed of the highest two for each of the three major regional producing zones) is 2,329 kg, which is obviously much higher than the 783 kg derived from 49 farm cases. We suspect that differences in plant maturity, soil fertility, and cultivation techniques are responsible for a high yield variance. For a mature planting of 3-7 years of age, the difference between average high technology and soil fertility and average low technology and soil fertility might be on the order per ha of 500 kg of dried leaf, with a yield of 1,000 kg as a reasonable estimate of the average. Inclusion of older plantings probably lowers the average yield to about 800 kg. However, sustained high prices (or low prices) might also pry this average yield up (or down) significantly.

No field survey data are available on the annual labor requirement for one ha of coca leaf. Data presented in Annex II, Exhibit G, Table 17 present the best estimates of a MA official in the area and UNAS cost estimates. For a coca field in the 3-7 year peak productivity, average labor required per ha is on the order of 0.8 laborer per ha per year for high technology cultivation. For low technology cultivation this annual average is on the order of 0.6 laborer.

Production costs (per ha per year) were estimated by a UNAS professor in prices of 1980. The cost of labor of this estimate is S/.209,530 (including maintenance of the field, picking and legally obligated benefits) and the cost of materials, depreciation, and drying and packing is S/.314,750. The latter would be the relevant cost for a small (one ha) grower using family labor and paying out-of-pocket for drying and packing of coca leaves. For the larger producer the cost of labor might be higher than the UNAS estimate. During 1980 the daily cash wage for part-time workers in the project area was about S/.800 for non-coca workers and S/.1,200 to S/.1,500 for coca workers. 1/ The reason for this wage disparity is unknown. It may relate to periodic

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1/ F.D.N. Plan, op. cit., p. 88-90.

unemployment of coca workers related to the employment in coca picking; it may include a cost of transport of workers to remote work sites; and it may include a payment for correct (silent) behavior. In addition, coca pickers are commonly paid on a piece-work basis, but even here good pickers can earn as much as others in coca. Tabulation of survey data indicates that coca producers pay workers in food as well as cash, and this practice is common for other part-time farm workers as well.

Coca farmers in the area consider US$1,500 to US$2,000 as the first half of 1981 "break even" point on a ha of coca. If one assumes materials costs at about S/.400,000 per ha and an average 0.7 person years of labor per ha (or 182 days of labor) at S/.1,500 per day, the total cost would be S/.673,000 (US$1,683). If one includes an additional S/.700 per day for food, the result is S/.800,400 (US$2,001). The respective "break-even" prices per kg of coca can be derived by assuming an average yield of 800 kg per ha. For the former case, this price is S/.841 per kg (or S/.9,422 per <u>arroba</u>); for the latter case, this price is S/.1,001 per kg (or S/.11,206 per <u>arroba</u>). The lower price (S/.841 per kg) would just reward the small producer with S/.1,500 per day for his labor in coca cultivation.

At a price of S/.2,000 per kg, the profit margin is at least S/.1,000 per kg, and a price of S/.2,000 per kg corresponds to S/.22,400 per <u>arroba</u> -- a price that is less than half of the real price prevailing in 1979. However, one caveat must also be noted. The substantial range in coca dried leaf prices (S/.12,000 to S/.30,000 per <u>arroba</u>) also suggests substantial market imperfection. The illicit nature of production, and particularly conversion into cocaine paste, and the bulkiness and difficulty of transporting leaves (green and dried) probably explain this imperfection. However, tied marketing arrangements affecting small producers may also be important.

c. <u>The Coca Boom</u>

Any crop that has an annual gross value of production of $4,000 per ha, a profit of $2,000 per ha ($800 per acre), and could provide an annual wage of about $3,000 per one person using 70% of his labor would have rapid expansion in area cultivated in Peru. Additional benefits of coca for producers are that it grows on lands not suited agronomically or economically to non-forest crops and the final product is easy to transport.

During the late 1960s and early 1970s, reportedly, a wide range of technical services were provided to farmers by cocaine paste buyers, including loans, technical assistance, and materials. There were less than 1,500 ha in 1962. By 1972 coca cultivation in the Project Area was probably still less than 3,000 ha. According to one observer, up to that time, most of the cultivation was related to stable farm operations. These commercial producers were, however, expanding cultivation and had a well-established system in place of agents in the sierra (enganchadores) who contracted labor for picking and cultivation. These laborers were generally contracted for only short periods of time. By c.a. 1973-75 many of these laborers were entering the Project Area, particularly the zones of Tingo Maria, Aucayacu, and Uchiza, to grow their own coca.

The largest portion of coca is grown in areas not included in the IDB-financed Colonization project (from the Anda River in the Aucayacu zone to the north) but in the Tingo Maria zone and southern portion of the Aucayacu zone. In addition, according to the former Technical Director of the Colonization project, title contracts under that project required no cultivation of coca. The 1978 educational census in the Aucayacu zone indicates substantial immigratior into that area after 1971. Strug 2/ cites an estimate of 8,000 peasants living between km eight outside of Tingo Maria and Aucayacu, and all observers who have visited this zone (which has a heavy concentration of coca growing to the east of the Marginal Highway) judge that there is evidence of two to four times as many people living along the highway as they could associate with observable (mainly non-coca) agricultural activity. A portion of land invasion cases also appears related to the taking over of land suited to coca cultivation. In particular, evidence includes invasion of 14 logging concessions, invasion of the Rio Oro sector of the Parque Nacional (near Tingo Maria), citation of this problem by officials of the CAP Pucate (west of the town of Aucayacu, across the Huallaga river) and lands of the CAP Te-Cafe Peru (Tingo Maria zone). The CAP Piura (Uchiza zone) also filed a complaint with the MA, stating that part of the land adjudicated to it had been invaded by a group of farmers who had caused damage to fences. These invasion cases appear related to coca; there are also other cases which do not appear to be so related and may correspond to dissolution of CAPs by their former members or invasions of lands not otherwise occupied as in the Tocache zone.

One observer notes that by the second half of the 1970s, there were basically two types of coca growers: those who cultivated coca as part of their general farming operations (probably the farmer with coca detected by the F.D.N. survey) and the type he termed a cultivador ambulante, i.e. a person who lives in a town or along the highway and walks to his coca field or fields which he owns or where he works but where he does not reside permanently. For this person, coca growing and picking is the principal occupation. Obviously a

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1/ D.L. Strug and C. Fonseca Martel, An Analysis of Coca Leaf Cultivation in the Upper Huallaga Valley of Peru: Implications for Regional Economic Development (Report to USAID, Lima, Peru, May 1981), pp. 78-79.

coca monocrop cultivator who worked on steep lands would probably not waste his time growing food crops (cassava and beans), but if this cultivador ambulante came from the sierra he woul? probably consume the traditional sierra foods, onions and potatoes. The same observer stated also that the cultivador ambulante type did not exist in the region in the early 1970s.

In the absence of supporting evidence, the above discussion could be dismissed. However, Tingo Maria truck control post data indicate that the regional inflow of onions and potatoes, staples of the serrano diet, increased vigorously during the 1970s. Annual inbound registrations are as follows in metric tons:

	Average Annual Truck Control Registration	
	1971-1973	1978-1980
Onions	287	732
Potatoes	1,016	3,503

Nutrition surveys in the Lima area (1972 and 1978) indicate that daily consumption of potatoes ranged from 0.9 kg for low-income families to 0.67 kg for high-income families. To obtain an estimate of possible families, we assume that the 75 % of the increase in registered potato imports pertain to the Project Area, that daily consumption is 1.0 kg per family, and that only half of these families are directly involved in coca cultivation. These assumptions yield 2,555 families. A higher daily consumption of potatoes by the family, of say, 1.5 kg would lower the number of families to 1,703. Estimates of the associated expansion of coca cultivation can be suggested. For example, assuming even 2.0 workers per family and 0.7 labor years per ha of coca cultivated suggests 7,300 ha cultivated by the 2,555 families or 4,866 ha cultivated by 1,703 families. The median set by these estimates is about 6,000 ha, a range for coca area expansion associated with recent immigrants dedicated principally to coca cultivation and not principally to non-coca farming. An estimate of this magnitude appears to approximate the expansion of coca cultivation outside the titled farm area. 1/

1/ Even though one cannot reject the hypotheses that stable farmers in the colonization took up the eating of onions and potatoes or that all the increase in potato consumption went on in Pucallpa (a town of about 90,000 population), only 37.5% of the increase is assumed directly related to increased coca cultivation, and the other hypotheses seem weak.

The number of farmers registered with ENACO [1/] (in 1978 when the registry was closed) in the Department of Huanuco was 4,513, the number of fields was 5,128 and the area amounted to 5,408 ha (The registry is believed to contain fraudulent information -- both under and overstatement of coca field size and ownership). The licit sales amounted to 682 MT, or about 15.7% of the expected output of 540 ha (at 800 kg per ha). Therefore, a sizeable area is unregistered both within and outside the Project Area, and coca growers registered with ENACO are selling coca leaf and cocaine paste outside the legal mechanisms of ENACO control.

Expansion of coca cultivation in the Project Area occurred in the first instance due to lack of effective governmental resistance. In terms of probable importance, the basic factors explaining this expansion are:

(1) high demand for illicit cocaine paste;

(2) corruption of governmental authorities which is related to high demand for cocaine paste and the profits from production;

(3) the good adaption of coca leaf production to climatic and soil conditions; and

(4) the poorer adaption of most other crops, and significantly lower annual returns and profits per hectare due to climatic and soil conditions.

d. <u>Coca Substitutes</u>

The PID and Environmental Assessment (EA) state that there can be very little "substitution" of crops on areas planted to coca because the poor soils and steep slopes on which coca flourish are not suited to the production of other crops. The EA estimates that 80% of the coca land (on slopes) should be in managed or protective forest or highly restricted agriculture. Even though this is a good supposition evidence is incomplete. Within the area of titled lands, coca is grown on some soils of Class II, III, and IV that could produce other crops and pastures for livestock. Outside of the area of titled lands, slope gradients are higher, and only a small portion of the land would be suitable for other crops and livestock.

1/ State coca registration and marketing company.

Inasmuch as nearly all of the level lands are owned, mainly by small and medium farmers, changes in land tenure to take land from these farmers to give or sell to cocaleros appear inappropriate and conducive to unnecessary social conflict. No combination of proposals for immediate high profile push on production withstood technical feasibility tests employed during Project development analysis. The best proposals included dual-purpose livestock, paddy rice-soybean rotation, and cacao. With each proposal, significant serious questions were raised regarding agronomic, environmental, or economic feasibility, and these doubts could be decreased only by more substantial research and on-farm experience than is available at present.

Frequently it is assumed that coca is simply a "golden" crop and that nothing can be done to reduce its profitability. The evidence discussed above suggests the opposite and also that disruption of processing supplies for cocaine paste production decreases the black-market leaf price. Estimated returns to labor for various crops (see Annex II, Exhibit G, Table 18) indicate that at an estimated 1980 shadow price of S/.1,500 per kg, coca produces a higher return per day of labor than any other crop grown in the region. At a price of S/.750 per kg, plantains, cacao, and coffee would produce higher returns to labor than coca. Based upon the evidence of economic history, there is no agricultural crop that will be grown without due regard to price and profitability.

e. The Regional Economy

Rapid expansion of coca cultivation in the project area during the 1970s brought about immigration of people to cultivate coca and higher incomes and from this increase in purchasing power a strong expansion of commercial activity in the towns of Tingo Maria and Aucayacu. Coca prosperity undoubtedly influenced non-coca producers by providing new opportunities in commercial activities and by increasing demand for locally-produced foodstuffs. There can be little doubt that expansion of coca cultivation has increased incomes and wealth within the region and also skewed the distribution of income toward coca producers. However, little evidence has been discovered to confirm abandonment of production on higher quality valley land (Class II and III lands) in favor of intraregional migration to hilly lands (Class IV to VIII lands) to grow coca, and the real world is probably more complicated than this.

It is difficult to assess how much of the coca prosperity has rubbed off on corn-cassava-plantain farmers situated on valley lands. The positive effect would include increased demand for food crops--beans, cassava, and plantains--and increased opportunities to engage in commercial activities, providing transport and housing services. Negative effects would include higher wages, more difficulty in obtaining labor, an increase in land invasion activity, and increased prices of regional food imports.

The elimination of coca cultivation by whatever the mechanisms employed (busting cocaine paste producers and merchandizers, eradication of coca plants, or stronger penalties for growing unregistered coca) will produce economic hardship for the groups who have benefitted most from the coca prosperity. The injured group includes cocaine paste producers and merchandizers (who do not appear to have invested substantial capital in fixed assets in the region), marchants who sell consumer durables, and coca cultivators. The Verde Mar operations have already taken the bloom off the prosperity of the towns. As noted by Strug (p. 78)

> "The availability of cash from coca farming has affected urban growth and infrastructure, and has attracted merchants to the area to meet the material demands of agriculturalists with cash to spend.
>
> "Just how important coca has been to the local economy is indicated by the decline of business activity in Tingo Maria since the Verde Mar operations. Business has dropped by over sixty percent according to merchants interviewed. The merchants note that agriculturalists have less to spend than previously; that there are fewer of them in the area, and many who out of fear for the police do not come to Tingo Maria". 1/

The Project Area has most of the characteristics of a dual economic system, i.e. the coexistence within an area of economic units with different factor endowments, ownership of essential means of high-income and high-profit activity production by economic agents from outside the region, importation of a labor force mainly to produce coca, and utilization of a sizeable portion of profits generated by the more productive (coca) sector outside of the region. Thus, while a portion of the profits from coca cultivation may stay in the region and capitalize farm operations, a larger portion has probably gone out of the Project Area for investment elsewhere.

An appreciation of the present importance of coca to the region can be obtained by comparing the gross farmgate value of coca production with non-coca agriculture. The farmgate price of coca understates its total national and regional impact but approximates the income received by coca growers and workers who reside and farm in the region. The significance of coca can be seen by comparing gross value of all agricultural production with and without coca. Excluding coca, gross value of agricultural production in the Project Area in 1980 amounted to S/.7.6 billion (US$26.4 million) and of this amount the proportions are 15.1% from annual crops, 57.7% from perennial crops, 11.6% from livestock, and 7.7% from forestry. Including coca with gross value of S/.14.4 billion (US$50.0 million) raises the gross value of agricultural production to US$76.5 million. (See Table II-7.)

Two hypotheses related to coca expansion in the project area were suggested and examined during project development. They are, curiously, strongly economic and non-economic, as follows: (1) that coca expansion strongly reduced all non-coca agricultural activities of the project region as labor and entreprenurial talent were absorbed by coca growing, and (2) that coca expansion has been caused by non-economic factors such as deterioration of public sector agricultural support services in the region, high interest rates, and neglect of road maintenance. Hypothesis (1) ignores the general high mobility of financial capital and labor in Peru and would be more comfortable if we could find no evidence of an influx of _sierra_ workers into the region to grow coca (and cash purchases of luxury Lima apartments) and convincing evidence of deterioration of feasible non-coca agriculture in the region. Apart from beef production, which was promoted under the IDB project, there is no evidence of substantial deterioration (e.g. cacao, plantains, citrus, or even coffee and cassava), and this is also understandable because arable lands unsuited to coca production in the valley do exist. Hypothesis (2) could be confirmed only if extension, credit, and road maintenance were shown to be of substantially lower quality than elsewhere in Peru or in the high jungle. No analyst with such comparative knowledge has been willing to sustain this allegation, and most confirm that such services are only as poor as or better than elsewhere in rural Peru. During the 1970s the state assisted the region in establishing or promoting tea, palm oil, and tobacco cultivation.

While these hypotheses might be deemed convenient and supportive of the project, this attribute cannot substitute for intrinsic validity. If the value judgement that coca production should be eliminated in the Project Area is accepted, there is no need to show that the non-coca agriculture will be able to grow sufficiently to compensate the region for the loss in coca production (no such promise was entailed in the PID). Nor is there any need to compensate the losers who may transfer financial capital and labor out of the region just as rapidly in the decade of the 1980s as they transferred these resources into the region in the 1970s.

TABLE II-7

BASIC DATA ON GROSS VALUE OF AGRICULTURAL PRODUCTION IN UPPER HUALLAGA PROJECT AREA IN 1980

Annual Crops	MT	Price Per kg (soles)	Gross Value (millions of soles)	Gross Value (US$ Million) (b)
Rice	3,300	89	293.7	1.02
Beans	140	100	14.0	.04
Corn	8,400	38.4	322.6	1.12
Cassava	27,500	15	412.5	1.43
Tobacco	3,456	30	103.7	0.36
Soybeans	72	84	6.0	0.02
			1,152.5	4.00
Perennial Crops (ex coca)				
Palm oil	4,428	230	1,018.4	3.53
Tea	852	436	371.5	1.29
Plantains	31,200	60	1,872.0	6.50
Cacao	800	580	464.0	1.61
Coffee	1,575	362	570.2	1.98
Oranges	4,000	30	120.0	0.42
			4,416.1	15.33
Livestock				
Beef (steers)	727	380	276.3	0.96
Beef (cows)	110	340	37.4	0.13
Milk	1,512	90	136.1	0.47
Pork	240	450	108.0	0.37
Poultry	493	500	246.5	0.86
Eggs	183	450	82.4	0.29
			886.7	3.08
Forestry				
High Quality Lumber	209,923 (a)	1,000	209.9	0.73
Low Quality Lumber	839,692 (a)	450	377.9	1.31
			587.8	2.04
TOTAL EXLCUDING COCA			7,630.9	26.48
Coca Leaf	9,600 (c)	1,500 (c)	14,400.0	49.98
TOTAL INCLUDING COCA			22,030.9	76.46

Source: See Annex II, Exhibit G, A Technical Note on Upper Huallaga Agricultural Production Data; see also F.D.N. Estudio, op. cit., p. 236 (for livestock) and p. 255 (for lumber).

Notes: (a) Stated in cubic meters.

(b) Converted at 1980 average buying rate of S/. 288.13 equal US$ 1.00.

(c) In regard to the value of coca leaf production, while a farmgate price of S/. 2,000 per kg of dried leaf is an estimated June 1980 price, the average price of 1980 was somewhat lower. The F.D.N. estimate is S/. 1,500, and the range may have been as great as from S/. 800 to S/. 1,800 The farmgate value of coca production is based on the following assumptions: 12,000 ha, an average yield of 800 kg per ha and, price of S/.1,500 per kg.

C. Constraints to Regional Development

In examining constraints to Project implementation success, it is appropriate to distinguish among four sets of constraints: (1) constraints related to physical environment and location, which are obviously unchangeable; (2) constraints related to presently known agronomics, market conditions, and the state of public sector agricultural services; (3) identifiable constraints associated with expansion of agricultural production in the region; and (4) the paucity of appropriately trained human capital.

1. Physical Environment and Location

Very high rainfall and a short dry season pose several constraints to increased agricultural production. The high rainfall and basic topography are responsible for comparatively large areas of valley land that are poorly drained and subject to compaction problems as is indicated by the presence of a high proportion of Class V lands. This constraint is less severe in the northern part of the Project Area due to more moderate rainfall levels.

The relatively short and not very dry season has unfavorable impacts on agriculture. These include: (1) the difficulties associated with production since pastures cannot be cleared of weeds and brush by burning; (2) a high seasonal demand for labor due to the coincidence of harvest and land-clearing activities; (3) difficulty posed for harvesting some crops, e.g. soybeans, and for drying and storage of other crops, e.g. corn and rice.

The general location of the Project area does not represent a constraint to production for relatively high value-to-weight crops such as cacao and coffee, but it does pose a constraint for regional exports characterized by low value-to-weight such as corn and rice. Intraregional location factors are highly varied, with some areas of Class II and III lands effectively cut off from road transport, thus inhibiting expansion of low value-to-weight crops.

2. Agronomic and Market Constraints

Pest and weed control problems exist for all crops presently grown in the Project Area. Coffee and citrus appear to be the most disadvantaged perennial crops, and corn is the most disadvantaged annual crop. At present there is no convincing empirical evidence to confirm the existence of economically feasible and behaviorally easy technological packages for specific crops or crops in rotation that would increase yields substantially at significant decreases in unit costs. The tractability of this constraint is unknown.

Marketing services provided by state enterprises in the Project Area are of low quality and could be improved (e.g. ENCI's inconsistency in purchasing corn). The near to medium-term future market prospects of particular crops grown in the region based on information from USDA FAS are as follows by crop:

Rice

Domestic consumption of rice is expected to continue to exceed local production despite production increases in the North Coast and Jaen-Bagua areas. GOP prices and marketing policy serve to maintain a high level of consumption and tends to assure a market for producers.

Corn

Corn imports for animal feed are high. Domestic support prices exceed the price of landed imports. (Corn plays an important role in the local production pattern, as the first crop to be put in after land clearing and as a dietary staple).

Soybeans

The domestic price for soybeans exceeds the price of landed imports. The decline in fish oil production in recent years decreased the availability of edible oils, leading to increased imports. The domestic demand for edible oils is strong.

Cassava

Yuca is grown at a low cost in the region primarily for autoconsumption, but with a small portion for the market. The demand for cassava by-products (flour, starch, animal feed) is expected to grow. (The GOP is considering a law that would required bread to include a small percentage of yuca flour).

Cacao

Cacao, a principal cash crop in the region, faces an uncertain future. Market performance of cacao has been good during the past decade, but record world production and high stock levels suggest continued downward pressure on prices in the near future. The domestic market for cacao products (butter and paste) is still strong.

Coffee

World and national market conditions do not appear propitious for major increases in coffee production. Prices are down and national production exceeds domestic consumption plus Peru's ICO export quota.

Plantains

Plantains are the principal commercial fruit crop in the area and domestic demand remains strong and will grow with population and income in Lima. The region appears to have a comparative advantage in producing plantains.

Palm Oil

Domestic demand is strong and private investors are planning and executing production expansion programs in the Tocache zone. The feasibility of involving individual farmers in this crop is unknown.

Tea

Expansion of production would involve movement into export, and the region does not appear able to compete in world markets due to quality and price problems.

Tobacco

Up to the present, production has expanded due to the effort and supervision provided by a state enterprise, Tabacos del Peru. Market constraints on increased production have not been explored.

Beef Livestock

The take-off rate is low due to climatic conditions which promote weed growth, make low-cost burning of pastures impossible, and promote hoof rot on Class V lands which have been used for pasture. The existing take-off rate provides labor in ranching with a gross income of about S/.500 per work-day assuming 10ha of pasture maintenance. Whether more intensive maintenance would increase the take-off rate to provide higher returns to labor is unknown.

None of the apparent market constraints appear overwhelming. A major expansion of rice/corn/soybean production in the area would require solution of storage, drying and transport constraints, but, at worst, these bottlenecks would be only temporary if adequate financing and selected incentive price policies were provided concurrently.

3. Constraints Associated with Expanded Production

A principal constraint associated with expanded production is appropriate soils management and crop rotation practices in order to avoid the lengthy fallow period required to restore soil fertility. We believe that this constraint can be overcome by application of lime and fertilizer, particularly on Class II and III land. We are less certain concerning appropriate crop rotations (which would impact on weed and pest control) and the appropriate type of mechanization. Reduction of these constraints depends upon an integral effort involving research, upgrading of extension services, on-farm testing and an enlarged and promotive credit effort. During the early years of such an effort, it will be possibe to determine the tractability of constraints affecting crop intensification.

The particular crops which should be the objects of this expansion include rice (both upland and paddy), corn, cacao, plantains, and possibly coffee in certain areas. The principal constraints to expanded production are likely to be the lack of improved crossing of the Huallaga (particularly those served at present by row-boats and dugout canoes), nonutilization of improved seeds and plantstock, and transitory storage/processing bottlenecks.

Diverse opinions exist regarding the feasibility and the prospects for utilization of wetlands (Class V, but not swamps) for crops. Such feasibility is not assumed herein, but it is thought that a portion of such land could be used for paddy rice. Much depends upon the cost of drainage works. Agricultural production on Class V lands will require considerable research and on-farm testing in order to ascertain economic feasibility.

Experts have suggested several crop species that can be grown in the region but are not grown there at present. This list includes jute, annatto, rubber, cashew nut, macadamia nut, cardamon, cinnamon, vanilla, pepper, pejebeye palm (heart of palm and fruit), euterpe palm, aguaje and other tropical fruit. Expansion of production of these crops would be enhanced by an adaptive research program and information packages to prospective investors. Assurance of a market of sufficient size and demonstrated farm production feasibility must coexist with production so that a minimum scale can be obtained so as to make processing/marketing feasible.

While coffee, cacao and papaya are grown in the area, no research has been done on high-value tropical crops, which either exist in the area or could be successfully introduced. Existing research has concentrated on rice and soybeans. The research that has been done is production-oriented not profit-oriented, from the point of view of the farmer.

Some specific constraints on increasing production include:

a. Marketing Difficulties

Distance from markets, poor roads, and difficulties of storage in a very humid climate have exacerbated marketing problems. Each crop faces its own unique constraints. For example, rice marketing is essentially controlled by a government monopoly, ENCI, which sets a maximum price. A case could be made that the price received by local producers is actually higher than these producers could expect in the free market since transport costs to the coast are absorbed by ENCI. However, this does not appear to be the actual case, because the region presently imports rice from other areas to fill local demand. Payments from ENCI also run about three months behind delivery which, with present inflation, represents a 15% decrease in the purchasing power of funds received.

Coffee is marketed mainly through a service cooperative. The major marketing constraints is that Peru's coffee quota is already filled and coffee is currently in oversupply worldwide with prices near five-year lows. Brazilian replantings after the 1975 freeze were made in areas less subject to frost and are now entering full production. The demographic data in the U.S., combined with consumption trends, are not considered favorable for increased U.S. imports of coffee.

Cacao is also sold through the same marketing cooperative. Its price is also currently at a five-year low, but its future outlook is brighter than coffee. However, it is a crop that has always been subject to extremely wide price swings. Production trends in Brazil and Africa will determine future prices, as will current experiments in development of synthetics.

b. Fertilizer Supply

Fertilizer suppliers for crop production are controlled by ENCI. Sales agents are selected by ENCI and margins are limited to six percent. From Tocache to Tingo Maria, only three outlets exist--a private dealer in Aucayacu, the service supply cooperative, and ENCI itself. As a result, access to fertilizer requires trips to Aucayacu or Tingo Maria. This situation will lead to supply bottlenecks should demand for fertilizer increase.

c. Credit Limitations

Subsidized interest rates have driven medium and long-term credit out of existence. Thus, credit for larger implements, machinery or infrastructure does not exist. Formal crop credits exists , but access to it is limited and, in spite of efforts to improve delivery, obtaining one's first loan is a time-consuming effort. Even subsequent loans may be subject to longer delays than necessary.

d. Extension Service

The extension service has suffered 12 years of neglect. The product it will be extending (profitable crop production packages) must still be developed and at the same time the hiring and training of the required extension agents must be initiated.

4. Paucity of Human Capital

Within Peru it has traditionally been a major problem to recruit trained personnel to work outside of Lima or a handful of other modern coastal urban areas. GOP Ministries are required to pay salary premiums to attract professionals to work outside of these major cetners, given a wide variety of real or perceived hardships associated with living in provincial areas which are not served by modern health, education, transport, communications or housing systems. AID, as well as other major donors, has had a long experience trying to recruit and retain trained manpower to work in isolated and relatively unserviced areas, and to date the record is not as positive as optimal implementation would require.

The general lack of knowledge of Amazon Basin humid tropical agricultural systems can be attributed to the fact that, historically, attempts have been made to transfer temperate agricultural practices to this region. There is ample evidence that soil management and fertility practices which are sucessful in the temperate regions cannot be applied directly to tropical regions.

Even though applied tropical agricultural science has now beenrecognized for the important role it plays in developing and adapting appropriate agricultural practices, much of the attention has been focused on large scale commercially oriented enterprises such as those found on the coast of Peru rather than on small farm agricultural systems which are found in the sierra and selva.

Therefore, emphasis has been placed on training agriculturalists in irrigated coastal agriculture techniques. This has led to a severe lack of agriculturalists trained in humid tropical jungle agriculture and has become a major constraint to agricultural development of the high jungle region.

Attempts to transfer coastal agricultural technology directly to the high jungle have yielded disappointing results. Agriculturalists trained in coastal agriculture work under a great disadvantage when attempting to transfer knowledge and technology from the mechanized, controlled agricultural environment of the irrigated coastal valley farming systems to those of the high jungle and low jungle regions. They are simply not trained to handle the soil, climatic, and agricultural production constraints that exist in the high jungle but are not encountered on the coast. They lack knowledge and appropriate training in such areas as: tropical soil fertility management, weed and pest control management, different cropping alternatives and patterns, and small farming systems.

D. Project Rationale and Strategy

In 1980, the USG proposed to the GOP the joint funding of a countrywide coca eradication program and an economic development program for the upper Huallaga valley. The eradication effort would be financed by an INM grant of $17.5 million and an equal amount in GOP counterpart for activities to be carried out during the period 1981-1985. The first area identified for activities of the eradication program, the upper Huallaga area, falls within the department of Huanuco and San Martin. The corresponding economic development program to be carried out in the upper Huallaga area would be financed by A.I.D., the GOP, and other interested bilateral and multinational donors.

Given the social dislocation, the reduction in regional income, and the political problems which a program of this nature will produce, it was suggested that AID mount a large-scale development effort in this high jungle region as part of its overall high jungle development strategy, in order to minimize negative social impacts of an eradication program. The AID development Project would be carried out, concurrently, but separately from the eradication program. Further the AID program would be designed to meet the usual AID Project development requirements, i.e. environmental, social, financial, economic, and technical.

A PID to finance a massive regional development program was presented to AID/W in late October 1980 and approved. In February 1981, Project-associated funding issues were resolved and the intensive review for project development began immediately thereafter. The approved PID proposed a life-of-Project investment of $167.0 million with the following breakdwown: $50.6 million in AID loan funds and $2.0 million in grant funds; a GOP investment of $42.0 million; and an investment by other international donors of $54.9 million.

The PID hypothesis for a $167.0 million substitution project was based on a set of assumptions for the Project Area regarding agronomic, infrastructural, marketing, and processing constraints to agricultural production, as well as assumptions concerning soil quality and environmental conditions. Subsequent Mission intensive review based on a careful analysis of the detailed information developed indicated that several of these asumptions, which were crucial to the PP design proposed by the PID, were not sustainable, and that some of the proposed activities and the scale of others were not economically or technically feasible. Additionally, the development focus of an AID-funded agricultural project requires that such a project must affect areas where it is believed that agricultural production can be significantly increased. This requirement excludes from consideration significant portions of poorer hillside soils in the Project Area which the analysis conclusively showed had no attractive economic alternative to coca. Furthermore, these hillsides have been invaded by opportunists who have planted coca in clear contravention of Peruvian law. It is expected that these illegals will either leave the region or be absorbed by increased demand for labor resulting from the intensification of the valley's agricultural land.

Information developed during intensive review demonstrated that expansion and diversification of agricultural production in the area has been constrained by the lack of crop and crop system technologies for the Project Area, and for the country's high jungle areas, in general. Thus, increased agricultural production, the dissemination of improved agricultural technologies, and the introduction of new crops requires extensive research and testing of these technologies and crops, as well as adequate extension and other agricultural support services. This "constraint-response" program is also based on recent data analyses indicating that one-third to as many as one half of the farmers on the area's agricultural land who currently grow coca would be responsive to improving their farming practices to increase income earned from the production of their legal crops and desist from further coca-growing activity. It is assumed those farmers now growing coca on marginal, non-agricultural land will either be absorbed into the production of legal crops resulting from the implementation of intensive farming methods or will migrate elsewhere. A land constraint exists for the farmers who would prefer to go into legal crops, since the majority of the land now cultivated in coca is not suitable for other crops and the estimated 70,000 ha of Class II, III, and IV lands in the Project Area which are suitable for intensive agricultural activity, have been titled in earlier colonization efforts. Improved agronomic practices resulting in more intensive labor usage will absorb additional labor. The improved land titling system planned under this Project will also partially address this concern assuring that unused parcels can be transferred to new owners.

In order to develop the information required to remove these constraints, the Mission proposes the funding of a program aimed at intensifying agricultural production through agricultural research, extension and training specifically adapted to the high jungle. Additional Project funds will be invested in agricultural support inputs, road maintenance, and potable water. This response will expedite the Mission's CDSS strategy by developing much-needed agronomic information specific to zones which the Mission and the GOP consider priority areas for ongoing large-scale infrastructure development projects. This technically, economically, and socially feasible project, designed to fit into a longer range goal of increasing the profitability of high jungle agriculture, will also respond to a sensitive political problem.

Based on the twin objectives of a program for 1) the economic development of the upper Huallaga area through expanded agricultural production; and 2) the amelioration of adverse political, social, and economic aspects of the coca eradication program, the Mission has developed an agricultural research, field testing, and extension program, seconded by improved agricultural support, road maintenance, and potable water, to meet these objectives. The Project's highest priority is to rapidly establish an extension program that will be able, in the short term, to extend to farmers present knowledge on crop specific improvements and to begin prompt implementation of the agricultural support, road maintenance, and public health services component. This will permit the Project to have an impact on agricultural production during initial implementation, as well as to increase the demand for labor at a time when the eradication effort will be reducing the labor requirements associated with coca production. Successful completion of the Project will provide a tested program of sustainable agricultural production technologies and strategies suitable for the Project Area, and for other high jungle areas of Peru (many of which also produce coca).

Research and extension are major Project components and receive approximately 35% ($9 million) of the total budget. Research objectives are twofold; (1) to increase farmer productivity of existing legal export crops; and, (2) to test the profitability of new crops generally characterized by high-value, low-volume export potential. Given the expected decline in the regional population caused by the coca eradication activities, research efforts will not focus on crops grown primarily for local market consumption. Emphasis on increasing production of these latter crops could very well have a severe recessionary effect in the region if marketing opporunities do not exist outside of the region.

The Project will have a major impact on improving the GOP capability to develop the high jungle region, which under prior GOP projects has not always yielded the expected agricultural response. The Project will also develop the expertise required to address and respond to the following questions:

-- How will farmers in the area respond to changed levels of technology?

-- What are the economically feasible production capacities of the region?

-- What are the most economically, agronomically, and socially feasible agricultural systems for the region?

-- Given the expected dramatic changes in economic relationships in the region, what will be the effect on relative prices of both production inputs and outputs?

-- How will the composition of the regional population be affected?

The knowledge gained by filling in these information gaps will provide an improved base for the design and the implementation of high jungle projects. This information and experience is important to both the developmental focus of the Project and to aid in minimizing the spread and/or increase in coca production within other ecologically similar zones. The increased profitability of small farmer agriculture, this Project's number one priority, will provide one of the best inhibitive measures throughout the high jungle to the initiation of coca production, without the resulting social dislocation that is occurring in the upper Huallaga.

E. USAID Assistance Strategy

1. Relationship to the USAID CDSS

The promotion of sierra and high jungle economic growth has been cited in recent CDSS documents as one of the key components of USAID/Peru's overall development strategy. High jungle development in particular is a GOP priority, and AID has developed major bilateral loan and grants in support of GOP programs to promote high jungle economic growth. Included in the high jungle development strategy are programs to increase food production and to encourage agricultural development through research and extension, as well as through improvements in rural infrastructure. The upper Huallaga valley was one of the GOP's first high jungle priority development areas. Significant resources were allocated to the region through past efforts of the GOP and international donors, the largest being the IDB project during the 1960's. The area is one of the more well-developed regions of the high jungle. It has not, however, achieved its full level of agricultural production potential. An objective of this Project is to consolidate previous investments by overcoming institutional and technological constraints which have been encountered during implementation. This Project fully supports AID's development strategy by focusing on constraints which have hampered the development of this important region of arable land to significantly higher production levels. (Peru's per capita ratio of arable land is one of the lowest in the Western Hemisphere, and in the jungle represents one of the only areas for the development of new arable lands). This effort is supportive of other AID projects (Sub-Tropical Lands Project and the proposed Central Selva Resource Management Project), and is also essential to Peru's goal of maximizing economic returns from investments planned for other high jungle regions.

AID will achieve the above development goals while simultaneously complementing the GOP and USG efforts to eradicate illicit coca production in the upper Huallaga valley by providing area farmers with the means to generate income and additional employment through increased productivity of licit crops, particularly food crops. Thus, the proposed Project will develop production packages which will augment the production of foodstuffs in the area, with particular attention to increased levels of profitability. Given Peru's historic need to import food products, increasing food production has been and will continue to be a GOP and AID priority.

2. Relationship to Ongoing USAID Project

The proposed Project, along with the ongoing central Huallaga project (Sub-Tropical Lands, 527-0263) and the Palcazu valley project (Central Selva Resource Management, 527-0240) to be implemented next year, presents AID with a unique opportunity to support GOP efforts to develop the high jungle. The management responsibilities for all three projects have been placed in special project offices under the Office of the Prime Minister. From the lessons learned in each of these projects, a rich pool of administrative and technical expertise will be developed for use in future GOP high jungle development efforts.

The Project also complements Mission programs in other areas, such as the Soil Conservation Project (527-0220), a centrally funded tropical soils management grant with North Carolina State University (AID-TA-C-1236), and the crop-specific research and extension program of the Agricultural Research, Extension, and Education Project (527-0192). Within the Project Area, AID supports the BANCOOP savings mobilization and credit Project results (527-0174). In addition, the Mission's Extension of Primary Health Project (527-0219) has initiated activities in the department of Huanuco and the Tingo Maria area, and will soon begin activities in the department of San Martin.

F. GOP and Other Donor Activities

In 1978, the concerns of the Morales Bermudez Government over the increases in coca production and illici cocaine trafficking in the Tingo Maria area, led to the passage of Decree Law No. 22095 which created a system for gradual reduction in coca cultivation. Acting under the authority of this Decree Law, GOP police forces undertook a pilot coca production control operation (Green Sea I) in the area in December 1979. The operation was successful in that it generated considerable fear on the part of coca growers in the area. But it also demonstrated that the problems were even greater than originally anticipated; some 95% of all coca producers were in violation of the law. Subsequently, the GOP issued Decree Law No. 22926 in March 1980, declaring a State of Emergency in the departments of Huanuco and San Martin and calling for the immediate termination of all coca production and marketing in the area. A second police operation (Green Sea II) was mounted in April 1980 with the participation of some 900 persons, primarily from the Guardia Civil. Small areas of coca were eradicated, land and buildings were seized, and coca processing facilities were destroyed. This operation caused some disruption of coca production and trafficking in the area but, with the lack of any follow-up action since then, much of the initial psychological impact has been dissipated.

The State Department's Bureau of International Narcotics Matters (INM) is planning to carry out a coca eradication program in the Tingo Maria area. INM will provide $17.5 million during the period 1981-87 in support of the effort by the PIP and the Guardia Civil to eradicate coca through either the voluntary or the compulsory eradication program.

Other donor activity in the Tingo Maria area is limited. The German government has several volunteer technicians working to assist area cooperatives. The UNDP is currently in the early stages of designing assistance to the health sector. The IDB has proposed a $30 million credit loan, approximately $1 million of which would be earmarked for this region. In addition, the World Bank is considering a loan for a nationwide road construction and maintenance program; the Tingo Maria area could be a beneficiary of this loan.

III. PROJECT DESCRIPTION

A. Project Goal and Purpose

The goal of the Project is to increase and diversify agricultural production in the Peruvian high jungle.

The purpose is to strengthen public sector agricultural support services and to develop and test agricultural production packages in the upper Huallaga region of the Peruvian high jungle. The purpose will be accomplished through the following major project activities: (1) carrying out a program of adaptive research to determine the agronomic, economic, and socio-cultural feasibility of agricultural technology packages; (2) expanding and upgrading existing extension services; (3) upgrading the capacity of the National Agrarian University of the Jungle (UNAS) to train agricultural scientists; (4) providing short- and medium-term credit; (5) strengthening complementary production and information services such as storage, marketing, and transportation facilities; and (6) providing potable water and sanitation systems to selected communities in the Project Area.

B. End-of-Project Status

By the end of the Project, the following conditions should exist, indicating that the Project purpose has been achieved:

1. The stock of human capital necessary to carry out high jungle research and development will be expanded through Project training and research activities, so that a functioning agricultural research, extension, and training center staffed by a permanent team of qualified GOP personnel will be in place and will be carrying out activities specifically related to high jungle development.

2. Two institutions, UNAS and INIPA, will have been strengthened to permit their continued leadership and support of relevant high jungle agricultural research and extension.

3. Production packages will have been designed for selected crops, resulting in both short- and longer-term improvements for a variety of crop packages.

4. A credit system using realistic rates for both short- and medium-term credit will be significantly expanded to serve Project Area farmers.

5. Delivery of farm production services, such as input marketing and land registration, will have been upgraded to make these services accessible to Project Area farmers.

6. The statistical capability to measure changes in cropping patterns, technology, and on-farm incomes will be in place and functioning.

7. The capacity of the regional office of the Ministry of Transportation and Communications to plan and carry out road maintenance activities will have been substantially improved, and transportation costs in the Project Area will have been reduced or stabilized due to improved road conditions.

8. Environmental sanitation conditions in the Project Area will have improved so that a significantly higher percentage of communities have potable water and sanitation systems.

C. Project Activities

The Project activities detailed below will be supervised and coordinated by the Upper Huallaga Special Project Office, an office which will operate under an administrative mechanism similar to that of the Project Office for the AID-funded Sub-Tropical Lands Development Project. (This mechanism is described in the Institutional Analysis, Section IV.B.1.) The Upper Huallaga Special Project Office will enter into agreements with several agencies of the GOP to carry out various elements of the Project. Agricultural research and extension activities will be carried out by the National Agrarian Research and Promotion Institute (INIPA). Additional adaptive research and extension as well as an agricultural training program exphasizing jungle technologies will be carried out by the National Agrarian University of the Jungle (UNAS). Credit will be administered by the Agrarian Bank and BANCOOP. Farm inputs will be marketed and produce stored by the National Agricultural Input Marketing Company (ENCI) and the Rice Marketing Company (ECASA). The Ministry of Agriculture Sector Statistics Office (OSE) will be charged with collecting, processing and publishing agricultural statistics. The National Office for Natural Resources Evaluation (ONERN) will be responsible for land use capability mapping. The National Rural Cadastar Office (OCCR) will carry out and maintain a land distribution system for the area. Road maintenance will be the responsibility of the Ministry of Transportation and Communications (MTC). The Ministry of Health Directorate of Sanitary Engineering (DSE) will implement the potable water and environmental sanitation component.

1. Research, Extension and Training (RET)

The agricultural extension activities of the Ministry of Agriculture have been minimal since the agrarian reform of the early 1970's. Those institutions responsible for the generation and transfer of agricultural technology to the farmer have suffered from more than 10 years of inadequate budget support for personnel, equipment, training, and operations. Consequently, the more qualified professionals and technicians have left to seek employment where their job prospects were more positive; many have left the sector altogether. Within the

Project Area, agricultural research efforts of the Ministry of Agriculture and the Tulumayo Experimental Station and the two sub-stations at Tocache and La Divisoria have been little more than caretaker operations since 1970.

At the national level, the newly created National Institute for Agricultural Research and Promotion (INIPA) has been charged with the redevelopment of the national research and extension system, but the new entity lacks experienced research, administrative, and operational personnel. Furthermore, the research facilities, laboratories, and equipment are presently not adequate to meet Peru's high jungle research demands. In the Project Area, extension activities are currently being incorporated into INIPA, but INIPA lacks technical information specific to the upper Huallaga area, trained personnel capable of extending improved production practices, and the vehicles and extension equipment necessary to reach the farmer.

The other major institution in the Project Area involved in agricultural research and extension is the National Agrarian University of the Jungle (UNAS) at Tingo Maria. The major objective of UNAS is to prepare students from the jungle and high jungle areas of Peru in professional and technical fields which are relevant to the development concerns of these areas. The UNAS has a basic science program and four academic degree programs offering the titles of engineer in agronomy, animal sciences, food science engineering, and renewable natural resources. The professional training carried out at the UNAS, however, operates under the constraints of insufficiently trained professors, inadequate laboratory facilities, and minimal library resources. In addition to the academic programs, UNAS also conducts a limited amount of applied agricultural research of which the majority is associated with student theses. In 1979, the UNAS developed an extension program to provide technical assistance to selected farmers, practical training to its students, and opportunities for applied research to the staff. Eleven extension centers were established, each with an agronomist and an agricultural technician who are responsible for working with 30 to 35 selected farmers.

In order to develop the human and physical resources of the institution involved in agricultural research, extension, and training in the upper Huallaga area, INIPA and the UNAS will carry out a series of coordinated activities. Professionals will be prepared, research activities reinitiated, and an effective extension program established to increase agricultural production of the Project Area.

The objectives of the agricultural research, extension, and training component of the Project are to:

-- develop technical packages of agronomic information applicable to the upper Huallaga area and other areas of the jungle;

-- improve the delivery of the technical packages and assistance to the farmer; and,

-- strengthen the training capacity of the UNAS to provide the human capital necessary for the research and extension activities.

Under the proposed Project, scarce human resources will be used in research and extension activities designed to maximize efficiency and minimize duplication of efforts. The training capacity of UNAS will also be strengthened to improve the quality of the preparation of professionals so that they are better able to meet the development demands of the upper Huallaga and other areas of the jungle.

Recognizing that a network of research and extension centers is required in order to effectively implement a comprehensive program of this nature, the GOP has begun to strengthen the capability of several other jungle research centers to form such a network. This network of stations will generate new technical information, interchange that information with other centers, collaborate on research to reduce duplication between centers, and allow for a more efficient use of scarce human resources.

The agricultural extension program in the Project Area will be expanded to establish on-farm testing of improved agricultural practices as well as to provide technical assistance. The agricultural extension program will be based at the Tulumayo Experiment Station with four sector offices and eight to ten sub-sector offices distributed throughout the Project Area. The location and exact number of the sub-sector offices will depend upon farmer interest. The location of the main extension office at the Tulumayo Experiment Station will facilitate interaction between researchers and extension personnel.

Finally, the basic science and academic programs of the UNAS will be strengthened to improve the quality of UNAS graduates. UNAS faculty members will collaborate with INIPA researchers in applied research carried out at the experiment stations and will serve as commodity specialists in support to the INIPA extension program.

Three major sub-components and activities will be financed under the Research, Extension, and Training element of the Project. The costs of each of these sub-components are as follows:

(a)	Research	$ 4,410,000
(b)	Extension	4,117,000
(c)	Training	2,104,000
	Total	$10,631,000 1/

The Research and Extension components will be given highest priority over the Life of Project and inparticular will receive priority attention during the first year of implementation. The extension Program will be developed in two phases to allow for a rapid impact on Project Area farmers. The first stage of the extension program will focuson improving existing farming practices through provision of improved and more intensive agronomic practices, such as use of lime and fertilizer and pest management for existing crops. The second phase should be ready during the third year and will focus on improved farm systems (such as those developed at Yurimagus by North Carolina State University) aimed at the twin objectives of reducing the fallow period and increased returns to labor.

a. Agricultural Research

The objective of the proposed agricultural research activities in the Project Area is to provide a research base for the extension operations so that they meet the production demands of the farmer. The Project will finance adaptive research, both to apply regional results to other areas of the jungle and to adapt research

1/ Does not include $400,000 of grant funded long term advisor.

conducted elsewhere to local conditions.

Research activities conducted by INIPA will be centered at the Tulumayo Experimental Station. The Tulumayo Station will focus such subjects as plant protection, crop production (soil management, agronomic practices, agricultural economics, agro-industry, etc.), and plant breeding. A team of top-level researchers will conduct research on tree crop management of cacao, tea, coffee, citrus, plan, and rubber; indigenous perennial crops; and annual crops, such as upland and paddy rice, peanuts, and corn. As a part of the research network approach, results from the Tulumayo Station will be extrapolated to other such centers in the jungle. Based on research on tropical soil management with annual crops (rice, corn, beans, etc.) and perennial crops done at the Yurimaguas Experimental Station and the research done on pastures and animal management at the Pucallpa Experimental Station, extrapolative work will be carried out at the Tulumayo Station.

Within the Project Area, activities at two sub-stations will be reinforced. La Divisoria sub-station will be developed to carry out research on tea, indigenous spices, organic pesticides, organic food coloring, and coffee. The Tocache sub-station will conduct research on palm and rubber and will carry out adaptive research on crops such as cassava, rice, corn, and soybeans.

The first major activity will be to develop a research program specific to the Project Area. Assistance will be provided to further develop the jungle research network. Research teams will be formed for each of the three stations of the Project Area. Personnel at the Tulumayo Station will include an entomologist, pathologist, soil scientist, agricultural economist, and an agro-industry specialist. The latter will focus on primary on-farm processing such as solar dryers for cacao.

The staff of La Divisoria sub-station will consist of two agronomists. The Tocache sub-station staff will include a plant breeder, a soil scientist, and eight agronomists. The professional staff of these sub-stations will be supported by field laborers and clerical staff. A long-term research consultant will be contracted to assist in the research effort, coordinate research and extension activities, and oversee Project-related actions of the UNAS. Short-term consultants from CIAT, CIMMYT, CEPLAC, CIP, and other areas will be contracted as necessary. In addition to the agronomists from INIPA at Tulumayo, La Divisoria, and Tocache, two professionals from the Pucallpa and Yurimaguas Experimental Stations will be assigned to work in support of the research network concept.

In order to link the INIPA program to the professional pool of UNAS, 15 professors from UNAS will participate in the research planning, experimental design, and implementation; additionally UNAS student thesis work will be incorporated within the ongoing research program of INIPA. Training will be provided to upgrade the professional capacity of the researchers; vehicles and equipment for field and laboratory research and offices will be purchased; the stations' building will be repaired; and housing will be provided for researchers to live in Tulumayo and Tocache. As a service to the extension program and for the adaptive researchers, laboratories for soil and plant testing, water testing, and selected pest management analytical services will be established at Tulumayo and at Tocache.

The following activities will be financed under the research component:

Long-term Technical Assistance

A long-term research consultant will be contracted for a period of four years to assist in the execution of the research activities of INIPA. The major responsibilities of the consultant will be to participate in the planning, implementation, and interpretation of the research in the Project Area, coordinate extrapolative research in the upper Huallaga with research activities of the Yurimaguas and Pucallpa Experimental Stations, coordinate research and extension activities, oversee the involvement of UNAS in the research and extension programs as well as other Project activities with UNAS. The consultant will live in Tingo Maria.

Short-term Technical Assistance

A three-person team of international consultants will provide a total of six person months of assistance to INIPA for the development of the agricultural research plan for the upper Huallaga area. Once research activities are in operation, short-term technical assistance will be provided to INIPA by professionals from CIAT, CIMMYT, CEPLAC, CIP, or other similar institutions. This assistance will require four technicians for a period of three months each per year over the life of the Project.

Short-term technical assistance will focus on the planning needed to develop the agricultural research network in the Peruvian Amazon basin. This planning is to extend over one and one-half years. Resources under this component will be provided for the salaries of a three-person Peruvian team and its travel within Peru and among countries of the network, and a total of 12 months of foreign technical assistance.

Research Training

Research training is critical to the success of the Project. Advanced degree training financed under the Project will require that all thesis research be conducted at the Tulumayo, La Divisoria, or Tocache Experimental Stations. Twelve M.S. degrees will be financed for training within Peru. Three overseas Ph.D. degrees and three overseas M.S. degrees will also be financed. In addition, three short-term special commodity training programs will be financed each year to further prepare those individuals working in the specific commodities or those who have recently finished a degree program.

Vehicles and Equipment

Research vehicles and equipment at the three Stations are presently in need of improvement. The following vehicles will be purchased: Tulumayo--4 pick-ups, one 5-ton truck, and one mini-bus; La Divisoria--1 pick-up; and Tocache--3 pick-ups. The Tulumayo and Tocache Experimental Stations will each receive one 60-hp tractor and two 14-hp tractors will be purchased for each of the three stations. Other research farm equipment including agricultural machinery, livestock for research, plastic green-houses, and related materials for nurseries will be purchased. Because the Tulumayo and Tocache Experimental Stations are located outside the present electrical network of Tingo Maria, each will receive an electric generator. Laboratory equipment for a research laboratory at Tulumayo, service laboratories of Tulumayo and Tocache, and office equipment to support the research operations will be purchased.

Facility Construction and Improvement

Housing will be provided for four professionals at the Tulumayo Experimental Station and for two professionals at the Tocache sub-station. Visitors' facilities will also be constructed. Buildings will be repaired at all three stations. In addition, a modest administrative building, a laboratory building, and a farm equipment building will be constructed at the Tocache sub-station.

Support Costs

In order to assure top-quality researcher assignments to INIPA positions, salary supplements will be provided for research professionals at the three research stations. Funds will be also provided for INIPA to contract the 15 UNAS research professionals as well as to pay for office supplies, printing, equipment maintenance, travel and per diem, and research materials.

b. Agricultural Extension

The objective of the INIPA agricultural extension program in the upper Huallaga region is to increase the rate of adaptation of new farming methods among the farmers of the region, so that overall yields increase at a rate of 5% to 7% a year, or 30% over the five-year Project life. The Project will promote greater rates of change by developing an intensive and flexible extension program based on successful experience from other regions of the jungle, mainly Yurimaguas and an improved research base in the Project Area.

INIPA and the UNAS will be the two national institutions involved in this program providing personnel and the technical backstopping for the extension program. The UNAS will work under a contractual arrangement with INIPA. The main extension office will be based at the Tulumayo Experimental Station, to promote interaction between the research and extension staffs located there. There will be four sector offices, located in Tingo Maria, Aucayacu, Uchiza, and Tocache. Sub-sector offices will also be established, with their locations depending on farmer interest and areas of agricultural importance. In each of the offices, there will be an agronomist and three technicians who should be from the region or from another part of the jungle.

The first priority of the program will be to find and train the extension staff. INIPA has contracted a private Israeli consulting firm, TAHAL, to train the extension personnel. After the initial TAHAL training period is finished, the extension staff will be brought together for one or two days a month to attend refresher courses, in order to make them aware of new developments in their field and to reinforce the initial training provided.

During the initial implementation of the Project, experts in pastures, annual crops, and perennial crops will be recruited for approximately three-month periods. These experts will collect technical information and develop training programs for the 15 commodity specialists in order to upgrade the specialists' knowledge in their respective fields. This training program will emphasize the use of available research data on individual crops and how to develop the data into technological packages to create a program that can assist farmers immediately. These commodity specialists will either be researchers from INIPA or professors contracted for a period of 18 to 24 months by INIPA from the UNAS or other institutions. When the group of commodity specialists is trained, they will develop a commodity program for each of the sector and sub-sector offices and carry out the training of the extension agents in each sector in the program developed. The training of the extension agents is crucial, since it is important that once they are placed in the field they have sufficient knowledge of particular crops both to advise the farmer and gain his confidence.

As soon as the commodity programs have been formed by the commodity specialists for the extension teams, the specialists will return to their particular institution or become permanent staff at the head extension office at Tulumayo. The permanent staff at the Tulumayo office will consist of broad-based specialists in credit and marketing, soil and water management, pastures, reforestation and agroforestry, animal husbandry, 1/ annual crops, and perennial crops.

The extension teams composed of the specialists and agents, will emphasize the major crops of their region. They will be responsible for establishing demonstration plots to test fertility levels and improved crop varieties, take soil samples, introduce new cultural practices, provide technical assistance, and develop a live-

1/ Animal husbandry throughout this paper refers to both large (beef cattle) and small (pigs, chicken, etc.) livestock development and production.

stock program with the introduction of new breeding stock. The extension team will also be responsible for assisting INIPA research staff to establish on-farm tests. This program should also allow for students from UNAS to do their thesis work on problems encountered by the extension staff. In order to assure farmer participation and offset the farmers' risk factor the material costs for fertilizer, seed and agricultural chemicals for demonstration plots and on-farm tests will be subsidized by the extension program.

The extension portion of the Project will finance the following activities:

Short-term assistance

A team of six consultants will be contracted for a period of three months each to develop a training program for the 15 commodity specialists. Technical assistance specialists will be contracted as needed during the life of the Project.

Training

The training of extension agents is fundamental to the success of the program. A team of 15 commodity specialists will be contracted for a total of 300 person/months. Their responsibility will be to establish particular commodity programs in each of the sector and sub-sector offices. Provisions will also be made for further and advanced degrees for extension personnel. Four agronomists per year will receive scholarships to study for in-country M.S. degrees. Similarly, two technicians a year will receive training for agronomy degrees. In addition, financing will include short courses provided by established research centers and refresher courses will be offered at UNAS and/or INIPA-Tulumayo.

Vehicles and Equipment

Extension vehicles and equipment for extension are virtually non-existent. The following vehicles will be purchased: Tulumayo-- 4 pick-ups and 8 motorcycles; each sector office-- 1 pick-up and 3 trail-type motorcycles (a total of 4 pick-ups and 12 motorcycles); each sub-sector office-- 3 trail-type motorcycles, (a total of 24). Other extension equipment will include a radio at the head office and one radio and electric generator at the four sector offices. Demonstrational equipment will also be provided for crop and pasture demonstrations and for farmers willing to become suppliers of such items as feeder pigs, livestock heifers and bulls, citrus root stock, etc. Also, office and educational equipment as well as library materials will be provided to support the extension program.

Construction and Housing

Construction of an extension office and some classroom facilities at Tulumayo Experimental Station, as well as some sector offices will be funded, if the office space cannot be acquired from existing Ministry of Agriculture or INIPA facilities. Each agronomist and extension agent should be provided with an adequate housing allowance to rent space in the area where they are working.

Support Costs

In order to assure a top-quality extension staff and to reduce the present high turnover rate, salary supplements will be provided to staff working in the sector and sub-sector offices. Other support costs will also include travel expenses and maintenance of extension vehicles.

c. Training at the National Agrarian University of the Jungle (UNAS)

The inability of local institutions to attract and retain qualified individuals trained in jungle technologies on their staffs is a major constraint to the development of a permanent research and extension system in the high jungle. The objective of the training component is to strengthen the capacity of the UNAS to prepare professionals with appropriate skills for employment in the Tingo Maria area as well as other areas of the jungle. As large infrastructure investments continue to be developed in the jungle regions of Peru, the demand increases for qualified professionals with area-related skills which enable them to be effective in the specific situations of the high and low jungle. Professionals from the region who receive their training locally are more likely to seek local employment and will probably be more productive than those prepared outside the area.

The major emphasis in the training component will be to improve the basic science program and the four academic degree programs. The basic sciences (math, physics, chemistry, biology, botany, and zoology) form the foundation on which specialization of a particular degree program is built. With an improved basic sciences program, the students will be better prepared to move into specialized academic courses which include courses in research and extension.

The quality of the training received at UNAS will be increased by providing additional teaching staff, with emphasis on the basic sciences program and the new renewable natural resources academic program. Additional personnel will permit existing staff to improve their course material and devote more time to fewer courses. As a result, the student contact with professors will be increased. Additional staff will be recruited from recent graduates from UNAS as well as other Peruvian institutions.

The knowledge base of the professors of UNAS will be improved through advanced degree training and short-term non-degree training. Degree training will be competitive and based on the needs of the five programs. Short-term non-degree training will emphasize specific commodity training as well as university administration training. Such courses are available at CIAT, CIMMYT, and selected universities.

Short-term technical assistance will be provided to the UNAS to advise the staff on academic programs and to offer seminars and workshops. Topics to be covered during the seminars and workshops include, among others, integrated pest management, animal health and photo interpretation for resource management. The short-term technical assistance may be contracted from Peruvian or foreign institutions.

The teaching laboratories of UNAS will be upgraded with new equipment and materials; the library will receive an increased number of reference texts, resource materials, and journal subscription. Microfilm readers will be purchased to permit the use of microfilm reference materials presently available from many sources. The research and extension personnel of INIPA will also be able to use the library in completion of their efforts.

The scope of the training received by students of UNAS will be broadened by incorporating agronomy and animal science candidate theses into the ongoing research and extension programs of INIPA. In this way, the research will be relevant to important production problems of the area and results may be directly incorporated into the extension program. The student will become familiar with INIPA research and will receive the support of the INIPA staff and facilities.

The Project will also support the student clubs of UNAS, such as the agronomy club, etc., which provide students with similar interests the opportunity to increase contact with faculty members, to exchange ideas with fellow students, and to gain practical experience in various areas of common interest. Financial assistance will be provided to the clubs for the production of feeder pigs, heifers, bulls, small animals, plant stock, improved seed, etc., for sale to farmers in the Project Area.

Specifically, the Project will finance the following activities under the training component:

Additional Teaching Staff

The teaching faculty of UNAS will be increased by five additional faculty members per year for the five years of the Project. As this is an additional expense to the UNAS, loan funds will be provided for this activity.

Training for Faculty

Scholarships at the M.S. level will be financed for 16 faculty members. Four faculty members will begin two-year programs in years one through four of the Project. To the extent possible, M.S. training will be at tropical universities in such places as Florida, Puerto Rico, Costa Rica, and Brazil. Three faculty members will receive Ph.D. scholarships. One faculty member will begin a three-year program in the United States in each of the Project years one through three. While faculty members are absent from UNAS on degree training, funds will be provided to UNAS to contract temporary replacement staff. Three faculty members per year for the life of the Project will receive three-month training courses in commodity specific topics at international research centers. Two faculty members per year for the life of the Project will attend three-month training courses in institutional administration.

Short-term Technical Assistance

Eight months of technical assistance per year will be provided to specific academic programs or to offer seminars and workshops.

Teaching Laboratory and Library Equipment

Ten basic science and academic program laboratories will be upgraded with new equipment and equipment repairs. Minor laboratory physical plant repairs will be made where necessary to accomodate new equipment. Two microfilm readers and a copy machine will be purchased for the library.

Library Resource Improvement

Funds will be provided for journal subscriptions and library purchases on an annual basis. An additional library supplement for purchases in the initial year will provide reinforcement to the basic science and the four academic programs.

Support Costs

Salary supplements will be provided for faculty members of the five programs. Funds will also be provided for laboratory supplies, support for 35 agronomy and animal science candidates per year, including stipends for research disertations done in the high jungle, and five student clubs.

2. Agricultural Credit

a. Institutional Arrangements

The Project will establish an agricultural credit fund for the Project Area to be implemented through the Agrarian Bank, the government agricultural bank, and through BANCOOP, a cooperative rural financial institution. As the GOP's principal agriculture credit organization, the Agrarian Bank will initially be given responsibility for the majority of the credit activities. However, BANCOOP, a current A.I.D. grantee for a Project in the Tingo Maria area, will have responsibility for the credit activities of its cooperative members and traditional borrowers. Thus, the Mission will build on the highly successful BANCOOP project and provide a certain degree of competition and innovation to the traditional practices followed by the Agrarian Bank. To the extent that BANCOOP demonstrates the ability to lend additional sums to current or new borrowers, additional funds will be provided to it for this purpose from the credit component.

Credit funds will be made available to the Agrarian Bank as a direct capital transfer by the GOP to the Bank's working capital. Project funds will form a special account for lending in the Upper Huallaga Project Area. As a condition to receiving these funds, the Special Project Office and the Bank will execute an agreement describing the terms and conditions under which the fund will operate. This agreement will be approved by USAID prior to disbursing funds to the Bank for this component. Reflows (capital and interest) will go back into this account. The GOP will covenant to maintain or exceed the current annual levels of agricultural lending in the Project Area in real terms and to maintain interest rates for Project-funded agricultural credit at not less than the Central Reserve Bank's projected inflation rate and not less than the established national Agrarian Bank interest rates.

The GOP will grant funds to BANCOOP as a contribution to its working capital for the operation of its credit activities. As a condition to receiving these funds, the Special Project Office and BANCOOP will execute an agreement describing the terms and conditions under which the funds will operate. The agreement will be approved by USAID prior to disbursing funds to the Bank for this component.

b. Credit Requirements

Under the Project, agricultural credit will be provided to farm households in the Upper Huallaga. The composition of the credit is a follows:

Crop inputs	$ 2,500,000
Land Expansion	500,000
Machinery Purchase	2,000,000
TOTAL	$ 5,000,000

Crop Inputs

The loss of liquidity that is expected to follow coca eradication provides the basic rationale for providing credit for crop inputs in the Project Area. At present, widespread production of coca provides a steady, dependable source of funds from which other agricultural activities are financed. A dramatic change in this situation is expected when coca is eradicated. If other means are not available for financing crop inputs, even existing levels of agricultural production can be expected to fall sharply, and there will be little prospect of increasing agricultural development. Therefore, the objective of the crop input component of the credit program is to assure continued liquidity to prevent a decline in production, rather than to expand, intensify, or diversify crop production.

Tables 1-6 in the Technical Analysis (Part IV.A) demonstrate that S/.1,000,000,000 or US$2,500,000 will be required to meet this objective.

Land Expansion

The objective of this component is to increase the production of crops on land in fallow. An estimated 78% of farm households do not cultivate the entire parcel of arable land under their control. Of the two main reasons for this phenomenon, "lack of credit" was cited by 30.7% and "soil depletion" by 29.4% of end subsample respondents. Lack of credit, therefore, prevents about 1200 families in the Project Area from expanding the area of crops they produce. In the Technical Analysis, credit availability is projected to result in an increase of 600 ha of cultivated land each year. This expansion will also result in the need for additional credit to finance crop inputs. The Technical Analysis shows that the combined demand for credit resulting from land expansion is S/.200,000,000 or about US$500,000.

Machinery Purchase

Transient labor previously attracted to the area by the high wages paid for coca harvesting is expected to become less available as coca production declines, making this constraint even more severe. Increased use of small 14-hp tractors along with other light equipment will thus be required. The machinery purchase component of the Project credit program is designed to meet the machinery requirements. This component will be managed with flexibility to allow for Project-funded research and extension to clarify the extent of the labor constraint and the configurations of machinery and equipment actually required. The funding requirement for this sub-component is US$1,500,000. The economic potential of cultivating Class V land will be tested under the research component. Heavy machinery (60-hp tractors) will be required to drain and/or prepare land for paddy rice cultivation. The requirement for this sub-component is US$65,000. The final machinery sub-component is US$350,000 for farm tools and implements. The machinery purchase component with allowance for inflation and contingencies, totals US$2,000,000.

c. Credit Policies

The estimated requirements and the implementation procedures to be followed for the credit program are based upon the following policies:

Quantity

A credit program should focus on the lowest feasible amount of credit necessary to satisfy financial requirements. Credit resources and/or subsidies should be viewed as augmenting farm financial resources. For annual crop credits, availability is more important than the volume. Financing a high proportion of annual costs impairs loan recovery and is usually unnecessary, inasmuch as a significant percentage of costs take the form of on-farm family labor. As a general rule, credit will not exceed 50% of the expected value of crop output for a cash crop and in most cases farmers will not borrow more than 25% of the expected value of his cash crops.

Interest Rate

Realistic interest rates will be charged (even though current rates are, at present, negative in real terms). The Project credit program will support the GOP policy of moving toward real positive interest rates for its organized financial intermediaries, including those operating in the agricultural sector. The policy of realistic interest rates allows the interest charges to serve as the principal rationing device for credit. All lending of Project funds for over one-year term will be subject to the Central Reserve Bank's new policy of indexation which consists of principal balances linked to a Central Bank constructed index and lowered nominal interest rates. It is expected that this new lending system devised by the GOP for all credits of over one-year term, and including agriculture, housing, and industrial sectors, will be fully operational by the time of Project implementation.

Eligibility

Eligibility for Project credit should be based upon individual repayment records and total debt capacity. It is not the function of the Project to build in additional eligibility requirements for sub-borrowers since the real problem is not elimination of irresponsible borrowers but how to remedy the absence of meaningful medium- and long-term credit. The Project management will cooperate with GOP coca eradication/enforcement efforts to deny credit to farmers growing coca for the illicit market.

Default

Penalty for default should be strong and take the form of denial of further credit. Even when the individual farmer has endured loss on the particular crop financed by credit, he will make a strong effort to maintain his credit-worthiness from proceeds of other cash crops if the penalty for default is high.

d. Implementation

The Special Project Office will work with both implementing agencies to streamline lending procedures for farmers by reducing eligibility requirements which are not linked to improved loan recuperation. In particular, mechanisms to reduce transaction costs and to increase availability of medium term credit will be employed.

Indexation

During project development the Mission explored the possibility of encouraging soundly based medium term lending by means of an innovation of crop-indexed loans. The Central Reserve Bank's new policy of indexation was announced in June 1981, i.e. late in the process of Mission project development, and this new policy is not yet implemented by specific legal regulations. Depending upon the implementation of the new indexation program, the Project may also attempt to introduce a commodity-specific scheme within the Project Area. As an example, the value of a tractor loan would be specified in terms of the present quantity of a specific crop. The interest would also be expressed in terms of an additional quantity of the same crop. In other words, the farmer would neither owe a given number of soles nor be subjected to an unknown and perhaps not understood future adjustment in loan principal (indexation). Rather, he would be confronted with an easy-to-understand situation, "one tractor is equal to so many kilograms of rice." At present in the jungle area, the government is paying 135 soles (US$0.32) for a kg of acceptable rice in the hull. A $4,000, 14-hp tractor would be worth 12,500 kg of rice under this scheme. The farmer would owe 2,500 kg per year plus 6% more kilograms on the outstanding balance. The first year's payment would be 2,500 + 750 kg. The second year's payment 2,500 + 600 kg, and so on. If the loan were paid late, more kg of interest would be due, but if paid on time the farmer would end up paying 12,500 + 2,250 kg of rice for his tractor. Since he really only owes the equivalent future value of the rice, it does not matter if he remains a rice producer or not. In each given year, his obligation is to pay the current present value of the kg owed, not to deliver the actual crop. The proposal has two notable merits as follows: (1) the monetary illusion of high nominal interest rates is avoided and, of course, the Central Reserve Bank indexation program also serves this objective; (2) the farmer-borrower becomes the beneficiary of reduction in the real price of the crop if the government pushes the price down to subsidize urban consumers as occurred intermittantly in Peru in the 1970s.

Eligibility based on previous repayment and capacity

The Agrarian Bank will be provided with an incentive to increase the use of its own 24-hour loan approval system. A real increase in loans made under this system would mean increased determination of loan eligibility based upon individual repayment records and total debt capacity, rather than ritualistic on-farm visits. In addition, implementation of this system, which could involve at least 1,500 loans per year, will be essential in preventing the additional new loan demand due to the Project from resulting in the Agrarian Bank's inability to service farmers' loan requests on a timely basis. The incentive will consist of underwriting a portion of the additional risk incurred by not applying additional subjective criteria. The Project Office will reimburse the Agrarian Bank for actual loan losses for this specific class of loan in excess of the percentage of average actual losses of 1979 and 1980 on all crop loans to individuals as determined by loans made and due in those years (recuperation rate). The GOP will make up losses below this level, as specified in the covenant. The maximum reimbursement per loan by the Special Project Office will be $1,000 and the total $100,000.

e. Technical Assistance

The Mission will contract a financial credit advisor who will be assigned to the Project. Such an advisor is required to help assure that the provision of credit appropriately test innovative credit, concept policies such as those discussed above. The objective of the Project is to assure that medium-term credit becomes and remains feasible long after the Project terminates; that loan transaction costs are significantly minimized; and that realistic interest rates are used, not only to maintain the value of funds used, but also to determine what activities are undertaken by farmers in the Project Area. Farmers will be free to undertake all legal productive activities. We do not expect them to borrow for those activities that are not profitable when real rates are used.

The use of the credit advisor will help the Project make a lasting impact in the area and even in other areas of Peru as successful innovations are internalized by both the Agrarian Bank and BANCOOP. A sum of US$120,000 has been budgeted for this purpose.

3. Farm Production Services ($1,276,000)

a. Land Registration

Land Tenure Situation

Efforts to create a system of private land ownership are not new to the area. In 1938, a law was passed reserving for colonization a strip of land 10-20 km wide on either side of the

Huanuco-Tingo Maria-Pucallpa highway which was built from 1938 to 1940. Subsequent colonization schemes by the government, and to a lesser extent by private enterprises, resulted in the creation of about 5,000 farms along a 175 km section of the Marginal Highway between Tingo Maria and Puerto Pizana.

Continued efforts on the part of the Agrarian Office have resulted in the issuance of many titles and certificates of possession throughout the area. The lack of compulsory ownership registration land has resulted in a confused land ownership system. The widespread practice of buying and selling land and/or its improvements with uncontrolled and unrecorded private documents has further confused the land ownership situation. Many factors have contributed to the creation of an unstable land system with complex land tenancies throughout the Project Area. Principal among these are the spontaneous settlements of "colonos" on unoccupied land as well as the occupation of titled land that was abandoned by its original owner.

Registration Activities

Land registration in Peru falls under the jurisdiction of the Ministry of Justice, which maintains a "Real Property Registry Office" in the capital city of each department. The nearest Registry Offices available to the Project Area are located in Huanuco for the department of Huanuco, and in Moyobamba for the department of San Martin (See Map N°2). Because of these inconvenient locations, very few of the documents pertaining to land holdings in the Project Area, particularly those in San Martin, are recorded in the country's legal system of property registration. The information on many of those originally recorded is incorrect due to changes in ownerships or possession without formal documentation and/or registration.

The Project will establish sub-departmental Land Registry Offices in Tingo Maria and Tocache to correct this precarious system of private land ownership. The initial functions of these offices will be to regularize land ownership documentation. The continuing functions will include the recording of all changes affecting parcels already registered, and the gradual incorporation of remaining land units into the registry maintained by these two offices.

Each Land Registry Office will be staffed by three people: a registrar, who will be in charge of the Office and will oversee the registration of documents; an agrarian surveyor, who will inspect the land parcels being recorded and will oversee the corrections or changes to the cadastral maps and/or survey plots; and an office assistant for typing, filing, and drafting work. Each office will be equipped with a drafting table and accesories, map cabinets, filing cabinets, and basic office furniture. In addition, the surveyor will have a motorbike and basic surveying equipment.

b. Input and Output Marketing Services

The objective of the input and output marketing services component is to improve the marketing system so that farmers' needs are served more efficiently. A marketing system which provides secure, fair, and rapid payment to farmers and which makes critical inputs widely available will help provide an appropriate incentive structure for the adoption of technologies recommended by extension agents. Four specific activities appear to be critical to aiding farmer adoption of improved technological packages and will be undertaken under this Project. They include:

Grain Storage and Handling

Storage capacity in Tocache will be increased by 2100 MT and dryers will be provided to existing storage facilities in Progreso and Tingo Maria/Naranjillo. These activities will alleviate the storage constraint in the Tocache area (the area with the greatest potential for rice production) and prevent storage losses at facilities in the humid areas of Progreso and Tingo Maria/Naranjillo.

The Project will work to increase the technical capacity of the agencies in charge of grain storage in the areas of facilities operation, logistics, and grain handling through an in-country training program and with the provision of short-term technical assistance.

Fertilizer Supplies

As a pilot effort, the Project will establish incentives for increasing fertilizer distribution through the private sector. Presently, the small market and the 6% fixed margin make fertilizer distribution unattractive to the private sector. In the area north of Tocache, where no fertilizer is available, ENCI will allow distributors to charge more than the 6% fixed margin. ENCI will solicit bids from the private sector for authorized agent status. Selection will be made on the basis of the lowest maximum margin. This will encourage the expansionof fertilizer sales in areas not presently served on an economic and long-lasting basis.

Improved Seed Accessibility

Under the research and extension component of the Project, a rice seed certification program will be established to make improved seed varieties more widely available in the Project Area.

Accessibility of Agricultural Lime

The Project Area is rich in dolomitic limestone deposits which can be crushed to provide agricultural lime. Soil acidity is a common problem in the area, and experiments at the Yurimaguas Research Station indicate that liming is a necessary practice on many soils. The use of a locally available, highly productive input makes sense. As shown in the Technical Analysis, however, large-scale lime production is not warranted. In order to make lime more available in the quantities necessary to meet likely area demand, lime will be produced on a part-time basis by the MTC in conjunction with their road maintenance activities. The rock crusher purchased road maintenance will also be used to crush limestone on a "as-needed" basis at various identified locations in the Project Area. While this does not seem a very sophisticated approach, it should be recognized that the expected demand is not large (Yurimaguas recommends .8 MT-1.0 MT per ha every 3 crop cycles); deposits are ubiquitous in the zone; transport costs from a single centralized location are high, and the actual level of effective demand is undetermined. A small, mobile rock crushing unit, capable of responding on an "as needed" basis appears to be the most cost-effective means of making agricultural lime available to farmers at a low cost. It is estimated that a single rock crushing unit could meet maximum area demand in one month of operation per year.

c. Agroindustrial Promotion

The Project is not directly financing agro-industrial projects, as there are a variety of credit lines currently available for agroindustry, including AID Loan 527-T-060, Rural Development Agro-Business Fund. Analysis of the area indicates there is potential for the development of agroindustries and processing activities. Possibilities identified include rice milling, yuca starch and flour, yuca leaves as animal feed, and processing and marketing of tropical crops such as cacao, vanilla, annatto, cardamon.

The analysis indicates that the principle constraints on the development of marketing/processing activities is not the availability of loan capital, but rather the weak institutional support in the Project Area (both public and private) required to facilitate the development of these activities in a frontier zone.

An agroindustry development specialist will be hired as a permanent employee of the Special Project Office. The primary purpose of this individual will be to develop supporting linkages among producers, extension, research, other technical support services, and agroindustrial firms. The activities to be promoted by the agroindustrial specialist include:

-- Technical Assistance. Provision of technical advice either directly or by contracting short-term assistance;

-- Pre-feasibility Studies. Development of pre-feasibility studies for agroindustrial and marketing investments either directly or by agroindustrial experts.

-- Information Dissemination. The dissemination of information to producers regarding processor requirements and prices and to processors regarding local supply conditions (procedures lists, outlook information, etc.).

-- Credit Linkages. Assist investors in presenting loan requests to the financial agencies; working with the banks and the investor to finalize and make adequate feasibility studies; and identifying possible investors.

-- Output Market Linkages. Identify consumers of local products (processors, distributors, marketers, etc.) and bring them into contact with the local producers and processors.

4. Development and Interpretation of Resource Information ($656,000)

A constraint to the development of the high jungle in Peru is a lack of reliable and timely information necessary for policy formation and investment planning. The objectives of this Project element are essentially threefold: (a) provide the basis for accurate measurement of the impact of the Project; (b) provide a continual flow of information to project managers to assist in implementation; and (c) provide the basis for rational future policy and investment planning. This element contains two levels of activity, basic resource information and statistical interpretation. The latter will include the upgrading of interpretive capability through the introduction of an area sample frame (ASF) technology and other statistical measuring techniques required to fully utilize the basic resource data either being developed or already developed.

a. Agricultural Information System

Current procedures for the collection of agricultural data are inadequate. Extension agents typically are used on an "as needed" basis to collect data. They "collect" data only on yields and area planted; data are collected from farmers closest to the roads in an unsystematic fashion; no questionnaires are used; and data are reworked with subjective impressions before being passed to Lima for further manipulation.

The multiple requirements for timely and reliable information on agricultural production and farmer characteristics require a strategy for data collection efforts that allows the flexibility to accomodate different data needs, yet reduces the costs of designing a new sample and survey for each user. To accomplish this, an ASF will be constructed for the Project Area and the staff of the statistics office will be increased and upgraded.

The area sample frame technique is a methodology for scientifically selecting the smallest sample necessary to obtain information representative of an area. The actual collection of data is carried out by means of interviews in the sampled areas (segments). The selection of the segments is made on the basis of photo-interpretation techniques, utilizing satellite imagery photography, cadastral maps, land use maps, and road maps. The construction of the ASF is carried out in three stages. First, the total area is divided into primary land use strata such as forest, intensive cultivation, pasture, urbanized areas, etc. The strata are homogeneous with respect to land use. Second, the strata are subdivided into smaller contiguous areas called "count units." By stratification, the sample can be made more efficient. Count units are randomly selected to construct the frame. Finally, the selected count units are divided into segments, based on topographic maps and aerial photographs. The segments for interviews are then randomly selected. The information obtained from the segments can be expanded to provide estimates for the areas as a whole.

The activities of the statistics office will focus on:

--the construction of the ASF;

--the design and implementation of surveys for continuing information, including (1) basic production estimates (area and yield) of the principle regional commodities - corn, rice, bananas, coffee, cacao, citrus, tobacco, tea, etc.; (2) rural employment data; (3) cost of production data; and (4) rural income data.

In conjunction with the research and extension program, specialized surveys will be undertaken, using ASF, to determine the specific constraints faced by area producers, rates of adoption of improved technological practices, problems encountered by farmers in adopting recommendations, etc. Consideration will be given to the maintenance of a farm records system for a sample of area farmers. The objective of these specific surveys is to provide research and extension personnel with a systematic understanding of the behavior of the farmer and the constraints he faces. This information is essential to orient extension and research activities toward farmers' needs, as well as providing a systematic micro-analytic base for over all Project assessment.

The construction of an ASF has two important advantages for the Project:

(1) It provides a scientific sample frame that accomodates multiple uses. The agricultural statistics office of the MA can use it as the base for estimated area production and its changes. Researchers can use it as the base for their specialized experiments. It provides the base for establishing benchmark statistics and their monitoring overtime for Project evaluation. This will reduce the total cost of information gathering activities.

(2) It is less costly than a census and is probably more accurate. In addition, the data generated by the ASF will have four special uses for the Project:

- Project impact evaluation;

- Systematic understanding of the constraints and felt needs of area farmers;

- Monitoring of coca eradication progress; and,

- Development of data base for future Project activities.

The construction of the ASF will be carried out in the first year of the Project using recent aerial photography and cadastral maps. Grant funds will provide short-term technical assistance in the areas of mathematic statistics, area frame construction, data processing, and agricultural economics. They will work with both the personnel of Statistics Office of the MA and INIPA, UNAS, and the PEAH. Currently the statistics personnel of the MA number three: one professional and two technicians.

b. Basic Resource Information

The 1964-69 BID financed Land Settlement Project carried out detailed mapping of soils resources and land holdings along the valley floor from Aucayacu to Tocache. This information is incomplete, and needs to be expanded. The Project will carry out a series of activities to obtain the basic information required to support the full development of the Project Area agricultural resources.

These basic resource development activities will be carried out in the valley between Tingo Maria and Puerto Pizana; they include:

-- Aerial photography covering about 900,000 ha;

-- Topographic maps of the agricultural areas;

-- Land use capability maps; and

-- Updated cadastral surveys.

Aerial Photography

Adequate aerial photography coverage of the entire Project Area is the key element requirement to carry out the basic surveys and inventories in the field and to expand existing coverage of cadastral and resources maps. In May 1980, the Mission made arrangements through the F.D.N. with the Servicio Aereo Nacional (SAN) to obtain aerial photography at 1:80,000 scale covering valley and surrounding areas and at 1:20,000 scale covering the valley between Tingo Maria and Puerto Pizana. To date, 10% coverage of the 1:20,000 scale photography has been obtained. SAN is working on this activity and subject to weather constraints it is expected that all aerial photography will be completed by September, 1981.

Topographic Mapping

The Project will contract for the completion of topographic maps at 1:10,000 scale of the remaining agricultural areas providing the basis for the expanding existing cadastral maps, and the land use maps.

Land Use Capability Maps

In 1961-62, the Ministry of Planning and Public Work did a reconnaissance level resource study of about 290,000 ha northward from Tingo Maria to Puerto Pizana providing the basis for the 1964-68 BID financed Tingo Maria-Tocache Project. The BID Project undertook detailed on-the-ground soils studies and produced 1:5,000 and 1:10,000 scale soils and land use potential maps (eight classes of land) of the areas selected for colonization. These maps provided the basis for laying out the farms within each colonization area. The Project will undertake to expand the coverage of land use capability maps so as to cover all currently occupied valley area.

Cadastral Survey

The Project will complete a cadastral survey to provide the basis for maintaining current land ownership records. The updated cadastral survey will be maintained by Land Registration Offices in Tingo Maria and Tocache. The development of the cadaster will be with the National Offices for Rural Cadasters and Agrarian Reform under the Ministry of Agriculture. The establishment of Land Registration Offices that will certify all land units being transacted and registered; maintain the cadastral maps and records of all land parcels affected by changes in boundaries; assign new parcel identification numbers as required; and, record all transactions.

5. Road Maintenance ($5,000,000)

The Huallaga valley parallels the Andes mountains from south to north for about 600 km from Tingo Maria to Tarapoto. The west side of the valley is divided by a series of large streams and rivers that originate in the Andes. The streams on the east side of the valley are fewer and smaller since they originate in the lower range of hills separating the valley from the low jungle regions. The Marginal Highway was constructed on the east side of the Huallaga River in order to avoid the prohibitive expense of bridging a large number of major streams.

As noted on Map N°3, the highway only crosses to the west side of the Huallaga for a short distance from Tocache to Puerto Pizana, providing access to the good agricultural lands there. The development of the remaining agricultural lands along both sides of the Huallaga River required the development of a considerable network of farm feeder roads. Currently, there are two barges which connect the La Morada and Uchiza areas on the west bank to the Marginal Highway.

During intensive review, four additional sites for barges were analyzed to determine their economic feasibility. Two were eliminated by analyzing the amount and quality of land being served.. A cost-benefit analysis was developed for the two most promising barge connections, and they were eliminated from further consideration since the most optimistic assumptions yielded a benefit-cost ratio of .5.

As shown on Map N°3, each feeder road sub-system consists of a main feeder road along one side of a lateral river valley and a series of connecting farm roads. The same pattern is repeated to a lesser extent on the east side which contains only two lateral river valley sub-systems. The remainder are short feeder roads connected to the Marginal Highway.

The Marginal Highway runs 190 km from Tingo Maria to Tocache. Approximately 290 kms of feeder roads provide access to the better agricultural lands in the area. In addition, about 200 km of feeder roads are located in poorly drained areas associated with cattle ranches on Class V lands, and will not be maintained by the Project.

Basic Feeder Road Network
(km)

Zone	East Bank	Connected West Bank	Unconnected West Bank	Total
Tingo Maria	9.0	27.3		36.3
Aucayacu	54.0		30.6	85.4
La Morada	1.0	32.5		33.5
Uchiza	22.8		81.1	103.9
Tocache	--	32.4		32.4
Totals	87.6	92.2	111.7	291.5

As described in the background section, road travel is the major means of transportation in the Project Area. Heavy rainfall, poor road drainage, lack of a maintenance capacity, and, in the case of feeder roads, uncontrolled jungle growth have resulted in the deterioration of the road network. The Ministry of Transportation has generally focused on new road construction rathern than maintenance of existing roads.

Cost of road transport is a function of distance and road conditions. Transportation costs represent a significant portion of the marketing costs. A poor road system reduces the farm gate profitability and thus represents a constraint to the expansion of output and to the provision of services. The cost of providing extension services are increased and visits by extension agents tend to be fewer. Inadequate roads also affect the farmer's access to credit, since trips to the bank by the farmer seeking credit or visits to the field by the bank's loan officer become more difficult.

The Project will undertake the following activities through agreements with the regional offices of the Ministry of Transportation and Communications:

Institutional Capability

The Project will provide assistance to the MTC to improve the Ministry's ability to plan for road maintenance as well as to actually maintain both the highway and feeder roads.

Maintenance

Under the Project, funds will be provided to assist the MTC in the maintenance of the Marginal Highway from Tingo Maria to Puerto Pizana and in the general maintenance of 290 kms of feeder roads.

Maintenance Center

With Project funds, the MTC maintenance center at Huayranga (near Tocache) will be upgraded and equipped. The Huayranga center will maintain the roads in the La Morada, Uchiza and Tocache areas, including 129 km of Marginal Highway and 290 Km of feeder roads. Existing maintenance centers Tulumayo, Madre Mia, and Pizana will continue to service other sections of the Marginal Highway and feeder roads.

Annex II, Exhibit F contains a list of road maintenance and shop equipment and a summary of road maintenance costs.

6. Potable Water and Environmental Sanitation ($250,000)

The Environmental Assessment for this Project pointed out the lack of potable water systems and basic sanitation facilities in the upper Huallaga valley. The problem is most severe in rural outlying areas than in Tingo Maria, which has a municipal water supply from ground-water and a sanitary sewage collection system. However, the collected sewage from Tingo Maria is discharged into the Huallaga River without treatment, creating a health hazard for those who use river water downstream.

According to the Ministry of Health, approximately 20% of all deaths in the area are attributable to disease associated with poor sanitation practices: dysentery, gastroenteritis, and parasites. Pre-school and school-age children are most severely affected by health problems, such as malnutrition accompanied by anemia, intestinal parasites, and gastro-intestinal infections. Adults are also affected by intestinal diseases, causing an elevated loss of time from work due to illness.

Throughout the rural areas, abundant surface water is available; surface streams are the main source of drinking water. However, these streams are readily contaminated with human and animal fecal material. No water quality data are available for the area, but public health officials at the Tingo Maria hospital state that fecal contamination of streams and rivers in the upper Huallaga area due to lack of sanitary facilities is the rule rathern than the exception.

A.I.D. is currently financing a $5.5 million Project, Rural Water Systems and Environmental Sanitation (527-U-074), which over the next four years will build water systems in 420 sierra and high jungle communities in six regions. However, neither Huanuco nor San Martin will be covered by that Project. In order to address the concerns raised in the Environmental Assessment as well as to complement ongoing activities in Huanuco and San Martin under the AID Primary Health Project (527-U-072), one component of the proposed development project will provide selected communities in the Project area with potable water and latrines.

Under the proposed Project, approximately 60 communities in the Project Area, which are within the jurisdiction of the Ministry of Health, will be provided with potable water services. Low-cost, easily maintained chlorinators will be incorporated into the larger system where water testing demonstrates need. Where feasible, public sanitary units including basins for washing clothes, public taps, and public showers will be constructed. Latrines will include as a Project component to be constructed in public buildings, such as schools, health posts, and community centers, and for individual homes. The Project will also finance the installation of wells in communities where gravity-fed systems are not feasible.

The Directorate of Sanitary Engineering (DSE) of the Ministry of Health will be responsible for Project implementation. The DSE has a national office which coordinates and executes national environmental sanitation planning activities, major equipment and supply procurement, personnel and program administration, and the integration of environmental sanitation with other health activities of the Ministry. The DSE regional office is responsible for the implementation of sub-projects within the health region. From the regional office, a project team will be assigned to a sub-regional office in the Tingo Maria hospital area. This team will be employed as permanent staff of that office, and will be composed minimally of the following personnel: 1 regional sanitary engineer, 3 sanitary technicians, and support staff from the hospital area office.

Potable Water Systems

DSE has developed a number of standard designs which, to the extent possible, use locally available materials, are labor-intensive in the construction phase, can be maintained easily, and are consistent with community size and water source availability. Three of these designs will be used under this Project and are described in Annex II, Exhibit D.

Latrines

Complementing the effectiveness of all water systems constructed under the Project will be the provision of public and private latrines. Public latrines will be constructed in all Project communities lacking them, and will be located in communal areas such as schools, medical posts, and public halls. Depending on the size of the community, they will either be pit privies or include septic tanks with discharge into leach fields. Private latrines will also be constructed in all Project communities expressing an interest. Materials and molds will be provided by the MOH, while community members provide labor. Additional support for this component will be provided through the Primary Health Project in the form of educational materials. Education and motivation in system use and maintenance will be provided by sanitary technicians, and is an essential component to stimulate successful behavioral change.

System Installation

The selection of systems to be constructed with Project funds will be based on several factors, including the absence of an existing potable water source, cost criteria, and community interest and enthusiasm, e.g., the willingness of the community to contribute voluntary work for the construction of the water system and latrines and to bear a small portion of the construction expenses.

The sanitary technician will assist community water committees in the organization of voluntary labor for water system and latrine construction. In addition, the technician will ensure that all materials and equipment are on-site prior to the construction phase. The regional engineering supervisor will accompany the delivery of materials in order to brief the technician on the design and execution of each sub-project. Approximately twice a month, a sanitary engineer will return to inspect the construction. Finally, when the sub-project is completed, the engineer will ensure that it has been completed in accordance with the design standards as originally established. Construction will take place in "priority clusters" to economize on the movement of personnel, equipment, and materials. The clustering of sub-projects will also permit the Project to capitalize on the interest generated in an area by the construction of a water system in one of the area communities.

System Maintenance

The maintenance component will be given considerable emphasis to avoid, to the extent possible, the construction of a series of potable water/sanitation sub-projects which deteriorate because of improper maintenance. To improve the maintenance of systems constructed under the proposed program, a maintenance plan has been developed, based in part on the successful aspects of DSE's experience with system maintenance to date. In order to qualify for a water system under the program, a community water committee will be established in each Project site with the assistance of the sanitary technician. The committee will organize voluntary labor for system construction and will be responsible for the maintenance of the system, including the collection of maintenance fees. The fee per user will be established by DSE for each community and the system to be installed in each community will depend in part on the user's ability to pay the fee.

IV. PROJECT ANALYSES

A. Technical Analysis

1. Research and Extension

a. The Amazon Research Network

Agricultural research, with few exceptions, has not been operative in Peru since 1970. In 1979, efforts were initiated to redevelop the agricultural research service of Peru. The present INIPA (National Institute for Agricultural Research and Promotion) was created and charged with national research and extension redevelopment. Over the next few years a series of research programs will be initiated but severely constrained by a scarcity of experienced research, administrative and operational personnel. An agricultural research emphasis in the Project Area must compete with the issues of human scarcity, inadequate research facilities, and the historically low priority given to agricultural research efforts in the country.

Recognizing these conditions, the following discussion presents a proposed structure for jungle research, and the Upper Huallaga Agricultural Development Project role for participating in the formation of an Amazon Research Network.

Given the diversity of agriculture resources in the Amazon basin, agricultural scientists from Bolivia, Brazil, Colombia, Ecuador, Peru, and Venezuela have formed a planning group identified as the Agricultural Research Network for the Amazon (Red de Investigación Agraria para la Amazonía - REDINAA). After a series of meetings, the group has signed a cooperative agreement and is proceeding to plan the network which will lead to experiment station proposals for each country. Eventually they will seek international support to implement the network. In the planning stages, the network has had participation from international organizations such as A.I.D., the Rockefeller Foundation, North Carolina State University, World Bank, IDB, United National Development Program, FAO, the Technical Cooperation Society of Germany, CIAT and IICA.

The general objectives of the network focus on the efficient generation of new knowledge, interchange of knowledge, collaborative research to reduce duplications, and means to efficiently utilize scarce human research resources. An important overall focus is to generate knowledge supporting actions that will rationally and scientifically exploit resources in the Amazon basin.

There are many concerns related to the fragile ecological balance of the Amazon basin, its probable influence on the climate of large land masses, and knowledge gaps of the consequences of increasing population pressure on traditional agricultural methods and the effect of alternative agriculture or agro-forestry production systems. The research network is being designed such that the product of the network will add knowledge on these important issues.

Within a given country the general structure is to develop jungle research centers that will focus on such areas as soil management and conservation, the management of annual and perer·ial crops, pasture and animal management, forest management, agro-forest management, permanent tree fruit management and fisheries management. Each such center would also serve as a sub-station site to test and adapt ideas developed at the other centers. The same concept would extend beyond the borders of the six cooperating countries.

Tentative plans of the network within Peru consider some seven agricultural research center locations: Iquitos, Iberia, Pichis/Palcazu, Pucallpa, Tarapoto, Tulumayo and Yurimaguas. At this early stage, the Pucallpa Experiment Station is being structured to focus on pastures and animal management, the Yurimaguas Experiment Station is reasonably well developed with a focus on annual and perennial crops and soil management, and the Tulumayo Experiment Station will be developed to focus on agro-tree crop management. Such an agricultural research network offers a series of benefits:

(1) Provides for an efficient use of very scarce agricultural research personnel - top research personnel at a center would direct research at the center but also direct similar research throughout the other six locations.

(2) Provides the much needed research base for further development within the Peruvian Amazon.

(3) Provides a research base on which to build extension operations designed to create cropping and livestock alternatives.

(4) Provides for an effective exchange of research progress and issues across centers within and between countries.

The Amazon Research Network is seeking resources to further develop the Peruvian network model. Modest support toward this goal from the Upper Huallaga Agricultural Development Project is proposed. Furthermore, the development of the Tulumayo Experiment Station as part of the research network with linkages to the Pucallpa and Yurimaguas Experiment Stations is a step forward toward reaching this goal.

b. <u>Extension Program</u>

To increase average crop yields by 30% in five years, the agricultural extension program will need a large group of dedicated and qualified extension agents. There are few agents at the present time. In order to rectify this situation, a sizeable number of experts, knowledgeable in the important crops of the area, will be needed at the beginning of the program. It will be their responsibility to provide the necessary training in all aspects of crop production, so that knowledgeable commodity specialists and extension agents will be placed in the field to advise farmers.

This program is concerned with developing human capital through on-the-job training, refresher courses at UNAS and/or INIPA Tulumayo, thesis studies of UNAS students, scholarships for advanced studies, and short courses provided by established research centers. These well-trained personnel would then be able to make an important impact in the upper Huallaga Area and other regions of the humid tropics.

Review of Rejected Agricultural Extension Options

Several extension options have been considered, but for different reasons, have been rejected. These options are:

(1) To develop separate programs for both INIPA and UNAS. UNAS would maintain its extension sites while INIPA would develop a new extension program. This option was rejected because;

(a) it would create a duplication of effort;

(b) resources are too scarce to allow each institution to develop its own program; and,

(c) it would not contribute to an information pool of experience in solving the agricultural problems that exist for a particular region.

(2) To develop an INIPA-UNAS team that would replace the UNAS program now located in 10 to 13 villages in the upper Huallaga region. This option was rejected because:

(a) there would be no organization to disseminate information quickly or to evaluate the extension teams;

(b) the team would not be able to focus extension activity in areas where farmer interest is high; and,

(c) there would be problems integrating INIPA and UNAS into one extension team.

(3) To develop commodity centers using an INIPA-UNAS extension team. Approximately 10 commodity centers would be created in the major zones for the respective crops. This option was rejected because:

(a) these centers would not be able to work with farmers in other regions who are cultivating the same crop;

(b) large quantities of a certain crop are not grown in a single region; and,

(c) a tremendous amount of overlapping would be necessary. For example, in a perennial crop commodity zone, there would also be a need for extension agents in annual crops, pasture, etc.

(4) To develop two INIPA sectoral offices, one in Tingo Maria and another in Aucayacu with one agronomist and seven agricultural technicians in each office. This option was rejected because:

(a) it ignores the small but capable human resource pool of the university; and,

(b) it is very limited in scope and could not begin to develop an extension program that would help a majority of the area farmers.

Accepted Agricultural Extension System

The extension strategy to be followed in the upper Huallaga region is to develop an INIPA system with the participation of contracted UNAS personnel to be centered in four sectors throughout the valley. Sub-sector offices will be established at later dates depending on farmer interest.

The major problem with this system is that it will need to develop sufficient expertise to provide technical assistance to a large number of farmers. The strong points of this system are:

(1) It will develop a strong agricultural structure, so that the extension teams will be able to pool agricultural information from different regions. This model will also permit the rapid dissemination of information to individual extension teams.

(2) The system is flexible and will allow the development of a stronger extension program where farmer interest is greatest.

(3) The program will have a strong backstop of qualified experts, including the agronomist in the field, the broad-based specialists at the central extension office, and the professors at the UNAS.

(4) The program will tie together research and extension, as well as utilize research data and successful extension models found in other regions of the jungle. Thus, researchers will be constantly aware of new problems and the extension technological packages will be updated as new information becomes available.

2. Agricultural Credit

a. Introduction

Under the Project, agricultural credit will be provided to farm households in the upper Huallaga. The composition of this credit program is as follows:

Crop Inputs	$2,500,000
Land Expansion	500,000
Machinery Purchase	2,000,000
TOTAL	$5,000,000

The discussion that follows first outlines the rationale for the level of financing proposed for each component of this credit program. The discussion of the mechanism that will be used for credit provision can be found in Part III.C.2 of this paper. The economic justification of the credit program appears in Annex II Exhibit H.

b. Estimation of Credit Requirements

(1) Crop Input

As discussed in Part III.C.2 the basic rationale for this component of the credit program is to compensate for the loss of liquidity that can be expected to be associated with the eradication of coca in the Project Area. At the present time, the widespread production of coca in the upper Huallaga not only provides farmers relatively high incomes; it also affords a mechanism through which future agricultural activities can be financed. With the ability to harvest coca leaves three times a year, coca producers are guaranteed a steady and reliable flow of cash.

With the eradication of coca, this state of affairs can be expected to change dramatically. Unless means are found to finance crop production costs, not only will no substantial increase in agricultural development occur, but legitimate agricultural production can be expected to plummet from current levels as well.

Although some crop diversification can be expected to occur as a result of coca eradication, the objective of the crop input component of the credit program is not in and of itself to expand, intensify, or diversify crop production. It is simply to offer sufficient liquidity to offset wholesale declines in crop activities.

Tables 1-6 in Annex II, Exhibit H and the discussion of the credit situation provide a framework for estimating credit requirements to meet this objective. Each of these tables is based on data from the F.D.N.'s socio-economic survey of the upper Huallaga area and is organized so that distinctions can be drawn among six categories or farm households:

-- Farm households with no credit for crop-related activities and with no coca;

-- Farm households with no credit for crop-related activities and with up to one ha of coca;

-- Farm households with no credit for crop-related activities and with more than one ha of coca;

-- Farm households with credit for crop-related activities and with no coca;

-- Farm households with credit for crop-related activities and with up to one ha of coca; and

-- Farm households with credit for crop-related activities and with more than one ha of coca.

The F.D.N. estimates that there are approximately 5,000 farm households in the Project Area, not including the Monzon sub-zone. If the F.D.N. estimate is adjusted to include Monzon, then as discussed above, this number rises to 6,238 farm households. This estimate includes farm households registered in the cadaster and areas containing a concentrations of squatters. It does not include coca growers on lands that have never been formally settled, which are at substantial distances from feeder roads.

On the 5,000 farm households outside Monzon, the F.D.N. estimates that 72.2 %, or slightly more than 3,600 households, are legally eligible to receive at least short-term credit. If this percentage is applied to the expanded farm household estimate, the number of credit eligible households rises to about 4,500. With the loss of liquidity accompanying coca eradication, however, additional farm households can be expected to take the legal steps required to become eligible for credit. As a working hypothesis, therefore, it is assumed that approximately 5,000 households will be legally eligible to participate in the Project's credit program and that the socio-economic relationships evidenced by the F.D.N. survey data can be used as a basis to arrive at reasonable estimates of credit requirements.

Present credit availability can be estimated from the data presented in Table 5. If credit for "construction and installation" is excluded, extrapolation of these data to the entire Project Area suggests that S/.189,491,848 of bank credit is currently provided for crop-related activities. This appears to be an underestimate however. Agrarian Bank records indicate that crop loans to individuals in the Project Area totalled S/.355,763,000 in 1980, but much of this total can be expected to have gone to a small number of large,highly commercialized farms, that is, farms that are typical of the farm households in question here. The appropriate amount to be deducted from the gross requirements estimate, therefore, is concluded to lie somewhere between the two extremes of S/.189,491,848 and S/.355,763,000. To be on the safe side, that is, to avoid overestimating the size of the crop input component of the credit program, a figure of S/.300,000,000 is used. This yields a net requirements estimate of S/.795,432,000. If a ten percent margin is allowed for contingencies and a 15% allowance is added for inflation, then a final estimate of the total level of financing required for the crop input component of the credit program can be obtained. This estimate comes to S/.994,290,000.

These calculations, with appropriate rounding, can be summarized as follows:

	S/. (Millions)	$ (Millions)
Gross requirements	1,100	2.75
Current credit availability	300	.75
Net requirements	800	2.00
Contingencies	80	.20
Inflation	120	.30
Crop input component of credit program	1,000	2.50

(2) Land Expansion

The objective of the land expansion component of the credit program is to promote the conversion of idle land to crop production. From the F.D.N. subsample, it is estimated that 78% of upper Huallaga farm households do not cultivate all their parcels. There are two major reasons for this. Of the reasons offered by subsample respondents, 30.7% were "lack of credit" and 29.4% were "depleted soils." While the second of these constraints may be addressed by adding nutritients to soils, doing so could be economically prohibitive--and, in any case, the practice of placing land in fallow is certainly an appropriate way to deal with this problem. The first constraint, however, is another matter and can be addressed directly under the Project's credit program.

If the "lack of credit" percentage is applied to the 78% of upper Huallaga farm households that do not cultivate all their parcels, this yields an estimate of approximately 1,200 households in the Project Area that would presumably expand crop hectareage if adequate credit were provided for this purpose. In what follows, it is assumed that credit availability would induce these households to open up an average of one ha of land each every two years. It is estimated that two years is an appropriate payback for land clearing loans, particularly since the common practice of planting corn on freshly cleared land provides a farm household with a relatively rapid, though modest, cash return on its investment. At a per ha cost of S/.30,000 (30 jornales at S/.1,000 per jornal), therefore, the financing required for land clearing in the Project Area can be estimated as:

2.00 x .50 x 1,200 x S/.30,000 , or S/.36,000,000.

With the opening up of an average of 600 ha of cultivated land in the Project Area each year, additional credit will be required to finance the cash costs of crop inputs associated with increased cultivation. As discussed above, the gross requirements for financing crop inputs in the Project Area, with no land expansion, are estimated to come to S/.1,095,432. Using the hectareage estimates in Table 6 (but with the substitution of 7.355 11.0 for category IV), it is estimated that this financing will cover approximately 25,370 ha. This implies a per ha financing requirement of S/.43,178. If this same requirement is applied to the 600 ha that are projected to be opened up annually, then S/.25,906,800 of additional credit will be required to finance crop inputs each year. Over the five year life of the Project, therefore, the crop input financing requirements implied by land expansion are S/.129,534,000.

The following table pulls together the land clearing and the crop input requirements of the land expansion component of the credit program. By taking contingencies and inflation into account, it also estimates the total funding required for the land expansion that is projected to take place under the Project:

	S/.
Land clearing	36,000,000
Crop inputs	129,534,000
Land expansion	165,534,000
Contingencies	16,553,400
Inflation	24,830,100
Land Expansion component of credit program	206,917,500

Rounding this figure to S/.200,000,000, the funding required for this component of the credit program therefore comes to approximately $500,000.

(3) Machinery Purchase

As noted in Section II.C.2., a major constraint to increasing agricultural production in the Project Area is the shortage of labor at peak demand periods during the year. This is particularly the case for land preparation. With coca eradication, this constraint can be expected to become even more severe. As the high wages that are currently paid for harvesting coca leaves decline, so too will the availability of transient labor in the area. 1/ This suggests that increased use of machinery will be called for, particularly for land preparation.

The machinery purchase component of the Project's credit program is designed to meet these machinery needs. In what follows, the requirements of this component of the program are briefly discussed, based on current estimates of these needs. It is important to note that as Project-funded research and extension activities shed further light on labor constraints at the farm level, different configurations of machinery

1/ The requirements of the crop input component of the credit program are not based on coca wage rates but on the prevailing rate for non-coca activities, namely, S/.1,000 a day.

and equipment may turn out to be required. As a consequence, this component of the credit program will be administered with sufficient flexibility to accomodate the anticipated growth in knowledge of farming systems in the Project Area.

As a rule, heavy machinery is not required either for land clearing or for land preparation in the upper Huallaga. Most land has already been cleared, burned off, and planted at least once in the past and, as a result, land clearing can generally be performed by hand. The same is true for land preparation. If insufficient labor is available to prepare land for planting,however, the task can be performed quite adequately with small, 14 HP tractors. Such tractors are already in use in the upper Huallaga and experience with them to date has been favorable. In fact, interviews with personnel in the Project Area suggest that the principal reason that more of this machinery is not used has been the limited availability of medium-term credit for this purpose.

Over the five-year life of the Project, Project funds will assist upper Huallaga farm households to purchase 500 14HP tractors. Funds from the credit program will be used to finance 75 percent of the cost. At a unit price of $4,000 and with an average repayment period of five years, the funding required for this subcomponent of the Machinery Purchase component of the credit program can be estimated as:

$$(.5 \div 5000) \times 500 \times \$4{,}000, \quad \text{or } \$1{,}500{,}000.$$

As discussed in Section III.C.1., the research component of the Project will include on-farm experiments to test the economic viability of cultivating Class V land. These experiments will require the use of heavy machinery, either to drain the land or to prepare it for paddy rice cultivation. Project funds will be used to finance the purchase of four 75HP tractors for this experiment program. As discussed below, lease-purchase agreements will be set up with four farm households for this purpose.

Each 75HP tractor, including spare parts, will cost $18,000 on delivery to the Project Area. Project funds will be used to finance 90 percent of this cost. The requirements for this subcomponent of the credit program therefore are:

$$4 \times .90 \times \$18{,}000,$$
$$\text{or } \$64{,}800, \text{ which can be rounded to } \$65{,}000.$$

The final subcomponent of this component of the credit program will be a modest $35,000 fund for farm household purchases of farm tools and implements. It is anticipated that this fund will turn over every two years.

When contingencies and inflation are taken into account, the machinery purchase component of the Project's credit program can be summarized as follows:

14 HP tractors	$ 1,500,000
75 HP tractors	65,000
Tools and implements	35,000
Machinery purchases	$ 1,600,000
Contingencies	160,000
Inflation	240,000
Machinery Purchase component of credit program	$ 2,000,000

3. Farm Production Services

a. Grain Storage and Handling

The grain storage and handling component has three basic elements: an increase in storage capacity of 2100 MT in the Tocache area, installation of dryers in existing facilities, and training in storage and handling procedures for the persons involved in these operations.

Total usable storage capacity in the area is 8557MT. In addition, there is 1850 MT of storage capacity in MA warehouses that need rehabilitation. Tocache is the most important rice zone in the Project Area, has a significant area in corn, and has the potential for an increase in production through both yield and area increases.

The alternative to increasing storage capacity in Tocache, to serve the Tocache and Uchiza markets, is to transport grain to the underutilized facilities in Tingo Maria. This alternative is discounted. Transport facilities donot permit bulk shipment. Therefore, shipment to other facilities in Tingo Maria would involve reception, storage, and bagging in Tocache followed by transhipment to Tingo Maria - loading, unloading, redrying, rebagging, etc. This would be an inefficient process. Therefore, under the Project, an additional 2100 MT storage facility will be constructed in Tocache.

Estimated demand for storage facilities is based on an expansion of 10% in grain production (rice and corn) beginning in the third year of the Project. It is assumed that 800MT of grain per month can be shipped out of Tocache. With truck capacity of 10 MT per load, this requires 80 trips per month--approximately four trips per day. This is substantially above the current rate of shipment out, but appears feasible. In year three of the Project, demand for storage exceeds capacity during the peak months of April-May-June, during the rice harvest, but it is assumed that this can be met on a short-term basis by increased shipping. However, in year four, demand begins to outstrip supply. The storage facility is programmed to be completed by May of Project year four. The technical specifications for the facility are described in Annex II, Exhibit J.

The tropical environment presents difficulties in the operation of storage facilities. Four principle problems are evident:

(1) High storage losses from pests, heat, and humidity. At one storage facility visited by grain storage experts, it was found that practically all the corn being stored was infested by insects. They roughly estimate that at least 15% of the grain stored in the area is lost due to poor operating procedures and lack of drying facilities.

(2) Lack of trained personnel in quality control (principally fumigation) and administration (record keeping, logistics).

(3) Lack of equipment for measuring grain quality (humidity, insects, foreign matter).

(4) Administrative delays in paying for grain received. This problem is of two sorts. First, ENCI and ECASA have liquidity problems. At harvest, they are often financially unprepared to receive the grain the farmers are bringing in. Second, payment is not made in Tocache. Farmers from Tocache must go to Tingo Maria to receive payment.

Losses of 15% due to poor management and lack of dryers represent a cost of $432,000 per year at current production and price levels. The following measures to stem these losses are, therefore, economically justifiable.

To overcome these operational difficulties, the grain storage component includes the following:

(1) A training program for storage personnel in the area of grain storage management and operations, e.g. record keeping, logistics, quality control. This will be accomplished through an incountry short course such as that provided by the Food and Feed Grain Institute at Kansas State University, under a contract with USAID.

(2) Installation of drying facilities at storage centers in Progreso and Tingo Maria. An additional six dryers at each location with a capacity of 0.25 MT per hour are required. This will allow more grain to be accepted, reduce losses, and allow storage for a longer period.

(3) Equipment for existing storage facilities in Tingo Maria (ECASA and ENCI). Under the Project, moisture meters and an air oven for calibrating the meters will be purchased. The existing equipment is not adequate: meters sample only eight grains, no standard for calibration is available, units are not in operating condition. Grain is incorrectly classified, accepted, and rejected on the results of poor equipment.

(4) The Project office will work with ENCI/ECASA to ensure a smoother functioning administrative operation. This will include (a) supplying both institutions with production estimates,so that sufficient liquidity at harvest time is available and (b) establishing a full function facility in Tocache, permitting payment in Tocache.

By August 1982, three weeks of short-term technical assistance will be provided in grain storage and handling. The purpose of the initial technical assistance will be to develop a working agreement between the storage agencies and the Project Office. Under this agreement, the Project will provide a short-term, in country training program for storage personnel,provide the required dryers and test equipment, and arrange the implementation of the new storage facility in Tocache. ENCI/ECASA will operate the full service facility in Tocache. The short-term technical assistance will also review and update the technical specifications for the dryers and test equipment.

In year two of the Project,August 1983,one month of short-term technical assistance will be provided to the Project Office to develop the marketing study and technical specifications for the new storage facility. The facility will be in operation for the 1984 harvest period. The contract will include a training component for the personnel who will operate the facility.

b. Agricultural Lime

Experiments at the Yurimaguas Experiment Station on response of lime on continuous cropping of corn, soybean and rice show that lime is a critical factor on some soils by reducing percent aluminum saturation. Liming is not considered necessary on newly cleared land, due to the effect of the ash content in raising the ph level of the soil. Only after one or two crops is liming considered necessary. To determine the amount of lime that will be neededover the life of the Project, the following assumptions havebeen made;

(1) Lime is initially applied at a rate of 2 MT per ha and at a rate of 1 MT per ha every two years thereafter (approximately 3 croppings).

(2) An initial lime application is made to 10% of the area currently in annual and permanent crop production (29,975 ha).

The rock crusher purchased for the road maintenance equipment has a capacity of 100 MT per day, which may also be used for crushing liming material. The demand for lime and the number of days required to produce that quantity is shown in the following table.

DEMAND FOR LAND AND UTILIZATION OF ROCK CRUSHER

	YEARS					
	1	2	3	4	5	TOTAL
Production/Demand (MT)	4995	4995	7493	7493	9990	34966
Utilization(days)	49	49	74	74	99	349
Ha under continous liming practices	2497	4995	7493	9991	12489	

The rate of utilization of the rock-crushing unit for lime production rises from approximately four days per month in the first years of the Project to eight days per month in the fifth year.

The alternative of constructing a single facility utilizing the rock crusher equipment full-time for lime production can be quickly dismissed. Operating at 80% capacity (200 days per year) it would produce 20,000 MT per year. If 5000 ha per year were placed under continous liming practices, capacity wouldnot equal demand until the fifth year of the Project. It is unlikely that the adoption rate will be that high. Therefore, the alternative of a mobile unit, producing agricultural lime in numerous decentralized locations is the most cost effective means of making lime accessible to area farmers.

The most effectiv distribution means will be to have the extension agents in each sector identify the farmers willing to utilize lime and the quantity that is needed. The farmers will then arrange for transport either through the MTC or by private truckers. The role of the Project activity in lime is not to become the areas major producer and distributor of lime but to make lime available to farmers and demonstrate the existence of a market.

4. Road Maintenance

a. Description of the Existing Road System

The vital trunk line serving the Project Area is the Marginal Highway, which runs 214 km within the boundaries of the Project Area from Tingo Maria in the south to Puerto Pizana in the north. This section in turn connects the Project Area with the coastal region through the Tingo Maria-Huanuco-Cerro de Pasco-La Oroya highway (565 km) and with the central Huallaga region and Tarapoto through the Campanilla-Juanjui-Tarapoto section of the highway (192 km). Within the Project Area, the highway runs near and parallel to the Huayanga river, on the valley's right bank from Tulumayo to Tocache. The highway design standards are the following:

Road width: 6.00 meters
Width of shoulders: 1.00 meters
Maximum grade: 7%
Maximum load for bridge design: H20-S16-44

At present, the section between Tingo Maria (km 0) and Aucayacu (km 52) has asphalt pavement and offers good conditions for transit. The section between Aucayacu and Madre Mia (km 94) is in poor condition but the Ministry of Transport and Communications (MTC) has budgeted GOP resources for its immediate rehabilitation and asphalting. The GOP also has budgeted for the building of the Puerto Pizana (km 214) Campanilla (km 304) section. The proposed Project will maintain the 120km between Madre Mia and Puerto Pizana.

In general, the Marginal Highway north of Aucayacu is in poor condition due to more than ten years of neglect in maintenance activities. The section between Madre Mia and Tocache was surfaced at the time of construction with cobblestones and river-run gravel. At present, some sections have very little gravel, and large cobblestones make the surface irregular and rough. The drainage is also generally poor, many culverts are not operative, drainage ditches are destroyed or blocked, and very often, the rain water runs down the center of the road. Uncontrolled jungle growth has reduced the original 7-meter width, so that in several sections, traffic is one-way. The road north of the ENDEPALMA plantation toward Campanilla is worse, since the original construction was done with much lower standards. At present, this section is only a dry weather trail.

The Project Area has a network of 490 km of feeder roads which were constructed to link the agricultural valleys located along both banks of the Huallaga river with the Marginal Highway. Most of the feeder roads are simple, dry-weather trails constructed without proper engineering design. Their widths range between three and five meters and their alignment follows the contour of the terrain. The roads generally lack well developed drainage strucutres; the water crossings consist of rudimentary timber structures. While some road sections receive maintenance by private farmers or agricultural cooperatives, they are sometimes impassable during the rainy season.

b. The Proposed Road Program

The overall objective of the proposed road program will be to establish a road maintenance capacity which will assure all weather operation. AID funds will be used to carry out maintenance of 120 km of the Marginal Highway between Madre Mia and Puerto Pizana, to upgrade 180 km of feeder roads, and to establish a permanent road maintenance capacity.

The proposed program will be implemented during a four-year period with a total investment of approximately $5,000,000 and will consist of the following components:

Implementation of the Maintenance Center	$ 300,000
Procurement of Road Maintenance Equipment	1,850,000
Operational Costs	2,740,000
Institutional Development	110,000
	$5,000,000

The proposed work on the 120km between Madre Mia and Puerto Pizana will require the cleaning of the vegetative undergrowth, improvement of the drainage system, and the levelling and surfacing of some of the most critically deteriorated road-bed sections. These improvements will ease the traffic flow, and reduce the travelling time and freight rates.

Under the Project, 180 km of feeder roads will be maintained to ensur~ normal traffic conditions during the dry season and periods of moderate rain. The maintance work will comprise the following activities:

-- Clear trees, bushes, and roots, and strip off topsoil for at least eight meters from the center of the feeder roads.

-- Provide the basis for correcting emergency situations such as land slides and wash outs due to flooding.

-- Place 8-inch course of surfacing material, preferably crushed gravel up to 3-inch size.

Loan funds will be used for the procurement of road construction equipment in the amount of $1,820,728. This equipment will be used during the life of the Project to maintain the Marginal Highway and upgrade feeder roads. A detailed equipment list is presented in Annex II, Exhibit F.

c. Maintenance Centers

In addition to the MTC maintenance center located in Tingo Maria, the Project proposes to implement a second maintenance center in Huayranga (154 km from Tingo Maria), so that the road maintenance equipment can operate from two centers to service the road network. In Huayranga, the MTC already has a maintenance center which needs to be upgraded and equipped. The following facilities need to be installed: a warehouse for tools and materials, shops for repair of equipment units and components greasing and washing ditches, parking area for equipment, fuel tanks, and water tanks.

The estimated cost of the center at Huayranga is $303,000, broken down as follows:

Construction Open Area	2,00 m^2 at $75	$150,000
Construction Roofed Area	300 m^2 at $180	54,000
Procurement of shop equipment and tools		98,000
	Total	$302,000

The center will provide monthly check-ups and maintenance services to all the mechanical equipment and will attend to minor repairs. Daily check-ups and preventive maintenance will be provided at the field through the various mobile units, while the regional center at Huanuco will attend major repairs and overhauls.

5. Potable Water and Environmental Sanitation

a. Technical Capability of the MOH/DSE

Since 1962, the Directorate of Sanitation Engineering of the Ministry of Health has been in charge of carrying out programs for the installation and supply of water and sewage systems in rural communities of fewer than 2,000 inhabitants. A.I.D. is presently financing a Project (527-U-074) to construct rural water systems in six other regions; DSE is carrying out the implementation of that Project. The proposed Project will benefit from the experience gained from the ongoing Project since the types of systems to be constructed are similar.

b. Feasibility of Selected Technologies

As described in the Project Description, three systems types are contemplated:1/

(1) Gravity-fed systems terminating in public taps (Type I).

This system is based on a surface source found at a sufficient elevation above the community so that gravity flow alone will have the required hydrostatic head to provide necessary pressure for adequate water distribution. Intake, sedimentation, and treatment facilities will be used where necessary. For all systems public sanitary units will be constructed.

(2) Deep wells with hand pumps (Type II)

Where a community is too small (generally under 200 inhabitants) to justify a Type I system, or where no surface source of water is available, hand-dug wells with hand pumps will be provided.

(3) Shallow wells with hand pumps (Type III)

In areas where, due to the dispersion of families, even community wells are not feasible, the Project will finance the hand pump apparatus for any family willing to dig its own well.

1/ More detailed information on technical specifications and costs are contained in Annex II, Exhibit D.

The gravity-fed system is the most desirable for the selected areas but the wells will be dug where the source of water lies at a lower level than the community it is to serve or where the population is not large enough to warrant a type-I system. Pumps will also be provided to families willing to dig their own wells.

In general, surface sources or springs will be used. Spring water needs no treatment as long as it is adequately protected on its route to final use from the spring. In the case of surface sources, adequate steps will be taken to see that water intake is at a spot where least contamination will occur. Where ever the conditions of terrain and source permit, filter galleries should be constructed, principally in order to improve the physical characteristics of the water; otherwise, a home-made filter would be installed. In all cases where bacteriological tests show contamination of the water, the installation of simple chlorine-dosing mechanisms will be carried out.

The systems will consist of the following principal components:

(1) Water intake system consisting of a concrete box which takes in the spring water under cover. Where surface sources allow, intake will take place through a filter gallery or alternatively by means of a dike, with intake through the bottom or the side.

(2) Water lines using piping of minimum1" diameter.

(3) Reservoir (in cases where the minimumvolume warrants).

(4) Distribution network with pipes of minimum 1" diameter.

(5) Public taps and some sanitary units. Sanitary units consist of full installations with 2 public taps, 2 showers, and washing sinks.

(6) Dug wells with hand pumps.

As complement to the water supply, latrines will generally be installed; they will consist basically of a hole 1.80m deep and 0.8 m x 0.8m wide, a surrounding collar for support of 1.00m. x 1.00m. (Turkish type), and a shed made of locally available materials.

c. System Design

Once a locality has been selected, the respective field studies will be carried out and systems will be designed. These designs will be governed by specific parameters derived from the adaptation of design standards for larger conventional systems currently in use by the DSE in its programs with the IDB for communities of 500-1,000 inhabitants.

Some of the more important parameters for the various types of systems under consideration are as follows:

Rate of Supply: Between 30 and 80 liters per inhabitant per day, depending on the type of system and the climate predominating in the locality.

Conduits: PVC tubing with a minimum diameter of 1" should be used.

Distribution Network: PVC piping with a minimum diameter of 3/4" should be used, the maximum pressure should be 50m. (5kg per cm^2) and the minimum 10m. (1 kg per cm^2).

Reservoirs: These are calculated for 25%-35% of the average daily consumption, depending on type of system. Inthe cases involving pumping, the length of pumping time daily will be taken into account.

Duration: Generally, the systems are designed to last for 20 years, excepting the pumps which would last 10 years.

Treatment: In the cases where the bacteriological quality of the water require it, water treatment will normally be carried out by desinfection using simple and cheap dosing mechanisms which are easy to operate and maintain. This treatment is in addition to filtering of the water when necessary by means of filter galleries at the source intake or by means of home-made filters.

d. System Construction, Operation, and Maintenance

The construction technique to be used will generally be the most simplified, based on the DSE's experience with programs carried out previously in rural areas andon the contribution of community labor resources and supplies from the government and the community.

The Loan will provide all the specialized materials (PVC piping and accessories, galvanized piping and bronze accesories, cement, reinforcement steel, corrugated roofing, anti-corrosive paints, cleaning agents, glues, finishing products for the tanks, pumping sheds and sanitary fixtures, such as metal covers, corrugated bars, metal window frames, etc.) the hand-operated pumps, and water treatment equipment supplies. The communities will supply non-specialized materials (stone, aggregate, brick, timber) which, if not available locally, will be brought in by the Government.

In previous years, the DSE experimented by contracting for the construction of the systems to be built, but this proved unsatisfactory, primarily because the system of using community labor, especially non-skilled labor, prevented synchronization of this co-operation with the general contractor's work on the job. As a result, this procedure has been discontinued. Consequently, the system of force account by the DSE was adopted, and is more easily tied in with the work of the community. This direct administration procedure will therefore be employed in this Project, using the technical and auxiliary personnel to be provided by the regional health office to supervise the construction and to contract for the skilled labor and materials required.

Skilled labor will be funded by the Loan and the non-skilled provided by the communities themselves. The Government will cover all costs for administration, technical direction, studies, and logistical back-up.

Completed systems will be administered, operated, and maintained by a community water committee to be set up by the DSE technician and the community. This committee will also appoint an employee to be in charge of operating the system and maintaining it in good condition. The employee will be in charge of any repairs which might be required of the various system components and, in general, will take care of the units which require permanent maintenance. The committee will be governed by regulations jointly established by DSE technician and the community, and will include service charges, which will be communicated to the users.

The community members will undertake to pay monthly user fees. This monthly tariff will be developed by the community and the DSE technician on the basis of each individual community's economic situation. This tariff should at least cover the minimum administrative costs required for the system, including a minimum salary for the operator, the administrator's supplies for the operation and water treatment (if necessary), and a small margin for repairs and modifications of the units as required. In any case, this monthly tariff should not exceed the value of the average daily wage in the locality.

The DSE, through its division for maintenance and supervision of the systems, will schedule periodic visits (at least every 6 months) by its sanitation technicians, in order to observe the way in which the water supply service is being run, to check if the tariffs are being paid regularly according to the tariff schedule, to see that the registers and other control documentation are being kept correctly, and to give any assistance required by the committees.

B. Institutional Analysis

1. Institutional Organization

Project activities will be supervised and coordinated by the Upper Huallaga Special Project Office. This administrative mechanism for area development was first established in late 1979 to direct the implementation of AID's loan-funded Sub-Tropical Lands Development Project in the central Huallaga and lower Mayo River valleys. This approach was adopted to facilitate the flow of funds to the six GOP agencies and ten sub-projects financed under the loan and to provide an overall supervision and coordination. The Special Project concept was not completely new--it had been used for a few large projects under line ministries such as the Ministry of Agriculture's Special Projects for the Majes and Chira/Piura irrigation projects, and for Plan MERIS (Small and Medium Irrigation Project supported by AID loan 527-T-059 - Sierra Irrigation). The placement of the Huallaga Central/Bajo Mayo Special Project within the Office of the Prime Minister was an innovation. This was done because of the multi-sectoral nature of the Project and also because of the strong interest of the Office of the Prime Minister in closely monitoring the Project to assess its suitability as a model for possible future replication for other high jungle development projects.

The initiation of the Huallaga Central Project proceeded slowlv. It took over a year to pass the necessary laws and decrees to establish the Special Project and to name the Executive Director. However, once this was accomplished and the Special Project staff was in place, Project implementation has proceeded at a much faster pace than has been the Mission's usual experience with GOP administered projects. One of the principal reasons for accelerated Project implementation has been the speed and relative ease with which funds are made available for Project activities. The Special Project budget is carried as a line item under the Office of the Prime Minister and disbursements are made directly to the Special Project from the Ministry of Economy and Finance. This procedure circumvents the more cumbersome and lengthy procedures involved in processing disbursements through the highly bureaucratized administrative structure of the line ministries. Another advantage of the Special Project has been its ability to attract and retain high quality professionals because of the more liberal salary schedules allowed under its enabling legislation and regulations. An additional positive feature has been the Special Project's authority to contract directly with public and private entities and individuals to carry out Project activities.

Both the President and the Prime Minister have been favorably impressed with the performance under the Huallaga Central Special Project and are using it as the model for other large-scale high jungle development projects being developed for the Pichis/Palcazu/Pachitea, Jaen/Bagua/San Ignacio, and Madre de Dios areas. Other strong supporters of the Special Project institutional mechanism are the IDB, which will apply the model in financing the Jaen/Bagua/San Ignacio area development project, and the World Bank, which has requested that the Huallaga Central Special Project administer the proposed IBRD area development project for the upper Mayo River valley.

The Upper Huallaga Special Project Office will enter into agreements with several agencies of the GOP to carry out various sub-elements of the project. For example, the agricultural research and extension activities will be carried out by the National Agrarian Research and Promotion Institute (INIPA), land use capability mapping will be carried out by the National Office for Natural Resources Evaluation (ONERN) and road maintenance will be carried out by the Ministry of Transportation and Communications. The agreements between the Special Project and the GOP agencies will lay out sub-project objectives, a work plan and a detailed budget estimate which will serve as the basis for direct disbursements from the Special Project to the cooperating agency. These procedures have been used for the Huallaga Central/Bajo Mayo Special Project and proved particularly effective in carrying out activities such as equipment procurement, and the design and construction of roads, storage facilities, and machinery centers. The Special Project Office in collaboration with the implementing agencies will establish the technical standards for the Project agreements and will coordinate their implementation. When the funding provided under the Project is completed, the Special Project's role will terminate and the GOP agencies will carry on the services established as a result of the Project.

2. Institutional Analysis of the Upper Huallaga Special Project Office (PEAH)

The Office of the Prime Minister has prepared a draft Supreme Decree establishing the Upper Huallaga Special Project which will be signed by the President, the Prime Minister, the Minister of Agriculture, and the Minister of Transportation and Communications following AID/W authorization of the Project. The Supreme Decree will establish a budget account for the Special Project under the Office of the Prime Minister and will also establish an Executive Committee to provide policy guidance to the Special Project Executive Director. A representative of the President of the Council of Ministers (the Prime Minister), will serve as Chairman of the Executive Committee. (This will probably be the Minister of Agriculture as is the case for the Pichis/Palcazu/Pachitea Special Project.) It is anticipated that the Executive Committee will include, inter alia, the following:

- A representative of the Minister of Agriculture.
- A representative of the Minister of Transportation and Communications.
- A representative of the Minister of Health.
- The Executive Secretary of the Presidency of the Council of Ministers.

The Executive Director will be nominated by the Executive Committee and appointed by the Prime Minister.

This organizational structure is similar to that used in the establishment of the Pichis/Palcazu/Pachitea Special Project. It differs somewhat from the Huallaga Central/Bajo Mayo Special Project in that the Upper Huallaga Executive Director will be responsible to the Executive Committee rather than directly to the Prime Minister.

The Executive Committee concept was introduced to facilitate coordination at the top levels of the GOP and to provide continuing policy guidance to the Special Project Executive Director. This procedure has worked well in the case of the Pichis/Palcazu/Pachitea Special Project and should assure continuing high level support and guidance to the Upper Huallaga Agricultural Development Project.

3. Institutional Analysis of Additional Implementing Agencies

Analysis of the GOP agencies which will be responsible for implementing their respective Project components is found in Annex II, Exhibit I. These include: INIPA, UNAS, Agrarian Bank, BANCOOP, ENCI, ECASA, OSE, ONERN, OGCR, MTC, and MOH.

C. Financial Analysis

1. Financial Plan

The total cost of this five year Project is estimated to be US$ 26,500,000, of which up to US$ 18,000,000 will be contributed by A.I.D. through a loan of US$ 15,000,000 and a grant of US$ 3,000,000. The GOP will finance 32% of the total cost, US$ 8,500,000, with cash contributions. Tables IV-1 and IV-2 show Sources and Applications of Funds, Tables IV-3 to IV-6 show Requirements of Foreign Exchange and Local Currency, Expected Disbursements by Year, Technical Assistance Requirements and Off-Shore Procurement.

Approximately 46% of the Project funds have been allocated to finance inputs for the development of the research, extension and education program in the Project Area; 21% to finance the costs of agricultural credit; 21% to fund the road maintenance activities; and 12% to finance farm production services, development and interpretation of resource information, potable water services, and staffing of the Project Office.

Project Loan and grant funds will finance the cost of personnel, training, demonstration activities, technical assistance, the acquisition of vehicles, research, education, training and laboratory equipment to equip the Project facilities; agricultural credit; farm production services, including storage and drying equipment and land registration activities; development and interpretation of resource information, including vehicles equipment and personnel costs; road maintenance center equipping and construction, technical assistance, equipment, vehicles and personnel; potable water supplies equipment and vehicles; and, personnel support costs of the Project Office.

Approximately 255 man-months of short and long-term foreign technical assistance will be required to develop the research, extension and training activities, as well as the agricultural credit, farm production services, resource information, and road maintenance systems. The cost of U.S. technical assistance under an institutional contract has been calculated at $10,000 per work/month, considering that per diem and transportation average nearly $3,000 per month for short-term technical assistance and $100,000 per year for long-term technical assistance in Peru.

GOP funds will cover the salary and travel costs of personnel, the operation expenses of all vehicles and road maintenance equipment, office equipment, facilities construction and repair to house Project activities. In-kind costs are not included in estimates of the GOP contribution to the Project, although the GOP will contribute additional materials, supplies, and administrative costs, as well as that of current personnel and the local labor cost contributed by the communities under the potable water and extension components. The GOP cash contribution is 32% of the total Project cost, thereby exceeding the minimum requirement of Section 110 (as of the FAA); and the additional in-kind contribution will increase this percentage.

2. Recurrent Costs

Peru is now entering into an economic recovery phase and, to a certain extent, the national budget has been freed from the harsh fiscal austerity of previous years. Increased allocations, in real terms, have occurred in 1981 and are expected to occur in the future, although the demand for funds for all sectors far exceeds the supply, at least for the present. Total GOP budgetary allocations for the implementing institutions has reflected this upward trend over the last two years. Recurrent costs after the first year of the Project are expected to increase at a rate of ten percent per year on a dollar basis. Given the GOP and President Belaunde's often stated interest in high jungle and jungle development and the concrete demonstrations over the past year of increased human and financial resources made available for development of these areas, the recurrent cost requirements, as detailed in Table IV-7, do not seem excessive.

TABLE IV-1

SUMMARY FINANCIAL PLAN: SOURCE & APPLICATION OF FUNDS

(Thousand U.S. Dollars)

	Total	A.I.D. Loan	A.I.D. Grant	G.O.P.
1. RET				
A. Research	4,410	1,464	970	1,976
B. Extension	4,117	1,581	465	2,071
C. Training	2,104	853	608	643
RET Long-Term Specialist	400	-	400	-
	11,031	3,898	2,443	4,690
2. Agricultural Credit	5,000	4,800	200	-
3. Farm Production Services	1,276	1,088	14	174
4. Development & Interpret. of Rsource Information	656	164	98	394
5. Road Maintenance	5,000	3,000	-	2,000
6. Potable Water	250	250	-	-
7. Project Office	612	370	-	242
8. Evaluation	50	-	50	-
	23,875	13,570	2,805	7,500
Inflation & Contingencies 1/	2,625	1,430	195	1,000
	26,500	15,000	3,000	8,500
	100%	57%	11%	32%

1/ Average factor of 14% once the loan financed agricultural credit component is excluded.

TABLE IV-2

SOURCE & APPLICATION OF FUNDS
(Thousand U.S. Dollars)

Investment Category	Total	A.I.D. Loan	A.I.D. Grant	GOP
1. RET				
A. Research				
A-1 Personnel				
- Salaries	1,568	470	-	1,098
- U. Selva Salaries	300	90	-	210
- Staff Fringe Benefits	110	33	-	77
- Technical Assistance	650	-	650	-
	2,628	593	650	1,385
A-2 Capital Investment				
- Vehicles	141	141	-	-
- Farm Equipment	40	40	-	-
- Elect. Generators	30	30	-	-
- Res. Farm & Lab. Equipment	260	260	-	-
- Office Equipment	33	-	-	33
- Housing & Buildings	168	-	-	168
- Building Repair	35	-	-	35
	707	471	-	236
A-3 Other Annual Costs				
- Maintenance	130	-	-	130
- Office Supplies Princing	145	-	-	145
- Travel & Per diem	80	-	-	80
- Research Materials	200	200	-	-
- Fellowships: Local	180	180	-	-
- Fellowships: Foreign	215	-	215	-
- Training: Local	20	20	-	-
- Training: Foreign	25	-	25	-
- Amazon Res. Network	80	-	80	-
	1,075	400	320	355
Sub-Total Research	4,410	1,464	970	1,976
B. Extension				
B-1 Personnel				
- Salaries	1,318	395	-	923
- Staff Fringe Benefits	300	90	-	210
- Technical Assistance	390	-	390	-
	2,008	485	390	1,133
B-2 Capital Investments				
- Vehicles	96	96	-	-
- Motorcycles	104	104	-	-
- Educ. & Demonstration Equipment	90	90	-	-
- Office Equipment	62	-	-	62
- Radio Equipment	63	63	-	-
- Buildings & Repairs	127	-	-	127

(continued)

B-3	Other Annual Costs				
	- Maintenance	280	-	-	280
	- Training: Local	208	208	-	-
	- Training: Foreign	75	-	75	-
	- Demonstrational Supplies	520	520	-	-
	- Housing Allowances	189	-	-	189
	- Office Supplies & Printing	105	-	-	105
	- Library Support	15	15	-	-
	- Travel & Per diem	175	-	-	175
		1,567	743	75	749
	Sub-Total Extension	4,117	1,581	465	2,071
C.	Training				
C-1	Personnel				
	- Salaries	672	200	-	472
	- Staff Fringe Benefits	173	52	-	121
	- Technical Assistance	320	-	320	-
		1,165	252	320	593
C-2	Capital Investments				
	- Lab. Equipment	150	150	-	-
	- Lab. & Building Repairs	50	-	-	50
		200	150	-	50
C-3	Other Annual Costs				
	-Training: Local	128	128	-	-
	- Training: Foreign	288	-	288	-
	- Lab. Supplies	150	150	-	-
	- Thesis Support	90	90	-	-
	- Student Club	25	25	-	-
	- Library Support	58	58	-	-
		739	451	288	-
	Sub-Total Training	2,104	853	608	643
	Long-Term RET Consultant	400		400	
	Total RET	11,031	3,898	2,443	4,690
2.	Agricultural Credit				
	- Credit Fund	4,800	4,800	-	-
	- Technical Assistance	200	-	200	-
	Total	5,000	4,800	200	-
3.	Farm Production Services				
A.	- Storage/Drying Unit	550	550	-	-
	- Drying Facilities	370	370	-	-
	- Moisture Meters & Laboratory Equipment	21	21	-	-
	- Training: Local	40	40	-	-
	- Technical Assistance	14	-	14	-
		995	981	14	-
B.	Land Registry Office				
	- Personnel	180	54	-	126
	- Equipment & Materials	53	53	-	-
	- Facilities	48	-	-	48
		281	107	-	174
	Total FPS	1,276	1,088	14	174

(continued)

4. Development & Interpretation of Resource Information				
A. Agricultural Information System				
- Vehicles	10	10	-	-
- Equipment	18	18	-	-
- Office Supplies	40	-	-	40
- Personnel	236	71	-	165
- Transportation & Per Diem	32	-	-	32
- Technical Assistance	98	-	98	-
	434	99	98	237
B. Natural Resource Inventory				
- Personnel	142	43	-	99
- Equipment & Materials	22	22	-	-
- Operational Costs	58	-	-	58
	222	65	-	157
Total DIRI	656	164	98	394
5. Road Maintenance				
Capital Costs				
- Equipment	1,821	1,821	-	-
- Maintenance Center	204	204	-	-
- Tools	98	98	-	-
Operational Costs				
- Labor	1,151	300	-	851
- Fuels & Spare Parts	1,565	416	-	1,149
- Materials & Tools	80	80	-	-
- Personnel	81	81	-	-
Total	5,000	3,000	-	2,000
6. Potable Water and Environmental Sanitation				
- Gravity Systems, Deep and Shallow Wells, and Latrines	214	214	-	-
- Vehicles and Motorcycles	36	36	-	-
	250	250	-	-
7. Project Office				
- Personnel	370	370	-	-
- Other Support Costs	242	-	-	242
	612	370	-	242
8. Evaluation	50	-	50	-
Total (1) to (8)	23,875	13,570	2,805	7,500
Plus: Inflation and contingencies 1/	2,625	1,430	195	1,000
Grand Total (1) to (8)	26,500	15,000	3,000	8,500

1/ Average factor of 14% once the loan financed agricultural credit component is excluded.

TABLE IV-3

REQUIREMENTS OF FOREIGN EXCHANGE AND LOCAL CURRENCY

(Thousand of U.S. Dollars)

	Total	Loan		Grant		GOP
	Fx + Lc	Fx	Lc	Fx	Lc	Lc
1. RET						
A. Research	4,410	561	903	890	80	1,976
B. Extension	4,117	333	1,248	465	-	2,071
C. Training	2,104	250	603	608	-	643
RET Long-Term Consultant	400	-	-	400	-	-
T O T A L R E T	11,031	1,144	2,754	2,363	80	4,690
2. Agricultural Credit	5,000	-	4,800	200	-	-
3. Farm Production Services	1,276	589	499	14	-	174
4. Development & Interpretation of Resource Information	656	20	144	98	-	394
5. Road Maintenance	5,000	1,919	1,081	-	-	2,000
6. Potable Water	250	36	214	-	-	-
7. Project Office	612	-	370	-	-	242
8. Evaluation	50	-	-	50	-	-
	23,875	3,708	9,862	2,725	80	7,500
Plus Inflation & Contingencies 1/	2,625	600	830	178	17	1,000
	26,500	4,308	10,692	2,903	97	8,500

1/ Average factor of 14% once the loan financed agricultural credit component is excluded.

TABLE IV-4

AID AND GOP EXPECTED DISBURSEMENTS BY YEAR
(Thousands of U.S. Dollars)

	Year I	Year II	Year III	Year IV	Year V	Total
1. RET						
A. Research						
AID: Loan	409	458	198	198	201	1,464
GOP	465	440	356	356	359	1,976
B. Extension						
AID: Loan	508	335	245	245	248	1,581
GOP	434	499	377	377	384	2,071
C. Training						
AID: Loan	140	290	140	140	143	853
GOP	128	128	128	128	131	643
2. Agricultural Credit						
AID: Loan	500	800	1,000	1,000	1,500	4,800
3. Farm Production Services						
AID: Loan	834	210	20	10	14	1,088
GOP	73	25	25	25	26	174
4. Development & Interpretation of Resource Information						
AID: Loan	55	27	27	27	28	164
GOP	78	78	78	78	82	394
5. Road Maintenance						
AID: Loan	2,123	280	199	199	199	3,000
GOP	-	500	500	500	500	2,000
6. Potable Water						
AID: Loan	36	180	34	-	-	250
7. Project Office						
AID: Loan	74	74	74	74	74	370
GOP	48	48	48	48	50	242
	5,905	4,372	3,449	3,405	3,939	21,070
Plus Inflation & Contingencies	680	510	389	389	462	2,430
Sub-Total	6,585	4,882	3,838	3,794	4,401	23,500
AID: Grant	750	750	500	500	500	3,000
GRAND TOTAL	7,335	5,632	4,338	4,294	4,901	26,500

TABLE IV-5

PROJECT TECHNICAL ASSISTANCE REQUIREMENTS

1. RET			
A. Research	$ 650,000	-	$50,000 for Development of Research Plan of Operations (6p/months) = (3p x 2 mo) $600,000 for Research Specialists (60 p/months)
	$ 80,000	-	Research/Planning Specialists (12 p/months) = (4p x 3mo).
B. Extension	$ 130,000	-	Six Commodity Consultants (18 p/months) = (6p x 3 mo), and
	$ 260,000	-	(26 p/mo), of short-term technical assistance for Life of Project.
C. Training	$ 320,000	-	40 p/mo of Specialists to offer workshops and seminaries (8 mo/yr x 5 years).
Long-Term	$ 400,000	-	48 p/mo of Research/Extension/Training/Management Specialist.
TOTAL RET	$1,840,000	-	210 p/months
2. Agricultural Credit	$ 200,000	-	24 p/mo of Credit Advisor.
3. Farm Production Services	$ 14,000	-	2 p/mo of Grain Storage Specialist.
4. Development & Interpretation of Resource Information	$ 98,000	-	14 p/mo of Statistician (5), Area Frame Construction Specialist (3), Data Processing Technician (3), and Agriculture Economist (3).
5. Evaluation	$ 50,000	-	5 p/mo (1 p/month/year).
GRAND TOTAL	$2,202,000	-	255 p/months.

TABLE IV-6

OFF-SHORE PROCUREMENT
(Thousand U.S. Dollars)

1. RET	
A. Research	
- Vehicles	141
- Farm Equipment	40
- Electric Generators	30
- Res. Farm & Laboratory Equipment	200
- Res. Materials	150
	561
B. Extension	
- Vehicles	96
- Motorcycles	104
- Educ. & Demonstration Equipment	70
- Radio Equipment	63
	333
C. Training	
- Laboratory Equipment	150
- Laboratory Supplies	100
	250
2. Farm Production Services	
A. - Storage/Drying Unit	550
- Moisture Meters & Lab. Equipment	21
	571
B. Land Registry Office	
- Survey Equipment & Motorbikes	18
3. Development & Interpretation Of Resource Information	
A. Agricultural Information System	
- Vehicles	10
- Micro-computer	5
	15
B. Natural Resource Inventory	
- Field Equipment	5
4. Road Maintenance	
- Equipment & Tools	1,919
5. Potable Water	
- Vehicles & Motorcycles	36
Total	3,708

TABLE IV-7

EXPECTED RECURRENT COSTS FOR THE PROJECT 1/

(Thousand of U.S. Dollars)

	Year I After Project Termination	Year II	Year III	Year IV	Year V
1. RET					
A. Research	560	616	678	745	820
B. Extension	620	682	750	825	910
C. Training	262	288	317	349	384
2. Farm Production Services	82	90	99	109	120
3. Development & Interpretation of Resource Information	126	139	152	168	184
4. Road Maintenance	700	770	847	932	1,025
5. Potable Water	20	22	24	27	29
6. Project Office	650	715	786	865	952
Total:	3,020	3,322	3,653	4,020	4,424

1/ Recurrent costs after the first year are expected to increase at a rate of ten percent (10%) compounded, on a dollar basis.

D. Social Analysis

The Project region presents a highly diverse composite of farmers, land tenure systems, cropping patterns, and productive potential. It is an area that, to a great extent, has witnessed a chaotic settlement system since the early 1960's. Land classification studies which were to have provided the basis for orderly land settlment under the 1964-68 IDB project were largely ignored during the period of intense inmigration to the area that took place between the mid '60's and mid-to-late '70's.

In order to adequately examine the probable social effects of the Project on the valley's population, it is first necessary to try to make some generalizations which will allow us to distinguish among major types of producers whose livelihoods will be affected, in one way or another, by Project-financed activities. A major problem in attempting socio-economic differentiation among groups has been the lack of substantive data. Because of the fact that the chief economic activity of the area has been an illegal one, coca cultivation, survey data undertaken through official channels must be assumed to have a high degree of error. In addition to these problems, there are some severe gaps in existing information. For example, figures extracted from GOP documents show a high degree of migration to the Upper Huallaga area since the mid '60's, but the lack of inter-censal data precludes an analysis of specific migration patterns by year, occupational category of migrants, or year of arrival in the area.

In the absence of precise data, the social scientist must look to surrogate data and extrapolation of known data to supplement and/or test official statistics. For example, data collected in the preparation of the economic analysis, using surrogate data on potato movements into the zone to estimate sierra inmigration, has been used to estimate farm labor force, and correct earlier official estimates on population.

1. The Producers

Part II.B.2 (Background: Farming Systems) suggests five types of agricultural systems in the Upper Huallaga region: (1) small and medium farms; (2) livestock producers; (3) plantations; (4) forest extraction; and (5) a sub-group of coca producers who do not plant this crop in association with other significant farm activities.

Of these five groups, over one-third of the first and the majority of the last are those which will be immediately affected by the coca eradication program, and it is here that social upheavals are therefore most likely to occur during the implementation of the Project. It is important to distinguish between these two groups.

a. Small and Medium Farmers

While precise figures are not availalbe, it is estimated over one-third of the small and medium farmers in the area are currently producing coca, almost always in conjunction with other traditional cash crops. 1/ In general, the predominant work unit is based on unpaid labor of the head of family and his dependents, and on the hiring of temporary labor (eventuales) during planting and harvesting seasons. These family agricultural enterprises are highly individualistic which have left behind the communal and kinship bonds which pervade traditional sierra agriculture patterns. Because of the partially illegal nature of their economic activities, the pattern of their commercial activities is difficult to trace, since they must keep production records a secret from the authorities and carry out their commercial transactions in a clandestine manner.

It is estimated that there are currently about 4,000 hectares of coca grown on these small and medium size family-run farms. Coca cultivation is carried out in conjunction with other crops, and agronomic/topological features are such that other crop substitution would be feasible on about 80% of land currently dedicated to coca, whereas the other 20% of the land is located on slopes surpassing the 15% grade which environmentalists caution should not sustain agricultural production.

Assuming an average of 0.7 person years of labor per hectare of coca produced, illegal production of coca on small and medium farms requires a labor force of approximately 3,000 workers, most of whom represent farm family members. If we follow the assumption outlined above that 80% of this land can be put into other agricultural production, 2,400 of these workers can within the short run, be assisted by Project-financed activities which will lay the groundwork for a new legal productive patterns throughout suitable agricultural land in the area. While this will not occur from one day to the next following eradication efforts, a shift in cultivation patterns can occur fairly rapidly, given soil conditions, so no major displacement is likely to occur. Also, given the fact that largely family labor is used in these areas, total family income will drop during the shift-over phase, but farm areas dedicated to other crops will provide a subsistence income until new productive cycles commence.

For the remaining 20% of small to medium sized farm workers (an estimated 600 persons) the immediate effect of the eradication program will be loss of employment, since Project-financed activities which will increase the production/employment potential of the region will require a certain time lag before these benefits are felt. In the longer run, however, the Project contemplates creation of more farm jobs than currently exists in the zone. It is assumed that these 600 people, many of whom are eventuales hired from the sierra, will simply migrate back to their region

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1/ F.D.N. survey data on 385 farms indicated that approximately 35.3% of all farmers grew coca, with a range from 51.6% in the Aucayacu region to 3.2% in the La Morada region.

of origen until new economic opportunities open up either in the Upper Huallaga region or elsewhere.

b. Producers Engaged Wholly in Coca Production

A major dislocation will result, on the other hand, in the case of those producers who are currently cultivating coca as a monocrop on undocumented or untitled land. The majority of these cultivators are considered to be "precarious dwellers" who work abandoned plots of land, who have not regularized their legal status or are actual invaders of land previously adjudicated for cooperatives or forestry concessions. Strug and Fonseca cite, in a report done in May, 1981: 1/

> One sector of the ENDEPALMA Enterprised has been invaded by a group of farmers. Further north, in Tanata, another group of farmers took possession of forested land previously granted by the Government to a wood mill owner of the region... The Piura Cooperative has also filed an official accusation before the Ministry of Agriculture that part of the lands adjudicated to it have been "invaded" by a group of farmers, who have caused damage to the fences around the cattle raising area. In Uchiza, 200 families "invaded" land that had been abandoned by the ex-cooperative "El Porvenir," which is currently known as "Santa Lucia."

They go on to cite that to date 14 logging concessions have been invaded, as has the National Park, located right outside of the town of Tingo Maria.

Most of the "invaders" or illegal coca producers are relative newcomers from the sierra, whose only purpose in migrating to the area was to participate in the windfall gains associated with coca production.

Total area currently being cultivated by these producers is estimated at between 4,000 and 8,000 hectares, depending on how liberal one cares to be in his interpretation of data. Because the vast majority of these cultivators are producing on land inappropriate for other crops, given extreme grades, it is estimated that only about 15% of the total land area can be switched into alternate production using either current technologies or technologies to be developed under the Project.

1/ D. Strug and C. Fonseca, Analysis of Coca Leaf Cultivation in the Upper Huallaga Valley of Peru, May 1981, pg. 29

If we assume the existence of a middle figure of 6,000 ha of coca being produced on monocrop lands, and the same figure used above of 0.7 person years of labor per ha, a total of about 4,400 persons are currently needed for coca cultivation. Of these, 85% or about 3,500 workers, would suffer immediate employment dislocation effects following crop eradication.

In this group, however, we assume a high degree of geographic mobility. The growth of the region demonstrated a high degree of mobility among these cultivators, and it is probable that they will show the same outward mobility once the financial windfalls come to an end. While accurate statistics are not available, it is generally conceded that Mar Verde operations have resulted in the beginning of outmigration; the continuation of this pattern will help alleviate possible social strains resulting from the eradicacion process and make Project implementation easier.

2. Social Constraints

If we begin with the assumptions outlined above that a major employment and economic dislocation will be an initial result of the eradication efforts, it is obvious that the present Project must be designed to effect a re-structuring of agricultural and complementary economic activities within the valley in a relatively short time frame.

The success of Project efforts will largely be determined by the receptivity (or lack thereof) of the affected population. Because the Project will follow close on eradication efforts, there is bound to be initial hostility towards new GOP initiatives in the zone, even if they are couched in terms of "productive potential" or "new employment/income opportunities." The concept of "general welfare" is an abstract one, and one cannot help but foresee difficulties in trying to convince area farmers that crop dislocation and substitution constitutes this "general welfare" when all they can see is reduced incomes for themselves, even if it is only a short-run phenomenon. There is a long history in Peru of government promises which begin with the best of intentions, but never achieve the intended results. It should not come as a surprise, then, if area farmers are skeptical about GOP promises as to carrying out development programs for the upper Huallaga area.

A major constraint to Project implementation, then, will be negative farmer attitudes once eradication has been carried out. This will be partially alleviated, it is assumed, by some early-on outmigration from the zone, particularly among cultivators currently producing on untitled land, but the attitudes will prevail and implementation agencies must be sensitivized to the reasons for their existence.

3. Social Benefits

The Project has been designed to minimize the effects of economic dislocation upon the various sub-groups of farmer population of the valley. The package of services to be provided will form a basis for changing the technology base of the area, which will lead to a more profitable and rational system of agriculture capable of absorbing considerable more labor.

Information gained during the F.D.N. survey of 385 farms indicates a paucity of services in the area. Only 22% of farmers have ever used credit; the utilization of improved agricultural inputs is not widespread; a mere 23% have ever received technical assistance from GOP agencies. Poor extension service is exacerbated by lack of vehicles, operating funds and materials for training programs. While it is true that these services, in all probability, are no worse than in most parts of rural Peru, it is essential to upgrade them in the wake of an eradication program which will destroy the major cash crop of the zone. This particular element is especially important in order to counterattack negative farmer attitudes mentioned above.

Benefits which will accrue to the farmer population include increased access to credit, which will in large part compensate for the lack of liquidity associated with eradication efforts. It is estimated that about 1,200 households in the area could expand crop hectarage if adequate credit were provided. This would make possible the opening up of up to 600 new ha of cultivated land each year in the Project area. The package of research and extension services to be financed under the Project will help to insure that these new lands are cultivated in such way that profitability is maximized.

Project-financed research in upgrading promising new varieties of livestock, suitable for the prevailing climatic conditions of the area, will set the stage for new employment activities. Similarly, private interest (both Peruvian and foreign) are looking at possible investments in oil palm, sugar and cattle which could provide thousands of new jobs in the area over the next several years.

A more general benefit which will occur is in the overall upgrading of human capital to deal with technical problems of the jungle. Through experimentation and research, new technologies will be developed which will have an impact on not only the immediate project area, but virtually the entire high jungle.

E. Economic Analysis

In order to analyze the probable effects of the proposed Project, three different scenarios of Project Area economy are of interest, as follows:

Case 1 - There is intervention neither to eradicate coca nor to implement the Project.

Case 2 - Coca is eradicated in the Project Area but the Project or a similar agricultural development plan is not implemented.

Case 3 - Coca is eradicated in the Project Area and the Project is implemented.

Case 1 is difficult to assess because the GOP has already intervented in the Project Area, and cases 2 and 3 are identical to "without" and "with" Project analyses.

1. The Case 2 Scenario

The "without" Project situation for the Project Area involves, a displacement of labor from coca growing and possibly a lowering of wages. However, the evidence of a dual economy in the area and that wages for non-coca agriculture are lower than coca cultivation wages suggest that real wages paid by non-coca farmers may not be significantly lowered in the Case 2 Scenario. In regard to labor displacement in Scenario 2, there will be two impacts on non-coca agricultural production as follows: (Impact 1) labor that is absorbed by non-coca agriculture will increase output and, (Impact 2) the productivity of the labor that is absorbed will be lower than the average productivity of labor presently employed in Project Area non-coca agriculture. There is also a third effect (Impact 3) not arising from labor displacement and absorption; this effect is due to the fact that the high degree of cash liquidity presently derived from coca cultivation will be significantly lowered in non-coca agriculture. Measurement of these three probable effects is discussed in following paragraphs.

The present size of the Project Area agricultural labor force is presented in Table IV-8. Discussed by lines, line 1 indicates there are 5,713 farms/ranches in the documented area (including the Monzon valley and livestock CAPs.) These farms have an average familiar labor force of 2.75 persons and it is assumed that 0.5 persons per farm are engaged in household chores. Line 2 indicates 1,680 permanent workers employed by the two tea cooperatives and ENDEPALMA. Line 3 is the F.D.N. estimate (based on the survey of farm operators) of hired permanent labor. Therefore, the permanent labor force (excluding forestry) on titled lands totals 16,554 (see line 4).

If one sets 10,000 ha as an average area in coca cultivation (with 8,000 as the minimum and 12,000 ha as the maximum estimates for the Project Area) and accepts a 0.7 full-time worker per ha in coca

TABLE IV-8

PERMANENT LABOR FORCE IN PROJECT AREA

1.	Farm families 5,713 (and 2.75 persons per labor force — 0.5 persons absorbed in household chores)	12,854
2.	ENDEPALMA and two tea crops	1,680
3.	A maximum of 2,000 hired permanent workers	2,000
4.	Labor Force on Titled Lands	16,554
5.	Coca Workers (Assume 10,000 ha and 0.7 workers per ha)	7,000
6.	Total	23,534
7.	Less Adjustment for double counting of coca workers on 1,492 ha from farm survey	1,044
8.	Adjusted Total	22,490
9.	Related to Coca	7,000
10.	Related to Farming General and Ranching	13,810
11.	Related to Palm oil and tea	1,680
12.	Total (Adjusted)	22,490

Estimate A	
Related to Ranching	(4,571)
Related to Crop Cultivation	(9,239)
Estimate B	
Related to Ranching	(3,200)
Related to Crop Cultivation	(10,610)

(see Annex II, Exhibit G, Table 16), there would be 7,000 permanent jobs equivalents in coca cultivation, even though a portion of these jobs may be filled by a much larger number of part-time workers (see line 5). To adjust for double-counting of coca workers, we note that expansion of the survey by a factor of 13 produces only 1,492 ha in coca cultivation as contrasted with 3,932 ha detected on titled lands by aerial reconnaissance. We assume that the estimate of coca workers stated in full-time equivalents the number remains at 7,000 and deduct the 1,044 workers in coca cultivation per the farm survey from the total; see lines 7 and the adjusted total on line 8.

Lines 9, 10 and 11 divide the adjusted permanent labor force into three components: coca cultivators (line 9), labor in non-coca farming and ranching (line 10), and labor in palm oil and tea (line 11). A statistic on the number of permanent jobs associated directly with non-coca crop cultivation is not available. From Table II=7 and Part II.B.2.c., we know that exclusive of tea and palm oil, 13,810 full-time workers attend to 23,600 ha of crops and 32,000 ha of pastures. Assuming one full-time worker per 7 ha of pasture suggests 4,571 full-time workers so engaged and 9,239 employed in crop production with an average of 2.55 ha in crops per full-time worker (this is Estimate A in Table IV-8.) Assuming a lower intensity of pasture care, of, say, 10 ha per worker would reduce full-time ranch workers to 3,200 and increase the crop labor force to 10,610 with an average of 2.22 ha of crops per full-time worker (EstimateB in Table IV-8.) Estimate A implies that one full-time worker cultivates 78% more land in non-coca crops than in coca and comes close to the statistic of 5.90 ha of crops per farm noted in Table II-4 (as 2.55 ha times 2.25 workers equals 5.74 ha) and also the low percentages (31% in Table II-4) for pastures, than Estimate B.

The Case 2 Scenario might be taken to imply the absorption of a maximum of 7,000 full-time coca workers. This is equivalent to a 51% increase in the number of farm workers and an increase of 66% if only crop production were to absorb the displacedcoca workers. This is, however, an improbable economic event. As is discussed on page 21, the present demand for non-coca labor is mainly of a seasonal character due to climate conditions and the only way full-time coca workers could be induced to stay in the Project Area would be if they have suitable land for cultivation of non-coca crops. Also, there is little evidence to suggest that present crop farmers would be able to expand full-time employment strongly in an economically feasible manner. The harvest-land-clearing season with present technology underlies the higher productivity of part-time labor compared with full-time labor and explains the higher employment of part-time labor. Moreover, this relates also the fact that the harvest season in the Project Area comes after that of the Sierra. The order of magnitude of creation of full-time jobs for a medium-term period required to absorb all displaced coca workers (stated in full-time equivalents) would be very high and such expansion would constitute a sharp departure from existing practice and experience.

There is no totally useful guide concerning the number of farmers who farm coca and who also have land well suited for other cash crops. If it is assumed that 80 percent of the farmers who presently grow coca in the titled land area have such land and prefer to cultivate it rather than leave the area, the magnitude of transfer for such labor would amount to 2,240 full-time workers. For farmers who grow coca on the untitled land (which are generally not lands suited for other cash crops), the ratio described above might be on the order of 15%, and this would amount to the equivalent of 630 full-time workers. These calculations suggest that at a maximum-a maximum because the coca labor requirement has been stated in terms of full-time workers--of 2,870 workers who might trasnfer to non-coca crop and livestock production in the Project Area. If these workers transferred only to crop production and if the productivity of these transferred workers were equivalent to the present average productivity (Impact 1), a 27.0% increase in crop area and production would ensue. If productivity of the transferred l⁻⁻or were, more realistically, on an average 75% of the current farm area average (Impact 2), the increase in crop production would be 20.3%.

Apart from labor transfer from coca to non-coca production, which will expand non-coca crop production, the Case 2 Scenario also entails a loss of non-coca crop production (Impact 3). This loss is separate from theloss of gross farm income pertaining directly to coca and is an indirect effect. The argument presented in Annex II, Exhibit H, suggests strongly that non-coca crop production will also decline sharply because farm cash liquidity is presently maintained by the steady income from coca. The direct loss of coca production in the titled land area can be derived from Table II-7. In 1980, 4,000 ha of coca entailed a gross farm income of S/.4,800 million ($16.7 million). The gross farm income from all other crops and livestock (excluding palm oil and tea) amounted to S/.5,065.4 million ($17.6 million). Therefore, the direct impact of coca eradication amounts to $16.7 million but the decline in non-coca gross farm income is likely to be on the order of $1.9 million, as demonstrated below.

One method for measuring the decline in non-coca farm production (Impact 3), is to assume that present coca farmers, who are those contained in categories II, III,V, and VI in the tables presented in Annex II,Exhibit H, would drift to the same order of magnitude of gross farm income as farmers who are presently in category I (who have no coca and do not use credit). The survey data expanded to a farm universe of 5,000 farmers indicates a gross value of crop production (GVCP) of S/.1,198.7 million from coca andS/.4,243.9 million for non-coca crops. If all coca farmers (categories II,III,V, and VI) were to suffer elimination of coca production, then it can be assumed that their farm GVCP will approximate those of farmers in category I,i.e. farmers who do not use credit or grow coca. (Categories V, and VI are strange cases which in aggregate amount to only S/. 35.7 million when expanded to the farm universe). The resulting GVCP is S/.3,464.5 million which is 18.4% lower than present non-coca gross farm income,suggesting a loss approximating $1.9 million.

In summary, two distinct tendencies arise from movement from the coca to non-coca situation. Labor transfer to non-coca farming increases non-coca output. Reduction in cash liquidity resulting from the elimination of coca income reduces non-coca farm output. That these tendencies are of roughly the same order of magnitude is coincidental. For example, if it were assumed that some coca farmers reported only non-coca farm output and costs in Annex II, Exhibit H, the implication would be a greater loss in non-coca farm output.

2. The Case 3 Scenario

Implementation of the Project and elimination of coca cultivation are assumed to get underway in 1982. The impacts of labor displacement and absorption, the direct and indirect effects of declining net farm income due to elimination of coca cultivation, would have a similar time frame-work. Realistically, at a minimum, one could assume two years, and as a maximum five years. Inasmuch as the coca cultivation on titled lands is more accessible to control and eradication technology, two years would probably approximate as the period of largest impact on non-coca agricultural production.

Case 2 and Case 3 scenarios will be nearly identical in regard to the following events: (a) the near-term impact of labor displacement and absorption, (b) the near-term impact of loss of coca-generated liquidity, (c) expansion of crop area due to population growth and subdivision of farms. The Case 3 scenario differs from Case 2 mainly due to benefits arising from Project expenditures on road maintenance,credit, and extension. Adaptive research activities will also have spill-over effects outside the Project Area but these are also attributable to the Project.

3. Value of Project Benefits

Two distinct methods can be employed to approximate the value of project benefits. One is implicit within the cross-section 89 case subset of the survey data. The other is derived from crop yield and growth changes at a global level.

The impact of credit, improved transportation, and education via extension can be typified by the difference between the average net incomes of category IV farmers (credit and no coca) and the average net income of category I farmers(no credit and no coca). This difference amounts to S/.649,377($1,632)per farm. Inasmuch as the alternative cost Treatment of labor is readily implied in the present net income of category I farms, the difference can be treated as a benefit that derives from the Project. Expansion of the farm universe (noted in Annex II, Exhibit H) from 5,005 to the 5,713 farms estimated for the Project Area (see Table II-3) gives a ratio of 1.14146 and implies that 4,615 farms would be in category I state(no credit and no coca) 1/without the Project. If as a result of the Project their average net incomes increase by S/.649,377, the net effect of the Project would amount to S/.2,996.9 million($7,492,187 in 1981 prices). Assuming also 1982 is the base year of the Project, and that an appropriate annual inflation estimate for the U.S. dollar would be 10%, the total difference attributable to the Project is $8,241,405. The assumption regarding maturation is that one-fifth of the impact will result during each year beginning in 1983. Growth of benefits of the Project (which is the same as the difference between "with" project scenarios) ceases when the"with"Project situation has reached maturity. The present value of these benefits is calculated as basic benefits under column (A) of Table IV-9 (rounding benefits discussed above to $8.2 million). The 1982 present value of the benefit stream discounted at 15% is also shown in Table B.

TABLE IV- 9

VALUE OF PROJECT BENEFITS IN MILLIONS OF 1982 U.S. DOLLARS AND VALUE DISCOUNTED BY 15 % P.A.

Year Applicable	Alternative A * Undiscounted	Alternative A * Discounted	Alternative B * Undiscounted	Alternative B * Discounted
1982	-0-	-0-	-0-	-0-
1983	1.64	.891	.548	.477
1984	3.28	1.323	1.269	.960
1985	4.92	2.018	2.183	1.435
1986	6.56	2.344	3.316	1.896
1987	8.20	2.548	4.696	2.335
1988	8.2	2.659	5.979	2.585
1989	8.2	2.697	7.148	2.687
1990	8.2	2.681	8.178	2.673
1991	8.2	2.331	9.048	2.572
1992	8.2	2.027	9.727	2.404
1993	8.2	1.763	9.727	2.091
1994	8.2	1.533	9.727	1.818
1995	8.2	1.333	9.727	1.581
1996	8.2	1.159	9.727	1.375
1997	8.2	1.008	9.727	1.195
1998	8.2	0.876	9.727	1.039
1999	8.2	0.762	9.727	0.904
2000	8.2	0.663	9.727	0.786
2001	8.2	0.576	9.727	0.683
		31.192		31.496

--ONE HALF OF RESEARCH EXPENDITURES FOR LIFE OF PROJECT APPLICABLE TO BOTH ALTERNATIVES

	Undiscounted Benefit	Discounted Benefit
1992	4.477	1.107
1993	4.600	.989
1994	2.838	.530
1995	2.838	.461
1996	3.800	.537
		3.624

Discounted Value of Total Benefits:

Alternative A	34.816
Alternative B	35.120

* Excludes benefits outside Project Area arising from research.

The second method employs the global non-coca agricultural crop production stated in Table II-7. In 1980 this production equalled S/. 4,173.7 million and adjusting to April 1981 (the same data as the survey) involves a 48.6% increase (to S/. 6,202.1 million) to account for a 70% annual inflation rate. Further adjustment to the year 1982 involves conversion to U.S. dollars at S/. 400.00 per U.S. dollar (equals $15,505.250) and an increase of 10% to account for inflation. Therefore, without change in volume, 1982 gross non-coca crop production would equal U.S. $17.056 million. For the Case 3 scenario, future increase in this gross value of non-coca crop production can be presumed to result from increasing crop yield and an increasing area in crops. As directly related to the "with project" situation, it is assumed that crop yields will increase by 5% per year for five years and that 20% of the farmers will begin the yield improvement path in 1983 and each successive year. In regard to improved road maintenance, it is assumed that area in crops will expand by 3% p.a. beginning in 1983 and that this expansion will continue for a ten-year period. After the initial absorption of coca-displaced labor, (which is assumed completed in 1982 for illustrative purposes), no increase in the labor force is assumed and the 3% p.a. expansion in area is assumed to be accomplished by increased labor productivity. The cost of purchased inputs is assumed to remain stable at 20% of output, (GVCP) which is representative of the non-coca crop producer (which approximates the 20.7% average of categories I and IV in Table 6 of Annex II, Exhibit H). The specific annual benefits denoted under Alternative B of Table IV-9, are only the increase in the net value of crop production above $13.6 million (the initial net value). The projected annual series of net values of crop production is derived as 80% of the gross value of crop production obtained by multiplying yield as an index number by area as an index number. The present value of Alternative B is nearly the same as that of the present value of Alternative A. Both alternatives employ conservative assumptions regarding the secular flow of benefits which obtain maximums in 1987. However, the flow of discounted benefits is not identical due to the fundamental difference in the basic assumption.

The specific benefits of research are difficult to quantify. The cost of Project research components amounts to $4.1 million. In the normal course of events some portion of research expenditures may produce a strong break-through in regard to the yield of a specific crop or the adaptation of some new crop to the Project Area. World experience suggests that agricultural research expenditures are very productive. In order to adjust project benefits to account for high productivity of research and benefits outside the Project Area, it is assumed that one half of the expenditures in research during the life of the Project have an additional rate of return of 25% p.a., and that these benefits occur in the years 1992-1996. Therefore, each undiscounted U.S.$ 1.00 during the period 1982-1986 would yield $9.31 in each of the years 1992-1996. (The present(1982) value of the $5.00 of cost in this example is $3.60 and the present value of the $46.59 of benefits is $8.87.)

4. Project Costs

Total Project costs are stated as $24,070,000 before inflation and contingencies. We assume that a 10% inflation to mid-1982 would signify a Project cost of $25.4 million in 1982 prices. However, much depends upon exchange rate movements, which may also tend to reduce Project costs below a rate of inflation of 10% per p.a. With regard to cost-benefit analysis, this issue is not as important as it may seem. If inflation erodes costs in constant prices of the Project, this tends to reduce the scale of the Project and as such it also reduces Project benefits, but not necessarily in the same proportion. Generally, an inflation that is not anticipated tends to reduce costs in greater proportion than it reduces benefits in most instances, resulting in improved ratios of benefits to costs.

In 1982 prices, yearly Project costs in thousands of US dollars are: 7,328.6 (1982), 5,627.1 (1983), 4,334.2 (1984), 4,292.2 (1985), and 4,896.7 (1985). The expected recurrent costs are $3.02 million without inflation and adjusting to 1982 prices implies $3.322 million. The 1982 value of total cost for 20 years discounted to 1982 is $32.227 million.

5. Ratios of Benefits to Costs

Both methods of exploring probable project costs give similar results. The implications of Alternative B are discussed below. At a 15% p.a. social discount rate, ratios of benefits to costs are stated below, with sensitivity analysis assuming a 10% increase or decrease in costs.

	Alternatives	
	A	B
Costs as stated (in millions of US$)	$\frac{34.816}{32.227} = 1.08$	$\frac{35.816}{32.227} = 1.11$
Costs 10% higher (in million of US$)	$\frac{34.816}{35.450} = 0.98$	$\frac{35.816}{35.450} = 1.01$
Costs 10% lower (in millions of US$)	$\frac{34.816}{29.004} = 1.20$	$\frac{35.816}{29.004} = 1.23$

6. Expected Yield Performance

Judgments regarding the economic feasibility of specific programs to promote agricultural development in the Project Area are strongly related to judgments concerning to crop yields. In order to facilitate understanding of this problem, yield assumptions utilized in the analysis of Project economic feasibility are specified in Table IV-10. Under Alternative B, it is assumed that yields for all crops will increase by 27.63% in the tenth year of the Project (1982). Cost data constructed by the F.D.N. also

TABLE IV-10

A COMPARISON OF CROP YIELDS PER USAID ASSUMPTION AND F.D.N. CROP PRODUCTION PROPOSAL

	Implied by USAID Assumptions: Yield Kg/Ha Increases by 27.63 %		Implied by F.D.N. Assumptions (2): Yield Kg/Ha			Yield Increase in Percent		
	Accepted Average (1)	Implied 10th Year a/	Accepted Average Traditional Technology	New Technology Year 1	New Technology Year 10	New Technology Year 1 to Year 10	New Technology vs. Old Technology	New Technology 10th Year vs. USAID Accepted Average
Rice	1,500	1,914.5	1,600	2,000	3,000	50.0	25.0	100.0
Beans	700	893.4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Corn	1,200	1,513.6	1,500	2,500	3,200	28.0	66.7	166.7
Cassava	12,500	15,953.8	10,000	14,000	20,000	42.9	40.0	60.0
Soybeans	1,800	2,297.3	1,200	1,600	2,200	37.5	33.3	22.2
Peanuts	1,500	1,914.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Plantains	6,000	7,657.8	3,667	4,000	12,000	200.0	9.1	100.0
Cacao	400	510.5	400	400	800	100.0	-o-	100.0
Coffee	450	574.3	n.a.	450	990	120.0	n.a.	120.0
Oranges	8,000	10,210.4	n.a.	15,000	22,000	46.7	n.a.	175.0
Pineapple	6,500	8,296.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

a/ Accepted average multiplied by 1.2763

Source: (1) See Annex II, Exhibit G, Table 20.
(2) F.D.N. *Plan de Ejecución*, *op. cit.*, pp. 392-410.

presented crop-specific yields. These yields were based upon judgments regarding crop-specific production functions (and not upon the farm survey) and are divided into three sets: (1) an average yield with traditional (existing) technology, (2) an average yield under the first year with new technology employed by farmers, and (3) the average yield for all farms in tenth year after the base year of the Project. It is doubtful that yields in the tenth year of the Project would be on the order of 60 to 175% higher than those obtained with existing technology. Lack of empirical evidence concerning yields associated with the proposed new technology suggests that economic benefits of this magnitude would not be forthcoming. Even though unit costs are also lowered with this proposed technology, the yields for the first year of application of the new technology are substantially higher than suggested by averages constructed from survey data and what we suspect could be derived from continuing cultivation of the same fields. Judgment counsels caution due to the lack of empirical evidence supporting the F.D.N. highly detailed crop cost tables. Without empirical foundation such estimates cannot be deemed superior to reasonable estimates and particularly survey evidence.

The underpinnings of our Alternative B can be subject to similar scrutiny. Alternative B entails a 71.5% increase in the net income of the average farm. Although attributed to increased yields and area per farm in crop cultivation, this increase could be obtained by various combinations of changes of yield, area per farm in crops, and cost per unit of output. An array of the likely combinations are presented in Table IV-11.The tenth year is compared with the base year to illustrate changes in yield, land in crops, cost per unit of output, an absolute cost compatible with the specified 71.5% increase in net farm income. At the extreme with a land extensive technology, crop cultivation per farm have to increase by nearly 35%. With improved technology the reduced cost per unit of output (which is also a fundamental assurance of farmer adoption), the increase in crop land cultivated could be reduced. Ideally a technology which reduced absolute costs (by 6.4%) would imply a 22% increase in crop land cultivation. This ideal does not necessarily imply machinery cultivation but simply better crop rotation systems and less labor used for land clearing. The land intensive crop cultivation pattern will require significantly higher increases in crop yields. Such a system implies continued reliance upon fallow-land slash-burn technology, plant varieties, and inputs that are much more productive. The risk entailed in abolition of slash-burn technology is that no reduction in cost per unit of output would ensue.

TABLE IV-11

TENTH YEAR COMPARED TO BASE YEAR: CHANGE IN YIELD PER HA, LAND AREA IN CROPS, COST PER UNIT OF OUTPUT AND TOTAL COST STATED IN PERCENT (PER FARM INCOME INCREASES BY 71.52 % FOR ALL CASES)

Description of Method	Yield Per Ha	Land Area in Crops	Cost per Unit of Output	(*)	Total Cost
Land Extensive	+ 27.63	+ 34.92	No change	(20)	+ 71.5
Land Extensive With					
Minor Cost Reduction	+ 27.63	+ 27.99	- 20	(16)	+ 30.7
Moderate Cost Reduction	+ 27.63	+ 25.02	- 30	(14)	+ 11.7
Major Cost Reduction	+ 27.63	+ 22.17	- 40	(12)	- 6.4
Land Intensive	+ 71.52	No change	No change	(20)	+ 71.5
Land Intensive With					
Minor Cost Reduction	+ 63.36	No change	- 20	(16)	+ 30.7
Moderate Cost Reduction	+ 59.56	No change	- 30	(14)	+ 11.7
Major Cost Reduction	+ 55.93	No change	- 40	(12)	- 6.4

* Cost as percent of gross value of crop production.

F. Environmental Analysis

An analysis was prepared of regional natural resource constraints and opportunities, potential environmental impact from AID financed activities, and an overview of the broad ecological impacts of the proposed INM financed coca eradication program (See Annex III, Exhibit C). This analysis found that agricultural diversification, intensification, and production increases are constrained by a number of natural resource and related agricultural technology problems. Very high rainfall, large expanses of relatively unproductive, poorly drained and easily compactable soils, and large areas of steeply sloped forest lands subject to high erosion and slumping make an aggressive program of intensification of row crops and livestock production, given proven agricultural technologies and current local practices, ecologically inappropriate.

The proposed design of the AID financed UHAD project gives special recognition to these factors and has incorporated the following components to address then:

1. Financing research in sustainable agricultural production appropriate to selva ecological conditions; including pasture management, agro-forestry, and fertility management and integrated crop protection.

2. Development of an agricultural extension service for the selva with training and demonstration programs targeted to the conditions of the project area.

3. Improvement of the training and research functions of the principal selva agricultural training facility, the UNAS.

4. The production and interpretations of an extensive natural resource data base, including a forest management plan and survey, land capability analyses based on ecological life zones, and land use survey.

5. Improved drainage and erosion control through a labor intensive maintenance program for existing roads, and

6. Introduction of low cost, small scale potable water supplies to combat serious problems of dysentery and parasitosis.

V. IMPLEMENTATION ARRANGEMENTS

A. Administrative Arrangements

1. GOP Implementing Agency

The GOP entity responsible for coordination of the implementation and execution of the Project through the GOP implementing institutions will be the "Upper Huallaga Special Project Office." This Office will be officially created under the Prime Minister's Office and will function in a manner similar, although on a smaller scale, to the Huallaga Central and Bajo Mayo Special Project. The Office will coordinate the activities of all other implementing institutions participating in Project execution, including INIPA, ONERN, the National University of the Jungle at Tingo María, the Ministries of Agriculture, Transportation, and Health, and other public sector agencies. Part IV, Section B. contains a more detailed discussion of these arrangements.

The following reports from the GOP will be required to assist the Mission in monitoring the Project:

a. A monthly summary of activities and expenditures which will highlight potential problems or issues, and which will serve as an agenda for the monthly Project review meetings held between the Special Project Office and the Mission's Project Committee.

b. A quarterly progress report detailing the advances and expenditures by components and activities, based on the detailed Implementation Plan.

c. An annual summary of accomplishments by components during the calendar year, which will service as a basis for the joint GOP/AID evaluation.

d. Appropriate reports will be required concerning compliance with procurement requirements, such as source and origin and 50/50 shipping.

2. USAID

USAID/Peru will coordinate closely with the Special Project Office, and with the GOP implementing institutions involved in Project activities to review and monitor overall Project performance and to assist the GOP in Project implementation. Monitoring will be exercised by a USAID Project Committee with the following responsibilities:

a. Project Management. The Project Manager for the Project will be assigned from the Mission's Office of Agriculture and Rural Development. The Project Manager will work closely with the Project

Committee, the Special Project Office, the GOP implementing institutions, and the technical assistance provided to insure that provisions of the A.I.D. Project Agreement and Implementation Letters are met. The close involvement of the Project Committee will be assured through monthly meetings between the Committee and the Special Project Office to review Project implementation and resolve Project issues.

b. Joint Annual Reviews. Joint annual reviews will be an essential feature of Project implementation, the reviews to be undertaken by A.I.D. and the GOP.

c. The Development Resources Office will monitor Project implementation to assure that the terms and conditions of the Project Agreement are met.

d. The Mission Controller will review disbursement/ reimbursement requests for conformity with A.I.D. regulations and will ensure that adequate financial controls are followed.

e. The Engineering Office will be called upon to examine building plans, inspect construction sites, and review vehicle, equipment and road maintenance activities.

f. The Evaluation officer from the Program Office will assist in doing the annual evaluations.

g. Additional Mission offices, such as the RLA and the Executive Office will be called upon as appropriate.

B. Implementation Plan

The Implementation Plan is contained in Annex II, Exhibit C.

C. Disbursement Procedures

No deviation from AID established disbursement procedures is anticipated. Materials and equipment procured in the United States or other Code 941 countries will be paid using AID's standard disbursement procedures. Disbursement for local currency costs will likewise be made in an established manner acceptable to AID. These procedures will be transmitted to the Project Office with Implementation Letter(s).

D. Procurement Plan

1. Source, Origin and Nationality

Goods and services procured and their suppliers under the Loan shall have their source and origin and nationality, as applicable, in countries included in Code 941 of the AID Geographic Code Book and Peru, with the exception of trailbikes which may be procured from any country included in Code 935 (waivers are attached to the Draft Loan/ Grant Authorization).

Goods and services procured under the Grant shall have both their source and origin in the United States, Code 000, of the A.I.D. Geographic Code Book.

2. Procurement

Major equipment procurement, including all off-shore procurement, will be the responsibility of USAID/Peru. The Mission decided to use direct A.I.D. in lieu of host country contracting because of the lack of procurement experience of the implementing organization and because it is anticipated that implementing organization will stop functioning at the conclusion of the Project. The Mission believes that these factors justify the deviation from host country contracting permitted by Policy Determination 68.

In order to assure rapid acquisition of critical equipment and technical assistance components, the Mission anticipates the TDY assistance from a procurement specialist. The specialist will have the responsibility for organizing the required documentation, including preparation of IFBs, PIO/C's, and final workscopes and technical specifications for all goods and services, including the Grant-funded technical assistance. The Project Office will, however, actively participate in the preparation of the IFB's and the scopes of work for the T.A. The technical specifications for the road maintenance equipment and for the MTC service centers have already been developed by an equipment maintenance specialist contracted by the Mission. Technical specifications for vehicles and trailbikes are available from other similar projects, as are the specifications for other project equipment such as research and extension equipment. US technical advisors will be called upon to develop the specifications for all other specialized equipment and the majority of the short-term and all of the long-term technical assistance.

3. Equipment Acquisition

The Implementation Plan calls for the prompt acquisition of the trailbikes, vehicles, road maintenance equipment and all other goods and commodities required to implement the Project.

a. Trailbikes. The early delivery of trailbikes is needed to carry out the basic support activities and to initiate the extension activities. With AID authorization for proprietary procurement and source/origin waiver (see Section V, D.5 a.), USAID/Peru will advertise locally and in the United States and solicit bids through the U.S. Embassy Tokyo, soon after the signing of the Project Agreement and meeting of the appropriate Condition Precedent.

b. Vehicles. Following the signing of the Project Agreement, and meeting of relevant conditions precedent, USAID/Peru will begin procurement of 50% of the estimated number of vehicles required to implement the Project. The remaining vehicles will be required in FY 83.

c. Road Equipment. Following the signing of the Project Agreement, and meeting of relevant conditions precedent, USAID/ Peru will forward a PIO/C to AID/W for acquisition of road maintenance equipment.

e. Other. Other equipment procurement actions will take place in accordance with the Project's Implementation Plan.

4. Technical Assistance Acquisition

Short-term technical assistance will be procured directly by the Mission to assist the Special Project Office in meeting the conditions precedent to disbursement for the Project components. The Mission will procure short-term assistance to assist the Special Project Office and the implementing institutions in the preparation of the workscope for the institutional contract under which the remainder of the short-term and all of the long-term technical assistance will be acquired. Based on this workscope USAID/Peru will issue an RFTP and will award a contract for all of the services described therein. Under this arrangement the contractor will be responsible for the timely provision of the technical assistance required under the Project. Part IV, section c., Financial Analysis, contains a list of the required technical assistance.

5. Procurement Waivers

Trailbikes. For the loan-financed procurement of approximately 70 motorcycles, the foll ing justification is provided. The USAID/Peru procure on the borrowers behalf approximately 70 Honda trailbike motorcycles (125 cc) on a proprietary basis for use by the extensionists, surveyors, and researchers visiting farms in outlying rural areas where largely unpaved access roads are in poor condition and long distances necessitate some form of motorized transportation. The low-geared Honda Trailbikes are necessary to achieve the objectives under the Project. The only make of small motorcycles (less than 125 cc) with spare parts and maintenance facilities available in the Project area is Honda of Japan. Thus, the type of vehicle necessary is not manufactured in the United States and a waiver is justifiable. HB 1, Supp b, Chp 4 C.2.d. Given the rugged terrain, vehicles are regularly in need of spare parts and maintenance service. Honda has established a local assemply plant for its motorcycles. However, essentially all components of these trailbikes would cost approximately US$ 400 more per unit than the same model imported from Japan CIF. It is therefore necessary that a procurement waiver be granted to allow for proprietary procurement from Honda and procurement of Motor Vehicles from Code 935 (Special Free World) country, Japan.

E. Evaluation Plan

Project evaluation will focus on several issues: (1) the efficacy of the administrative and institutional infrastructure; (2) the Project's impact on employment, incomes, and living conditions of inhabitants in the Projects Area; the implementing institutions attainment of planned objectives; (3) an annual review of the coca eradication progress attained by the GOP-INM Project; and (4) Project impact on the capacity of the GOP to develop the high jungle region. Along with continual Mission monitoring, as described in Section A, annual evaluations will be undertaken by A.I.D., representatives of the Upper Huallaga Special Project Office and the implementing institutions. The Project will place special emphasis on establishing a strong Planning/Evaluation capacity.

The first evaluation will be undertaken at the end of the first year of Project implementation, approximately December of 1982. The evaluation will focus on the institutional/administrative mechanisms outlined in the Project Paper. Specifically, the evaluation will examine progress to date on agreements between the Special Project Office and implementing institutions (INIPA, ONERN, Agrarian Bank, BANCOOP, etc.) and the performance of these institutions where Project activities have begun. The Special Project Office will be an active participant in the evaluation. The Special Project Office will assure that the policy, procedure and technical improvements included in the agreements are in fact carried out. Of particular interest will be progress on activities related to implementation of the system components and to construction of the Area Sample Frame (ASF). Procurement of commodities and technical assistance will also be a principal evaluation concern. Where bottlenecks are identified, the evaluation will make specific recommendations with regard to their resolution in a timely fashion.

It is expected that the data generated with the ASF methodology will provide the foundation for evaluations in subsequent years. One of the key constraints to Project design has been the lack of reliable agronomis and socio-economic data. After its construction, the ASF will provide the framework for collecting benchmark statistics to measure the impact of Project activities on production, technology adoption, employment, etc. Specifically, the statistics component will develop basic production estimates (area and yield) of the principal regional commodities; rural employment, data, production costs and rural income data; identify constraints faced by area producers and their rate of adoption of improved technological practices.

Annual evaluations will measure overall Project progress during the course of the preceding year against output levels and other Project indicators in the areas of:

-- Research, Extension, and Training
-- Agricultural Credit
-- Farm Production Services
-- Road Maintenance
-- Potable Water and Environmental Sanitation

It is expected that the Project will have a major impact on the GOP capacity to develop the high jungle region which under prior GOP projects has not always yielded the expected agricultural response. At its completion, the Project should also have developed the expertise required to address and respond to the following questions:

-- How have the farmers in the area responded to changed levels of technology?

-- What are the economically feasible production capacities of the region?

-- What are the most economically, agronomically, and socially feasible agricultural systems for the region?

-- Given the expected dramatic changes in economic relationships in the region, what has been the effect on relative prices of both production inputs and outputs?

-- How has the composition of the regional population been affected?

The End-of-Project Evaluation Report will address these and other pertinent questions which will provide an improved base for the design and implementation of high jungle projects. The Evaluation Report will also address the attainment of End-of-Project conditions as outlined in the Logical Framework and Section III B.

The Project grant budget includes a line item for evaluations. While GOP and in-house USAID resources will be used to the extent possible for all evaluations, outside consultatns will provide additional expertise, particularly for the final evaluations. The results of this evaluation will be disseminated to GOP institutions and organizations such as the Amazon Research Network (REDINAA).

The Area Sample Frame will also develop valuable statistical resources for independent studies and graduate theses (such as, for example from Project-assisted UNAS students/and professors) which will be incorporated into the evaluation process. Specific studies in subjects such as agronomic input use and innovative credit mechanism could provide a rich pool of information for the Project as well as for development of the high jungle in general.

F. Conditions Covenants and Negotiating Status

The conditions and covenants of the Project Agreement are contained in the draft authorization included as Annex I, Exhibit C. With regard to the negotiating status, USAID/Peru and the Embassy have been in close contact with the Prime Minister and the Minister of Agriculture, who have been kept appraised of the Project's evolution. No difficulties are anticipated in promptly negotiating and signing the Project before the end of the fiscal year.

In addition to covenants in the draft authorization the Mission will include in the Project Agreement four additional covenants important to Project success. The Mission has not included these in the authorization in order to allow some flexibility during negotiations on final wording. Any changes in the proposed wording will be communicated to LAC/DR for approval. The proposed wording of the four covenants is as follows:

(1) The UNAS will increase teaching staff by five professors per year during the life of the Project, beginning in calendar year 1982.

(2) Instituto Nacional de Investigacion y Promocion Agricola (INIPA) will budget for contract personnel from UNAS for research, extension, and training assistance.

(3) It will maintain or exceed the current annual levels of agricultural lending in the Project area in real terms.

(4) It will maintain interest rates for Project funded agricultural credit at not less than the Central Reserve Bank's projected inflation rate and at not less than the established National Agrarian Bank interest rates.

ANNEX I
EXHIBIT A

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

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

I, Howard D. Lusk, the principal officer of the Agency for International Development in Peru, having taken into account, among other factors, the maintenance and utilization of projects in Peru previously financed or assisted by the United States, do hereby certify that in my judgment Peru has both the financial capability and human resources capability to effectively maintain and utilize the proposed Project: UPPER HUALLAGA AGRICULTURAL DEVELOPMENT.

August 13, 1981
Date

Howard D. Lusk

Howard D. Lusk
Acting Director
USAID/Peru

...dente del Consejo de Ministros

Lima, 17 de Agosto de 1981

Señor
HOWARD D. LUSK
Director Interino
Agencia para el Desarrollo Internacional
PRESENTE.-

Muy Señor Mío:

Tengo el agrado de dirigirme a Ud. en relación al Proyecto Especial denominado "Alto Huallaga", que responde a uno de los principales intereses del Gobierno Constitucional dentro de la política nacional de desarrollo: el desarrollo económico y social de las zonas de la selva y ceja de selva. Para llevar a cabo esta política, el Gobiemo ha dado los primeros pasos para planificar la inversión e identificar proyectos en distintas regiones del país.

Una de las regiones más importantes de la ceja de selva es el valle del Río Huallaga entre Tingo María y Campanilla. El Gobiemo da la más alta prioridad a la necesidad de desarrollar un Proyecto en esa zona, que comprendería un programa de investigación acerca de los principales productos agropecuarios aptos para las zonas de la ceja de selva, un programa de diseminación dentro de esta zona de las técnicas agrícolas desarrolladas y actividades de respaldo al desarrollo agrícola que comprendería crédito agrícola, servicios de mercadeo, sistemas de información, mantenimiento de carreteras que den acceso a las tierras productivas y agua potable para la zona rural.

Para ejecutar este Programa, el Gobiemo propone la creación de una oficina especial bajo la Oficina del Primer Ministro. Esta modalidad que ha sido utilizada por el Gobierno para llevar a cabo otros Proyectos tales como el del Huallaga Central y Bajo Mayo y del Pichis-Palcazú, ha demostrado ser una manera eficiente y rápida para la ejecución de programas prioritarios.

El monto total del Proyecto se estima en US$26,500,000, de los cuales el Gobierno Peruano aportaría la suma de US$8,500,000 y se solicita que la Agencia para el Desarrollo Internacional (A.I.D.) financie US$15,000,000, en calidad de préstamo y US$ 3'000,000 en calidad de donación.

En lo que respecta a las condiciones financieras del préstamo, esperamos que ellas sean, como en casos anteriores, los más favorables al país con 25 años para el reembolso que incluyan diez años de gracia e intereses del 2% por los años de gracia y y del 3% en adelante.

//..

...nte del Consejo de Ministros

Reiterándole el interés del Gobierno Peruano de realizar este Proyecto y esperando una respuesta favorable, hago propicia la oportunidad para manifestarle los sentimientos de mi mayor consideración.

PRESIDENCIA DEL CONSEJO DE MINISTROS
Despacho Ministerial
PRESIDENTE

Atentamente,

MANUEL ULLOA ELIAS
Presidente del Consejo de Ministros

ANNEX I
Exhibit C

DRAFT AUTHORIZATION

DRAFT AUTHORIZATION

Name of Country: Perú
Name of Project: Upper Huallaga Area Development
Number of Loan:

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Upper Huallaga Area Development Project for Peru involving planned obligations of not to exceed $15,000,000 in loan funds and $3,000,000 in grant funds over a 6-year period from date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project.

2. The project consists of developing and applying agricultural production packages and strengthening public sector agricultural support services in the upper Huallaga region of the Peruvian high jungle by (1) carrying out adaptive research to determine the agronomic, economic and socio-cultural feasibility of agricultural technology packages; (2) expanding and upgrading existing extension services; (3) upgrading the National Agrarian University of the Jungle (UNAS) training capacity for agricultural scientists; (4) providing short and medium-term credit; (5) strengthening farm production activities, such as establishment and improvement of land registration activities, grain storage facilities, and agriculture and resource information; (6) improvement of road maintenance; and (7) provision of potable water and related sanitary facilities.

3. The Project Agreement(s), which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority, shall be subject to the

following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

4. a. Interest Rate and Terms of Repayment

The Cooperating Country shall repay the Loan to A.I.D. in U.S. Dollars within twenty-five (25) 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 U.S. 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.

4. b. Source and Origin of Goods and Services (Loan)

Goods and services, except for ocean shipping, financed by A.I.D. under the Loan shall have their source and origin in Peru or in countries included in A.I.D. Geographic Code 941, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Loan shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of Peru or countries included in A.I.D. Geographic Code 941.

4. c. Source and Origin of Goods and Services (Grant)

Goods and services, except for ocean shipping, financed by A.I.D. under the Grant shall have their source and origin in the United States. Ocean shipping financed by A.I.D. under the Grant shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

4. d. Condition Precedent to Initial Disbursement (Loan and Grant)

(1) Prior to any disbursement or to the issuance of commitment documents under the Project Agreement, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that

(i) it has committed itself to a coca-eradication program in the Upper Huallaga Valley satisfactory in form and substance to the United States Government; and

(ii) it has established a Special Project Office in the Office of the Prime Minister for the Upper Huallaga Area Development Project and that it has named a Project Director acceptable to A.I.D.

4\. e. <u>Condition Precedent to Disbursement to Finance Research Activities under the Project Except Those Technical Assistance Activities Necessary to Prepare an Operation Plan for Research and Except for the Procurement of Vehicles, Including Trailbikes</u>.

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance research activities under the Project except those technical assistance activities necessary to prepare an operation plan for research and except for the procurement of vehicles, including trailbikes, Peru shall, except as A.I.D. may otherwise agree in writing,furnish to A.I.D., in form and substance satisfactory to A.I.D., an operation plan for research.

4\. f. <u>Condition Precedent to Disbursement to Finance Extension Activities under the Project Except Those Technical Assistance Activities Necessary to Prepare an Operation Plan for Extension under the Project and Except for the Procurement of Vehicles, Including Trailbikes</u>.

Prior to any disbursement, or the issuance of commitment documents under the Project Agreement, to finance extension activities under the Project, except those technical assistance activities necessary to prepare an operation plan for extension and except the procurement of vehicles. including trailbikes, Peru shall, except as A.I.D.may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., an operation plan for extension.

4\. g. <u>Condition Precedent to Disbursement to Finance Activities for UNAS Other than Technical Assistance Activities Necessary to Prepare a Procurement and Training Plan for UNAS</u>.

Prior to any disbursement, or the issuance of commitment documents under the Project Agreement, to finance activities for UNAS, other than technical assistance activities necessary to prepare a procurement and training plan for UNAS, Perú shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., a procurement and training plan for UNAS.

4. h. Condition Precedent to Disbursement to Finance Agricultural Credit Activities Except Technical Assistance

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance agricultural credit activities except technical assistance, Peru shall, except as A.I.D.may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence of a program in the Agrarian Bank for sublending for agricultural credit under this Project, including a description of procedures, administrative responsibilities, eligibility criteria and sublending terms and conditions.

4. i. Condition Precedent to Disbursement to Finance Land Registration Activities Except for the Procurement of Vehicles, Including Trailbikes

Priorto any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance land registration activities, except for the procurement of vehicles,including trailbikes, Peru shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., an operation plan for land registration and a plan for the establishment of land registration office(s).

4. j. Condition Precedent to Disbursement to Finance Grain Storage Activities other than Technical Assistance

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance grain storage activities other than technical assistance, Peru shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D.,in form and substance satisfactory to A.I.D., engineering,operation and procurement plans for grain storage facilities and an agreement between Empresa Nacional de Comercialización de Insumos (ENCI) and the Special Project Office which shall allow the sale of fertilizer at market prices in the Project Area.

4. k. Condition Precedent to Disbursement to Finance Road Maintenance Activities

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance road maintenance activities under the Project, Peru shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., a procurement plan and operation plan for road maintenance.

4. l. <u>Condition Precedent to Disbursement to Finance Potable Water Environmental Sanitation Activities Except for the Procurement of Vehicles</u>

Prior to any disbursement, or to the issuance of commitment documents under the Project Agreement, to finance potable water and environmental sanitation activities except for the procurement of vehicles Peru shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D., an agreement between the Special Próject Office and the Ministry of Health which includes a procurement plan and an operation plan for potable water and environmental santitation activities under the Project.

4. m. <u>Covenants</u>

Peru shall covenant, except as A.I.D. may otherwise agree in writing that:

(1) The principal Special Project Office shall be located in Tingo Maria.

(2) Not to exceed $5.5 million of A.I.D. loan and grant and Government of Peru counterpart funds will be spent for road maintenance activities under the Project.

(3) Not to exceed $250,000 of A.I.D. Loan and Grant and Government of Peru counterpart funds wull be spent for the development and/or updating of natural resources surveys, cadaster surveys, or topographic mapping.

(4) Instituto Nacional de Investigacion y Promocion Agricola (INIPA) will make arrangements acceptable to A.I.D. for personnel from UNAS for research, extension, and training assistance.

(5) It shall maintain or cause to be maintained all infrastructure and equipment financed under the Project.

(6) It will carry out its commitments pursuant to the documentation provided in satisfaction of the Condition Precedent set forth in paragraph 4.d.(1)(i) relating to coca-eradication and otherwise use its best efforts to eradicate coca production in the Project area.

4. n. Waiver

The following waiver to A.I.D. regulations are hereby approved:

(1) A.I.D. source, origin and nationality requirements are hereby waived to allow procurement of up to 70 125 cc trailbikes, whose source and origin and nationality is in any country included in A.I.D. Geographic Code 935. In so doing, I hereby certify that exclusion of procurement from Free World countries other than the cooperating country and countries included in Code 941 would seriously impede attainment of U.S. foreign policy objectives and objectives of the foreign assistance program.

4. o. Procurement Approvals

(1) I hereby approve the proprietary procurement of up to 70 Honda trailbikes for the Project pursuant to the authority in 41 C.F.R. Sec. 7-3.101-50(b)(3).

(2) I hereby approve proprietary procurement of vehicles and road maintenance equipment financed under the Project, after an initial competitive procurement to assure interchangeability and standardization of vehicles and of equipment, pursuant to the authority in 41 C.F.R. Sec. 7-3.101-50(b)(3).

ANNEX I

Exhibit D

UPPER HUALLAGA AGRICULTURAL DEVELOPMENT

STATUTORY CHECKLIST

Listed below are staturoty criteria applicable generally to FAA funds and criteria applicable to individual fund sources: Development Assistance and Economic Support Fund.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy?	No
2. FAA Sec. 113. Has particular attention been given those programs, projects and activities which tend to integrate women into the national economies of developing countries, thus improving their status and assisting the total development effort?	Yes
3. FAA Sec. 481. Has it been determined that the government of the 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.
4. FAA Sec.620(b). If assistance is to a government, has the Secretary of State determined that it is not dominated or controlled by the international Communist movement?	Yes
5. 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 or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) the debt is not denied or contested by such government?	No
6. 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

7. FAA Sec. 620(a), 620(f), 620(D); Continuing Resolution Sec. 511, 512 and 513; ISDCA of 1980 Secs. 717 and 721. Is recipient country a Communist country? Will assistance be provided to Angola, Cambodia, Cuba, Laos or Vietnam? (Food and humaniratiran assistance distributed directly to the people of Cambodia are excepted). Will assistance be provided to Afghanistan or Mozambique without a waiver? Are funds for El Salvador to be used for planning for compensation, or for the purpose of compensation, for the confiscation nationalization, acquisition or expropriation of any agricultural or banking enterprise, or property or stock thereof?

   No

8. 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

9. 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

10. FAA Sec. 620(k). Does the program furnish assistance in excess of $100,000,000 for the construction of a productive enterprise, except for productive enterprises in Egypt that were described in the Congressional Presentation materials for FY 1977, FY 1980 or FY 1981?

   No

11. FAA Sec. 620 (1). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason?

   Yes

12. FAA Sec. 620(m). Is the country an economically developed nation capable of sustaining its own defense burden and economic growth and, if so, does it meet any of the exceptions to FAA Section 620(m)?

   No.

13. 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?	Yes
14. FAA Sec. 620(q); Continuing Resolution Sec.518. (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 the country in default exceeding one year on interest or principal on any U.S. loan under a program for which the Continuing Resolution appropriates funds?	(a) No (b) No
15. 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, taken into account by the Administrator at time of approval of Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)	Yes, taken into account by the Administrator at time of approval of Agency OYB.
16. 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
17. 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?	Payment status is up to date.

18. FAA Sec. 620; Continuing Resolution Sec. 521. Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed an act of International Terrorism? Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed a war crime? — No.

19. 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. who is present in such country to carry out economic development programs under the FAA? — No.

20. FAA Sec. 669, 670. Has the country, after August 3, 1977, delivered or received nuclear enrichment or reprocessing equipment, materials, or technology, wihtout 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 SOURCE 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 the 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, evidence of this commitment and progress is Peru's counterpart contribution to AID projects carrying out the goals stated here.

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, assistance to urban poor and through community-based development programs which give recognition to people motivated to limit the size of their families?

2. Economic Support Fund Country Criteria

a. FAA Sec. 502B. Has the country (a) engaged in a consistent pattern of gross violations of internationally recognized human rights or (b) made such significant improvement in its human rights record that furnishing such assistance is in the national interest?

N.A.

b. FAA Sec. 532(f). Will ESF assistance be provided to Syria?

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. FAA Sec. 620B. Will ESF be furnished to Argentina?

N.A.

5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual funding 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. Continuing Resolution Unnumbered; FAA Sec. 634A; Sec. 653 (b).
(a) Describe how authorizing and appropriations Committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or International organization allocation reported to Congress (or not more than $1 million over that figure)?

(a) A notification has been sent to Congress concerning this project.

(b) No. Congress has been notified as required by Section 653(b).

2. FAA Sec. 611(a) (1). Prior to obligation in excess of $100,000, will there be (a) engineering, financial other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

(a) Yes.
(b) Yes.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be

N.A.

completed in time to permit orderly accomplishment of purpose of the assistance?	N.A.
4. FAA Sec. 611(b); Continuing Resolution Sec.501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973?	N.A.
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?	Yes
6. FAA Sec. 209. Is project susceptible 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.	Project will be executed as part of a multilateral project.
7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b)foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	The project will improve the technical efficiency of agriculture and foster private initiative and competition.
8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment agroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	Many of the goods and services under the Project will be purchased from private U.S. sources.
9. FAA Sec. 612(b), 636(h); Continuing Resolution Sec. 508. Describe steps taken to assure that, to the maxium extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.	Peru will provide counterpart to meet the cost of many services required by the Project. Local goods and services will be paid for with local currency.

10 . FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release? — No

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

12. Continuing Resolution Sec. 522. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity? — No

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and 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?

The project will help to spread investment out from cities to small towns and rural areas, and will support the self-help efforts of Peru.

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 (a) extent to which activity is specifically designed to increase productivity and income of rural poor; 103A if for agricultural research, full account shall be taken of the need of small farmers, and extensive use of field testing to adapt basic research to local conditions shall be made; (b) extent to which assistance is used in coordination with programs carried out under Sec. 104 to help improve nutrition of the people of developing countries through encouragement of increased production of crops with greater nutritional value, improvement of planning, research, and education with respect to nutrition,particularly with reference to improvement and expanded use of indigenously produced foodstuffs; and the undertaking of pilot or demonstration of programs explicitly addressing the problem of malnutrition of poor and vulnerable people; and (c) extent to which activity increases national food security by improving food policies and management and by strengthening national food services, with particular concern for the needs of the poor, through measures encouraging domestic production, building national food reserves, expanding available storage facilities, reducing post harvest food losses, and improving food distribution.

(a) The Project is designed to increase the productivity and income of the rural poor. The needs of small farmers are being taken into account in the research portion of the project. (b) The Project is designed to foster production of indigenous crops with nutritional value. (c) The Project is designed to increase Peruvian national food security by encouraging domestic food production.

(2) (104) for population planning under sec. 104(b) or health under sec. 104 (c); if so, (i) 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.

(4) (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; and (ii) extent to which assistance provides advanced education and training of people in developing countries in such disciplines as are required for planning and implementation of public and private development activities.

N.A.

(5) (106; ISDCA of 1980, Sec. 304) for energy, private voluntary organizations, and selected development activities; if so, extent to which activity is: (i) (a) concerned with data collection and analysis, the training of skilled personnel, research on and development of suitable energy sources, and pilot projects to test new methods of energy production; (b) facilitative of geological and geophysical survey work to locate potential oil, natural gas, and coal reserves and to encourage exploration for potential oil, natural gas, and coal reserves; and (c) a cooperative program in energy production and conservation through research and development and use of small scale, decentralized, renewable energy sources for rural areas;

N.A.

(ii) technical cooperation and development, specially with U.S. private and voluntary or regional and international development, organizations;

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

(iv) reconstruction after natural or manmade disaster;

(v) for special development problems, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(vi) for programs of urban development, specially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

c. (107) is appropriate effort placed on the use of appropriate technology? (relatively smaller, cost-saving, labor using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor.)	Yes
d. FAA Sec. 110 (a). Will the recipient country provide at least 25% of the costs of the program, project, or 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"?	N.A.
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 country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government.	The design of the Project has been carried out in close collaboration with Peruvian institutions and attempts to meet the needs of the Peruvian people.
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, at a reasonable rate of interest.	In the Mission's judgment, Perú has the capacity to repay the loan. Based upon events of the past few years, Peru's ability and will to repay the loan make it reasonable to expect repayment.
b. FAA Sec. 620 (d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?	The assistance is not for any productive enterprise which will compete with U.S. enterprises.

3. Project Criteria Solely for Economic Support Fund

a. FAA Sec. 531(a). Will this assistance promote economic or political stability? To the extent possible, does it reflect the policy directions of FAA Section 102? — N.A.

b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities? — N.A.

5C(3) - STANDARD ITEM CHECKLIST

Listed below are the statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by imposing limits on certain uses of funds. These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other restrictions.

A. Procurement

1. FAA Sec. 602 Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed? — Such arrangements will be written into the Loan/Grant Agreement.

2. FAA Sec. 602(a). Will all procurement be from the U.S. except as otherwise determined by the President or under delegation from him? — Yes

3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will commodities be insured in the United States against marine risk with a company or companies authorized to do a marine insurance business in the U.S.? — Yes

4. FAA Sec. 604(e); ISDCA of 1980 Sec. 705(a) 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? (Exception where commodity financed could not reasonalby procured in U.S.). — N.A.

5. FAA Sec. 603. Is the shipping excluded from compliance with requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers,dry cargo liners, and tankers) financed shall be transported on privately owned U.S. - flag commercial vessels to the extent that such vessels are available at fair and reasonable rates? — Compliance will be required in the Loan/Grant Agreement.

7. FAA Sec. 621. If technical assistance is financed, to the fullest extent practicable will such assistance, goods and professional and other services be furnished 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. carriers will be utilized to the extent such service is available? — Yes

9. Continuing Resolution Sec. 505. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States? — Yes, such a provision will be included in all such contracts.

B. Construction

1. FAA Sec. 601(d). If 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 interests? — 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(b). 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 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 exist to insure that the United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries? — Yes, the Loan/Grant Agreement will contain this restriction.

4. Continuing Resolution Sec. 514 If participants will be trained in the United States with funds obligated in FY 1981, has it been determined either (a) that such participants will be selected otherwise than by their home governments, or (b) that at least 20% of the FY 1981 fiscal year's funds appropriated for participant training will be for participants selected otherwise than by their home governments?

The requirements of this section of the Continuing Resolution have been fulfilled on an agency-wide basis for fiscal year 1981.

5. Will arrangements preclude use of financing:

a. FAA Sec. 104(f). To pay for performance of abortions as a method of family planning or to, motivate or coerce persons to practice abortions; to pay for performance of involuntary sterilization as a method of family planning, 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 provide training or advice or provide any financial support for police, prisons, or other law enforcement forces, except for narcotics programs? Yes.

d. FAA Sec. 662. For CIA activities? Yes.

e. FAA Sec. 636(i) For purchase, sale long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained. Yes.

f. Continuing Resoultion Sec. 504. To pay pensions, annuities retirement pay, or adjusted service compensation for military personnel? Yes.

g. Continuing Resolution Sec. 506. To pay U.N. assessments, arrearages or dues. Yes.

h. Continuing Resolution Sec. 507. To carry out provisions of FAA Section 209(d) (Transfer of FAA funds to multilateral organizations for lending.). Yes.

i. <u>Continuing Resoultion Sec. 509</u> To finance the export of nuclear equipment fuel, or technology or to train foreign nationals in nuclear fields?

j. <u>Continuing Resolution Sec. 510</u>. Will assistance be provided for the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human rights?

K. <u>Continuing Resolution Sec. 516.</u> To be used for publicity or propaganda purposes within U.S. not authorized by Congress?

ANNEX I
EXHIBIT E

INITIAL ENVIRONMENTAL EXAMINATION

INITIAL ENVIRONMENTAL EXAMINATION

Project Location: Peru

Project Title and N°:

Funding: $15.0 Million Loan
$ 3.0 Million Grant

Life of Project: 5 years, 1981-86

IEE Prepared by: Robert O. Otto, RDO, LAC/DR

Date: July 31, 1981

Mission Threshold Recommendation: **Negative Determination**

August 13, 1981
Date

Howard D. Lusk
Howard D. Lusk
Acting Director
USAID/Lima

PROJECT DESCRIPTION

This project provides financial and technical assistance to the Government of Peru to enable it to successfully address agricultural production constraints in the Upper Huallaga Valley. To date, production of agricultural goods has not met with expectations due,in large part,to serious constraints presented by very high rainfall and generally low land capability for agricultural production using traditional practices of cultivation and land management, as well as to problems of transportation and lack of available credit. The project proposes to strengthen research, training, demonstration and extension activities targeted on the Upper Huallaga,as well as provide support for the development of a comprehensive regional natural resource date base; credit for the region's farmers; maintenance of existing roads; provision of low-cost, small scale potable water systems; and improvement of production services, such as improved existing grain and seed storage facilities and land titling. Implementing agencies include the University of the Selva, INIPA, Agrarian Bank, ENCI, ONERN, and a special project's office under the Prime Minister's Office.

IDENTIFICATION OF POTENTIAL IMPACTS

The principle project activities of research, information gathering, training and extension have no foreseeable negative impacts on the project area. As per AID Reg. 216.2(c)(2), these activities are viewed as having no effect on the natural or physical environment and, therefore, are excluded from further evaluation.

The road maintenance component will be limited to improving access to agricultural production areas through regular road maintenance on existing rights of way. No new roads will be constructed. The net environmental effect of road maintenance will be positive, with improved road drainage and roadway erosion control leading the list of benefits.

The provision of potable water supply systems to small communities in the project area will help to reduce the occurence of dysentery and parasitosis. Because of their small scale, these water supply systems are not expected to have neither measureable negative effects on ground or surface water supplies nor any other environmental element.

Improvement of ancillary agricultural production services will include, primarily, upgrading existing grain and seed storage facilities and increasing the activities and improving the performance of cadaster and land titling operations in the project area. Other support services will involve the procurement and use of a portable limestone crusher. No significant negative impacts are anticipated in this component.

Collectively, the activities of the project should have a positive impact on the project area by ensuring that future agricultural activities are oriented toward sustainable land uses and cultivation patters. Current experience suggests that financial and technical assistance is needed to assure that future development of the Upper Huallaga valley is economically and ecologically sustainable.

MISSION THRESHOLD RECOMMENDATION

A review of alternative project strategies was completed during project development by a consulting team of six natural resource management experts collaborating with USAID/Lima and the Fundación National para el Desarrollo. This review included: 1) an evaluation of ecological, economic and social constraints to enhanced regional agricultural production; 2) an evaluation of possible ecological impacts of AID technical and financial assistance to stepped-up agricultural development; and, 3) the preparation of recommended alternative actions to mitigate or avoid identified potential negative impacts. The proposed project design concurs with the substance of the recommendations of the review team and, individually and collectively, presents no significant foreseeable threat to the environment. The Mission recommends a threshold finding that the project poses no significant threat to the natural resource base and a negative threshold determination be given.

INITIAL ENVIRONMENTAL EXAMINATION CHECKLIST

(IMPACT IDENTIFICATION AND EVALUATION FORM)

	IMPACTS
A. LAND USE	
1. Changing the character of land through:	
a. Increasing the population	N
b. Extracting natural resources	N
c. Land clearing	L
d. Changing soil character	M
2. Altering Natural Defenses	L
3. Foreclosing Important Uses	L
4. Jeopardizing Man or His Works	L
5. Other Factors	-
B. WATER QUALITY	
1. Physical State of Water	L
2. Chemical & Biological States	L
3. Ecological Balance	L
4. Other Factors	-
C. ATMOSPHERIC	
1. Air Additives	U
2. Air Pollution	L
3. Noise Pollution	U
4. Other Factors	-
D. NATURAL RESOURCES	
1. Diversion, Altered Use of Water	L
2. Irreversible, Inefficient Commitments	U
3. Other Factors	-

E.	CULTURAL	
	1. Altering Physical Symbols	N
	2. Dilution of Cultural Traditions	L
	3. Other Factors	-
F.	SOCIO-ECONOMIC	
	1. Changes in Economic/Employment Patters	M
	2. Changes in Population	L
	3. Changes in Cultural Patters	L
	4. Other Factors	-
G.	HEALTH	
	1. Changing a Natural Environment	L
	2. Eliminating an Ecosystem Element	N
	3. Other Factors	-
H.	GENERAL	
	1. International Impacts	U
	2. Controversial Impacts	L
	3. Larger Programs Impacts	N
	4. Other Factors	-

SYMBOLS USED ARE:

N - No Environmental Impact
L - Little Environmental Impact
M - Moderate Environmental Impact
H - High Environmental Impact
U - Unknown Environmental Impact

ANNEX II
Exhibit A

THE DEVELOPMENT OF TROPICAL LANDS

The Development of Tropical Lands

The following piece is reproduced from Michael Nelson's book The Development of Tropical Lands: Policy Issues in Latin America (published for Resources for the Future, Inc. by the John Hopkins University Press, Baltimore and London, 1973).

TINGO MARIA-TOCACHE

The project area is 630 km by road from Lima and stretches along the Huallaga River for about 200 km in the selva region of eastern Peru.

Spontaneous settlement started about 1932, but the first real impetus for development was the Huánuco-Pucallpa highway, which was constructed during the period 1938-40. In 1938 a law was passed reserving for colonization a strip of 10-20 km on either side of this highway (800,000 ha.), and $400,000 was allocated to support settlement. From 1939 to 1945, 65,000 ha were distributed in 325 lots of 15 ha each, 383 of 30-100 ha, and 35 of 100-300 ha, resulting in about 700 settlers with 2,900 ha under cultivation.

From 1946 to 1954 the basis of the Tingo Maria economy was bananas, and significant portions of the land were in coca and tea. By 1956 sigatoka and Panama disease had virtually wiped out the banana plantations, and many settlers abandoned their lands.[23]

In 1949 an Italian company[24] launched a land development scheme designed to settle about eighty Italian immigrant families on a concession of 48,000 ha. A total of forty families arrived, but only two remained in 1968. Over a twenty-year period the company invested an estimated $2 million in housing, a sawmill, access roads, a 9-km railroad, plantations, and clearing about 1,000 ha. In 1968 there were seventy-six men on the payroll.

The only other organized settlement resulted from an attempt to set a precedent for the transfer of people from the barriadas (slums) of Lima to the selva region. In 1964 eighty families were given substantial assistance to establish themselves at La Morada on the Huallaga River, 95 km south of Tingo María. In 1965-66, $430,000 in supervised credit was disbursed to the colonists. Only forty colonists remained in 1968, and repayment of the loan obligations has been on the order of 10 percent.

The official Tingo Maria-Tocache project originated with a study of natural resources on 290,000 ha in 1961-62.[25] It was found that available timber amounted to 2,400 million board feet in standing trees, of which 50 percent

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[23] Plantations were primarily of the Gros Michel variety of bananas, which were the most susceptible to sigatoka and Panama disease. See Chira C. Magdaleno, Monografía de la Provincia de Leoncio Prado (Lima, Peru: Compañía de Impresiones y Publicidad, May 1959), p. 191.

[24] Sociedad Anónima Italo-Peruana Agrícola Industrial.

[25] SCIF, Ministerio de Fomento y Obras Públicas, Programa de Evaluación de Recursos Naturales, Evaluación del potencial económico y social de la zona Tingo Maria-Tocache, Huallaga Central (Lima, Peru, May 1962).

could be exploited economically. Sustained-yield management of these forests would yield 40 million board feet of sawn lumber annually with a gross value of about $2 million. The total value of potential lumber production over the twenty-year period 1962-81 was estimated at $100 million. Some 96,000 ha were established as suitable for agriculture; of these, 10,500 ha were in cultivation supporting a rural population of 19,000 (urban population 9,500). It was estimated that there were about 4,800 colonists in the project area, 220 with firm titles, 1,410 with applications pending on fiscal lands, and 2,150 settlers without rights. The total area claimed amounted to 170,000 ha. The study also indicated that full development of the area over twenty years (1962-81) would result in a rural population of 118,000 -including local population growth and more than 10,000 immigrant families.

On the basis of this study the Oficina Nacional de Reforma Agraria (ONRA) prepared a twenty-year plan to reorganize tenancy on 30,000 ha occupied by 2,150 families and bring 66,000 ha of forest land into production; in the first six years 4,550 families were to be resettled or colonized. These families were to receive special technical assistance and credit over a sixteen-year period at a total cost of $25 million.[26] This plan was subsequently modified and the objectives of the final project, implemented in 1966, were the reorganization of tenancy on 30,000 ha, bringing 55,000 ha of additional land into production, and granting technical assistance and credit to the 2,150 families considered to be residents plus 3,100 new colonists who were to be established in four years. The budget, including credit, for these four years was $30.3 million. The project formed part of the complex of agricultural development associated with the proposed 2,445 km Peruvian section of the Carretera Marginal de la Selva, since the colonization area lies along a 175-km section of this highway.

Development in the region over a thirty-year period has resulted in sharp disparities in the structure and amount of family income between the older and newer areas. While average consumption is $1,570 per family, the range is $190 to $22,000. In the Naranjillo region where average residence is eighteen years, settlers have been able to develop nonagricultural activities that generate over $1,000 gross per year (see tables 12 and 13), representing sizable interests and employment in forestry, services and commerce.

The ex ante IRR's, based on a twenty-five-year project life starting in 1962, were 21 percent and 23 percent (opportunity cost of labor assumed at $150 and $200 per family, respectively). In fact, however, 1962 was not the base year for the project, and in the five-year interim (1962-65) before major public investments were made the situation in the region changed markedly. The news

26 ONRA, Colonization Huallaga, Tingo Maria-Tocache (Lima, Peru, 1965).

Table 12. Family Income in the Four Southern Areas of the Tingo Maria-Tocache Project, 1967

Residence, development, and income	Area: Naranjillo	Pueblo Nuevo	Aucayacû	La Morada	Total and average
Number of farms in cample	22	35	38	41	136
Average residence (years)	18	7	6	6	8
Area in cultivation per farm (ha)	22	9	8	7	10
Area in cultivation per year of residence (ha)	1.2	1.3	1.3	1.2	1.3
Family income					
Gross agricultural production ($)	6,260	1,640	1,080	1,160	2,050
Nonagricultural income ($)	1,190	70	40	70	260
Total gross production ($)	8,450	1,710	1,120	1,230	2,310
Purchased inputs, including labor ($)	2,350	600	370	300	750
Consumption and savings ($)	6,100	1,100	750	930	1,560

SOURCES: ONRA, and the FAO-IDB study group on financing agrarian reform, Lima, Peru, 1967.

Table 13. Income Distribution on the Tingo Maria-Tocache Colonization Project, 1967

Income per year	Area: Naranjillo	Pueblo Nuevo	Aucayacû	La Morada	Total and average
	Percentage distribution				
\$150- \$400	0	15	25	20	17
\$400- \$900	10	25	45	50	35
\$900-\$1,800	15	50	20	20	26
\$1,800-\$3,750	25	10	10	10	12
Over-\$3,750	50	0	0	0	10
Total	100	100	100	100	100
	Average income (\$ per family)				
\$150- \$400	0	260	220	220	220
\$400- \$900	600	600	600	630	600
\$900-\$1,800	1,270	1,230	1,310	1,190	1,230
\$1,800-\$3,750	2,910	2,200	2,010	2,500	2,500
Over-\$3,750	8,200	0	0	0	8,200
Average	6,100	1,110	750	930	1,570

SOURCES: ONRA, and the FAO-IBD study group on financing agrarian reform, Lima, Peru, 1967.

of the proposed colonization in the area and the provision for granting titles, credit, and technical assistance gave impetus to a movement of spontaneous colonists, particularly from neighboring areas. It is estimated that between 1962 and 1966 about 600 families occupied lands in the project area without any official action. The project was to have started with 2,150 previously established settlers in accordance with the original 1962 estimate; instead, the number was placed at 5,400 in 1966 -the result of a more thorough survey and of migration. Thus before the project got underway the final target for new colonists was scaled down from 3,100, since the number of families in residence in 1966 already exceeded the number specified in the original plan. It was not until 1967 that ONRA put an end to unauthorized settlement of new lands. Taking 1966 as the base year, and a twenty-five-year life, the IRR's were 17 percent and 19 percent.[27]

A survey of eighty-five colonists showed a 30 percent increase in consumption and savings per family and the incorporation of an additional 3 ha per farm between 1965 and 1967.[28] In assessing achievement at the farm level, there are two critical questions: How much of the improvement is directly attributable to the project? What has the various components -legal tenure, credit, technical assistance, roads, and social services contributed to the total achievement?

Of the 5,400 residents in the zone in 1966, less than 10 percent received titles during the period in question; thus the impact attributable to this aspect appears to be minor, although the expectation of improved security of tenure presumably contributed to the progress of the settlers. The $100,000 disbursed in credit probably had little direct effect on settler incomes -40 percent was allocated to housing and 30 percent to cattle purchases that would not show a return for two or three years. Social services may be expected to have their major impact on the number and type of new settlers attracted to the project and on the general stability of the settlement. It is unlikely that this element would have had any significant effect on the productivity of colonists who have been in the region five to eight years,[29] and it is probable that some of the production increase would have occurred without the project. Thus it appears that the major factor in development in these early years was the impact of roads and rising expectations.

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[27] If 1962 is taken as the base year, i.e., if the increased valued added in the region over the period 1963-67 is attributed to a public investment program that did not start in earnest until 1967, the IRR's are 25 percent and 40 percent.

[28] From the survey by ONRA and the FAO-IDB study group on financing agrarian reform, Lima, Peru, 1967.

[29] The hypothesis may be advanced that short-term gains in labor productivity can be obtained through improved levels of health. If labor is scarce and farming operations cannot be maintained when one or more of the farm family is ill, the element may have an important effect indeed.

Is the assumption that the project can benefit 5,250 families over a twenty-year period and earn 10 percent on the investment sufficient reason to invest public funds to the tune of $30 million? In the statement of project goals it is implicit that these benefits are insufficient to justify the project. In order to assemble adequate support for the investment, therefore, additional benefits are cited: opening new lands for spontaneous colonization, exploitation of forest resources, and the provision of a demonstration project that would have a major effect on employment and futur development throughout the selva.

But it is unlikely that significant lands will be available for massive spon taneous colonization within the project area. The principal possibility lie in opening lands to the north along the Huallaga River, which would require additional investment in the Puerto Pizana-Campana stretch of the Carretera Marginal de la Selva and in penetration roads.

It is more difficult to be specific about the proposal to set in motion a dynamic development process in the selva region that will cause major population shifts from the sierra over a relevant planning period of one or two generations. Recent history is not particularly encouraging on this score. Of the population that settled in the Tingo Maria-Tocache region prior to 1962, it is estimated that 25 percent came from the coast, 40 percent from the sierra, and 35 percent from the selva. The migratory tendency in recent years appears to be more toward resettlement within the selva. Most of the influx of population into the project area between 1960 and 1967 is believed to have come from neighboring tropical areas. The 1967 survey of project beneficiaries shows that 10 percent came from the coast, 40 percent from the sierra, and 50 percent from the selva.[30] In the project zone, the net increase in population over the period 1964-68 that can be attributed to the project was 8,000-10,000.

The demand for labor has raised wages in the area substantially. In 1966-67 the average daily rate without food was 90 cents per day and in 1968, $1.15. In spite of this rise and a marked differential between the rate for the project and that prevailing in the sierra, there has been no significant inflow of people from the highlands in search of work. The causes of this immobility might provide important guides to future policy for colonization in the selva. It appears that, although ONRA's responsibilities include improving the lot of underprivileged campesinos from the sierra, the agency is nevertheless sensitive to political realities requiring tangible evidence of settlement, production, and improved income levels in a relatively short time in order to justify the costs, infrastructure, and services provided. Consequently the project has been promoted in tropical area farther down the Huallaga River with the expectation of recruiting better colonists material than that available in the sierra.

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[30] Survey by ONRA and FAO-IDB study group.

Another facet of the same problem is production objectives that dictate capital-intensive practices and have given rise to demands on the part of both ONRA and the colonists for mechanization and cattle. The project administration elected to airlift bulldozers from Lima to clear forest for the African oil palm plantations at Tocache. Cattle develpment poses a further dilemma because of high credit requirements. By definition any ONRA program must cater to small farmers or landless campesinos, thus automatically exluding any significant flow of private capital. Even with the relatively modest goal of developing herds of 100 cattle over a fifteen-year period, at $6,000 per colonist, credit can be granted to only a few. Under these circumstances the minimum income criterion[31] becomes critical, since the inverse relationship between capital per capita and the total number of beneficiaries is self-evident if private capital is excluded from the equation.

While there may be some question about achieving the goal of shifting population from the sierra to the selva, about income distribution within the project, and about expectations of external effects, there is clear evidence of development to the benefit of low-income campesinos and of rapidly rising production. A goal of $2,300 per family in 1980 may well be overstated. If the full production level were two-thirds the projected level and its attainment were delayed until 1985, the IRR would be reduced from 17-19 percent to 4-10 percent. Since forestry benefits were not included in the calculation, however, and since a strong case can be made for excluding much of the trunk highway investment from project costs, the probability of a satisfactory performance appears good, with an IRR of 10-15 percent.

ANNEX II
Exhibit B

LOGICAL FRAMEWORK

ANNEX II
Exhibit B
Page 1 of 3

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Life of Project:
From FY 81 to FY 86
Total U.S. Funding $18,000,000
Date Prepared: August 13, 1981

Project Title & Number: Upper Huallaga Agricultural Development - 527-0244

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The Broader objective to which this project contributes: Agricultural production in the Peruvian high jungle increased and diversified.	Increased productivity of existing crops. Increased regional income from new crops.		1. Farmers accept and use new production package
Project Purpose: Public sector agricultural support services strengthened and agricultural production packages developed and tested in the upper Huallaga region of the Peruvian high jungle.	Conditions that will indicate purpose has been achieved: End-of-project status. 1. a) Stock of human capital to carry out high jungle research expanded b) Agricultural research, extension, and training center for high jungle in place and functioning. 2. INIPA capacity to carry out high jungle research and extension strengthened. 3. Production packages designed for selected crops. 4. Credit system using realistic rates for both short- and medium-term credit. 5. Delivery of production services upgraded. 6. Statistical capability to measure changes in cropping patterns, technology, and on-farm incomes in place and functioning. 7. Transportation costs in the Project Area reduced or stabilized. 8. Environmental sanitation conditions in Project Area improved.	GOP records Project reports and records Publications by researchers Project evaluations	

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Life of Project:
From FY ________ to FY ____________
Total U.S. Funding ____________
Date Prepared: ____________

Project Title & Number: ________________________________

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs: 1. a) Applied research carried out. b) Extension agents trained and working in the Project Area. c) Training carried out by UNAS. 2. Availability of short-& medium-term credit increased. 3. Production services delivery system in place and functioning. 4. Area sample frame, land use survey, and other surveys completed. 5. Machinery maintenance facility constructed and equipped and road maintenance carried out. 6. Potable water systems and latrines constructed.	1. a) 15-20 existing and new crops tested for their response to improved agricultural technologies. b) 56 extension agents trained and working by 1984. c) 375 persons trained by UNAS by 1986. 2. $48,000,000 in credits issued to farmers by 1986. 3. a) Increase in percentage of farmers using fertilizer and lime. b) Two land titling offices established. 4. a) One area sample frame completed by 1982. b) One land use survey completed by 1982. c) One agricultural cadaster completed by 1982. 5. One maintenance facility; $1,850,000 in machinery; and 490 km road maintained each year. 6. a) 10 surface water systems by 1986. b) 70 hand pumps installed by 1986. c) 40 smaller hand pumps provided to individuals by 1986. d) 130 latrines constructed by 1986.	GOP records AID records Site inspections Project evaluations	Research and extension personnel available and willing to work in Project area.

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Life of Project:
From FY _______ to FY _______
Total U.S. Funding _______
Date Prepared: _______

Project Title & Number: _______

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS					MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs:	(US$000)	Loan	Grant	GOP	Total		
1. Research, Extension, and Training	1.	3,898	2,443	4,690	11,031	GOP and USAID accounting records.	1. AID and counterpart funds are disbursed as required.
2. Agricultural Credit	2.	4,800	200	-	5,000		
3. Other Production Services	3.	1,088	14	174	1,276		
4. Development and Interpretation of Resource Information	4.	164	98	394	656		
5. Maintenance	5.	3,000	-	2,000	5,000		
6. Potable Water and Environmental Sanitation.	6.	250	-	-	250		
7. Project Office Support Costs	7.	370	-	242	612		
8. Inflation & Contingencies	8.	1,430	195	1,000	2,625		
		15,000	3,000	8,500	26,500		

ANNEX II
Exhibit C

IMPLEMENTATION PLAN

IMPLEMENTATION PLAN

DATE	ACTIVITY
1981 September	- Project Agreement signed - Implementation Letter N° 1 issued explaining how to fulfill initial CP's - Aerial photography previously funded completed.
October	- Initial Conditions Precedent (CP's) met including: . Special Project Office (PEAH) established and funding provided by GOP. . Director, Special Project Office hired. - Implementation Letter issued explaining procurement procedures and disbursement rules. - INIPA names counterpart research and extension design team after which AID issues PIO/T for short-term technical assistance to GOP for development of operational plan for research, extension and training (RET) activities to develop: . Technical specifications for research, teaching and service laboratory, and research and extension equipment. . Draft agreement between INIPA/UNAS. . Workscope for ST/TA extension program (March Group). . Workscope for LT/TA. . Workscope for additional ST/TA (after July 1982) - Implementation Letter(s) issued explaining the key Project personnel requirements. - Job description and technical qualifications developed for key Project personnel by PEAH.
November	- PIO/C for 50% of vehicles issued by Mission. - PIO/C for 50% of imported motorcycles issued by Mission. - ST/TA required for meeting additional CP's arrives. TA will develop the operational plan for the research and extension component, including: . Technical specifications for RET facilities construction and improvement. . Technical specifications for laboratory, research and training equipment completed. . Develop agreement to be executed between INIPA and UNAS to hire professors to work on development of research at INIPA.

DATE	ACTIVITY
	. Scope of work for RFTP for all remaining technical assistance under the Project. - PEAH key personnel hired. - PIO/T for Credit Advisor developed and issued by Mission. - Office established in Tingo Maria. - PEAH purchases office equipment for project offices with GOP funds.
December	- Operation Plans for research, extension and training; disbursement CP's met. - PIO/C for research, training and service laboratory equipment and field equipment issued by Mission. - PEAH purchases 6 vehicles and 10 motorcycles with GOP funds for RET and MOH activities. - PEAH signs agreement with ONERN to complete land classification maps.
1982 January	- PEAH develops job descriptions and technical qualifications for additional project personnel. - Workscope and RFTP for design of research and extension facilities, construction and improvement, developed by INIPA and PEAH. - Implementation Letter issued by Mission describing information required to meet condition precedent to disbursement on agricultural credit component. - Agreement executed between INIPA and UNAS for Professors to work with INIPA on research and extension program. UNAS professors contracted on part-time basis by INIPA. - PIO/T for short-term technical assistance to develop extension technological packages issued by Mission. - AID/W technician arrives to do PIO/T for PASA services required for area sample frame component and to draft agreement between Min. Ag. (OSE),PEAH and USDA for carrying out area sample frame. - PIO/T for short-term technical assistance to develop Amazon research network developed by Mission.
February	- Credit Advisor hired by Mission - Additional Project Personnel hired by PEAH. - Credit agreement between Project Office and Agrarian Bank approved by A.I.D. meeting CP. - Credit agreement between Project Office and BANCOOP approved by AID meeting CP. - Research staff (15) at Tingo Maria hired by INIPA. - Extension staff on-board at Tulumayo Experiment Station. - Agreement between PEAH, USDA and Min.Ag. (OSE) signed on area sample frame activities. - RFTP issued by Mission for the remaining short-term and all of the long-term technical assistance

DATE	ACTIVITIES
	- Implementation Letter issued explaining land registration requirements to meet CP to disbursement.
March	- Short-term technical assistance on board to develop Amazon Research Network. - PIO/P issued by A.I.D. for RET training: . Short-term in-country. . Short-term overseas. . Long-term in-country. . Long-term overseas. - Short-term technical assistance on board with INIPA for developing extension technological packages. - Additional teaching staff for UNAS of 5 hired. - INIPA prepares locally issued IFB for RET facilities construction and improvement - $380,000. - Short-term TA (4 months under USDA PASA arrives). - Procurement plan and operational plan for road maintenance approved by A.I.D. and CP to disbursement met.PIO/C for road maintenance and maintenance center equipment issued by A.I.D. - PEAH and MTC develop design for road maintenance center. - PEAH and ENCI sign agreement to allow higher profit margin to private fertilizer dealers, meeting CP to disbursement for construction of grain storage centers.
April	- Short-term training for research starts overseas. - Long-term training for research in-country starts. - Agreement with MOH for Potable Water component executed by PEAH. Condition Precedent met. - Selection of communities and design of potable water systems for first year begins. - Mission issues PIO/T for ST/TA in grain storage and handling. - Construction IFB issued by SPO and MTC for road maintenance center.
May	- Extension field personnel hired by INIPA are assigned to Sector Office. Begin training by INIPA. - Short-term training for UNAS professors overseas starts. - Contract awarded by Mission for all of the long-term and the remaining short-term technical assistance. - Technical specifications developed for initial off--shore and local order of potable water supplies (pipe, steel,etc.) by PEAH and MOH. - PEAH and UNAS award contract for RET training facilities construction and improvements at UNAS. - Conditions precedent met to disbursement for land registration activities, including establishment of registration office(s) in Project Area.

DATE	ACTIVITY
	- Construction of road maintenance center begins. - Technical assistance for grain storage develops technical specifications for driers and test equipment. - INIPA and PEAH award contract for RET extension facilities construction at INIPA facilities in the Project Area.
June	- Imported motorcycles arrive. - Locally procured potable water supplies needed for first year arrive. - Construction of first year potable water systems begins (5). - Vehicles arrive. - Extension training begins for extension field personnel by INIPA commodity specialists in Project Area. - Extension activities begin. - AID issues PIO/C for initial potable water supplies and equipment. - AID issues PIO/C for grain driers and test equipment.
July	- Research training and service laboratory equipment arrives. - RET facilities construction and improvement completed. - Office equipment for RET facilities purchased locally by PEAH and INIPA with AID funds. - Long-term technical assistance arrives for Tulumayo. - Short-term technical assistance for UNAS arrives. - Mission orders remaining motorcycles.
August	- Long-term overseas training for research, extension and training program starts. - Sample Frame design completed by USDA PASA. - Land use mapping completed by ONERN. - Mission issues PIO/T for road maintenance equipment and planning ST/TA.
September	- PIO/C for remaining vehicles issued by Mission. - Selection of communities and design of water systems for second year begins. - Land registry office established in Tingo Maria and Tocache.
October	- Construction of road maintenance center completed. - ST/TA for road maintenance planning arrives for two months.
December	- Annual Project Evaluation and RET evaluation takes place.

DATE	ACTIVITIES
1983 January	- Road maintenance equipment arrives. - Road maintenance begins. - Initial potable water supplies arrive. - Construction of second year potable water systems begins (10). - Remaining motorcycles arrive.
February	- ST/TA forroad maintenance equipment arrives for 2 months. - ST/TA for road maintenance planning returns for 1 month.
March	- Additional staff (5) hired by UNAS.
April	- Grain storage driers and test equipment arrives. - Training program for ENCI and ECASA personnel in use of grain driers and test equipment takes place. - ST/TA in grain storage develops technical specifications for storage facilities in Tocache.
May	- Remaining vehicles arrive. - Technical specifications for remaining potable water supplies developed by PEAH and MOH.
June	- PEAH issues IFB for construction of grain storage centers. - Full extension program in operation.
September	- IFB for remaining potable water supplies issued by Mission - Selection of communities and design of potable water systems for third year begins.
December	- Annual Evaluation.
1984 January	- Construction of third year potable water systems (15) begins. - ST/TA road maintenance equipment returns for 3 months.
February	- ST/TA for road maintenance planning returns for 1 month.
March	- Additional staff (5) hired by UNAS.
April	- Remaining potable water supplies arrive.

DATE	ACTIVITIES
June	- Grain storage facility construction completed. - Commodity Specialists Group completes work. - Head extension office is fully operational.
September	- Selection of communities and design of potable water systems for fourth year begins.
December	- Annual Evaluation.
1985 January	- Construction of fourth year potable water systems (15) begins.
March	- Additional staff (5) hired by UNAS.
September	- Selection of communities and design of potable water systems for last year begins.
December	- Annual Evaluation.
1986 January	- Construction of last year potable water systems (15) begins.
March	- Additional staff (5) hired by UNAS.
August	- Final Evaluation.
September	- PACD.

ANNEX II
EXHIBIT D

POTABLE WATER AND ENVIRONMENTAL SANITATION

POTABLE WATER AND ENVIRONMENTAL SANITATION

Table 1

Gravity System with Sanitary Units (Type I)

(assuming 350 inhabitants)

	Unit	GOP	Community	Loan	Total
A)	Intake (concrete)	$ 80	$110	$ 755	$ 990
B)	Conduction (1 km-- 1 1/2")	120	165	1,570	1,855
C)	Reservoir ($10m^3$)	70	90	890	1,050
D)	Distribution net (0.8 km--1")	45	60	700	805
E)	Sanitary units (4)	205	280	3,720	4,205
	Sub-total	520	705	7,635	8,860
	35% Administrative costs	3,100	-	-	3,100
	Total	$3,620	$705	$7,635	$11,960

Cost per inhabitant (without administration) $= \frac{\$8,860}{350} =$ US$25

Cost per inhabitant (with administration) $= \frac{\$11,960}{350} =$ US$34

Table 2

Deep Well with Manual Pump (Type II)
(assuming 12 families per well, approximately 72 inhabitants)

Unit	GOP	Community	Loan	Total
A) Digging	-	$120	-	$120
B) Pipe and accessories	-	-	$120	120
C) Interior walls with cement or masonry lining	-	-	370	370
D) Hand-operated water pump (0.5-1 liter/sec)	-	-	200	200
E) Concrete slab	50	-	20	70
Sub-total	50	120	710	880
15% administrative costs	130	-	-	130
Total	$180	$120	$710	$1,010

Cost per inhabitant (without administration) $= \frac{\$880}{72} =$ US$12

Cost per inhabitant (with administration) $= \frac{\$1,010}{72} =$ US$14

Table 3

Shallow Well with Manual Pump (Type III)

	Unit	GOP	Community	Loan	Total
A)	Digging	-	$50	-	$ 50
B)	Pipe lining and accessories	-	-	70	70
C)	Hand-operated water pump (0.2 liter/sec)	-	-	150	150
D)	Concrete slab	50	-	-	50
	Sub-total	50	50	220	320
15%	administrative costs	50	-	-	50
	Total	$100	$50	$220	$370

Table 4

Latrines

Unit	GOP	Community	Loan	Total
A) Digging	-	$6	-	$ 6
B) Platform	5	3	5	13
C) Cabin	-	10	20	30
Subtotal	5	19	25	49
10% administrative costs	6	-	-	6
Total	$11	$19	$25	$55

TABLE 5

SUMMARY COSTS -- POTABLE WATER AND ENVIRONMENTAL SANITATION

		Unit Cost	Quantity	Total Cost
Type I	Gravity System	$12,000	10	$120,000
Type II	Deep Well	1,000	70	70,000
Type III	Shallow Well	400	40	16,000
Latrines		60	130	8,000
	Sub-total			$214,000
Vehicles:	Four-wheel-drive Pick-up	$12,000	1	$ 12,000
	Small Dump Truck	18,000	1	18,000
	Motorcycles	2,000	3	6,000
	Sub-total			$ 36,000
Total Cost of Component				$250,000

TABLE 6

Implementation of Potable Water and Environmental Sanitation Systems

	1982	1983	1984	1985	1986	TOTAL
Procurement						
Vehicles	1*2*					
Materials	2*	1* 3*				
Number of Communities to receive Potable Water	5	10	15	15	15	60
Construction						
Type I Gravity System	2	2	2	2	2	10
Type II Deep Well	5	5	20	20	20	70
Type III Shallow Well	3	7	10	10	10	40
Latrines	12	16	34	34	34	130

*Numbers refer to quarters of the calendar year.

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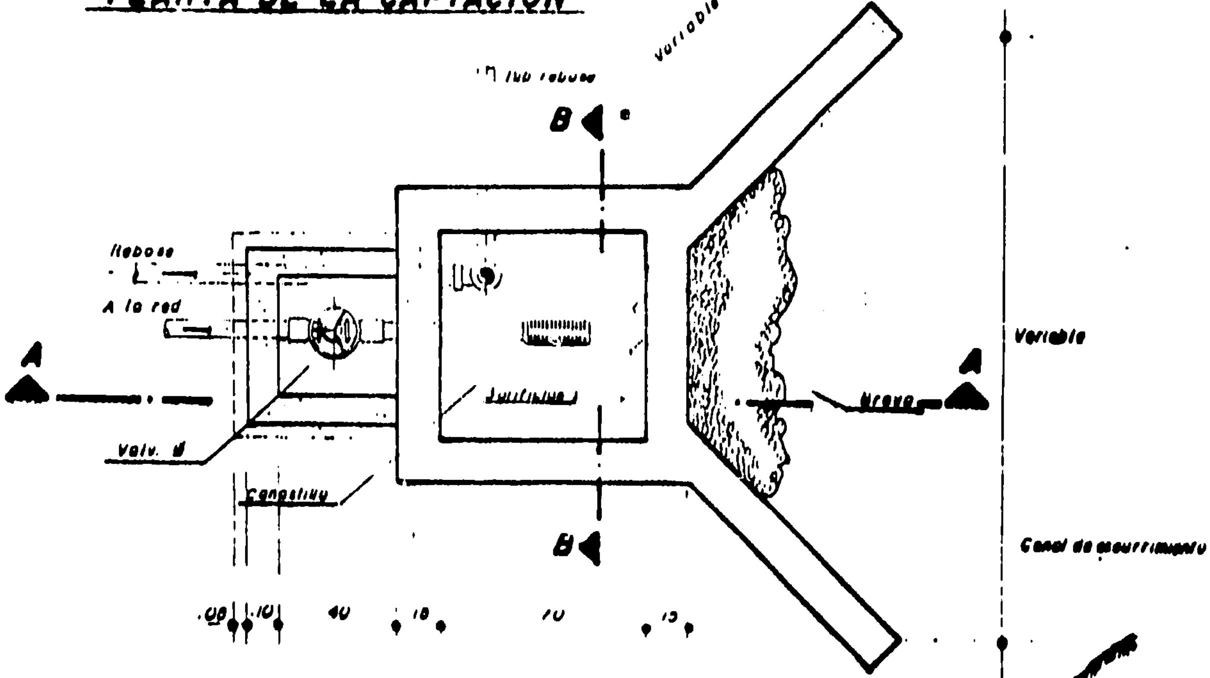

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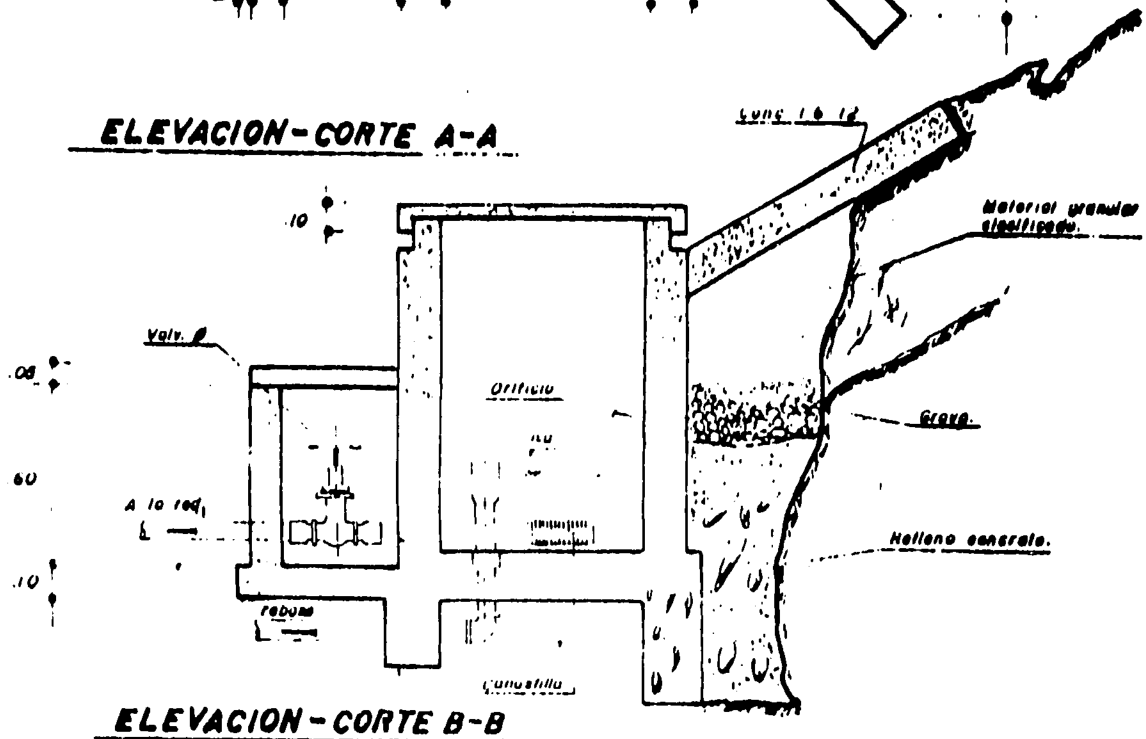

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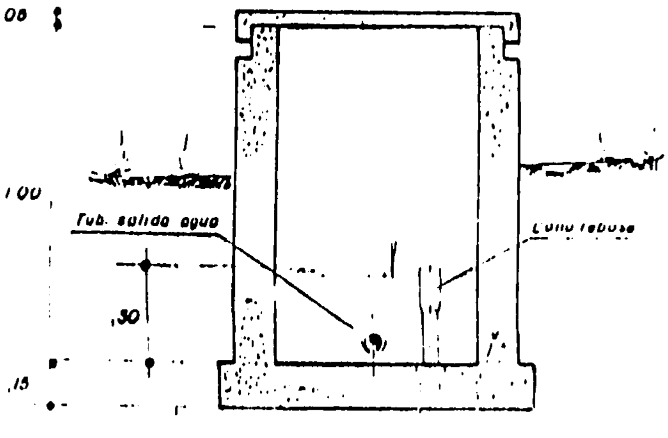

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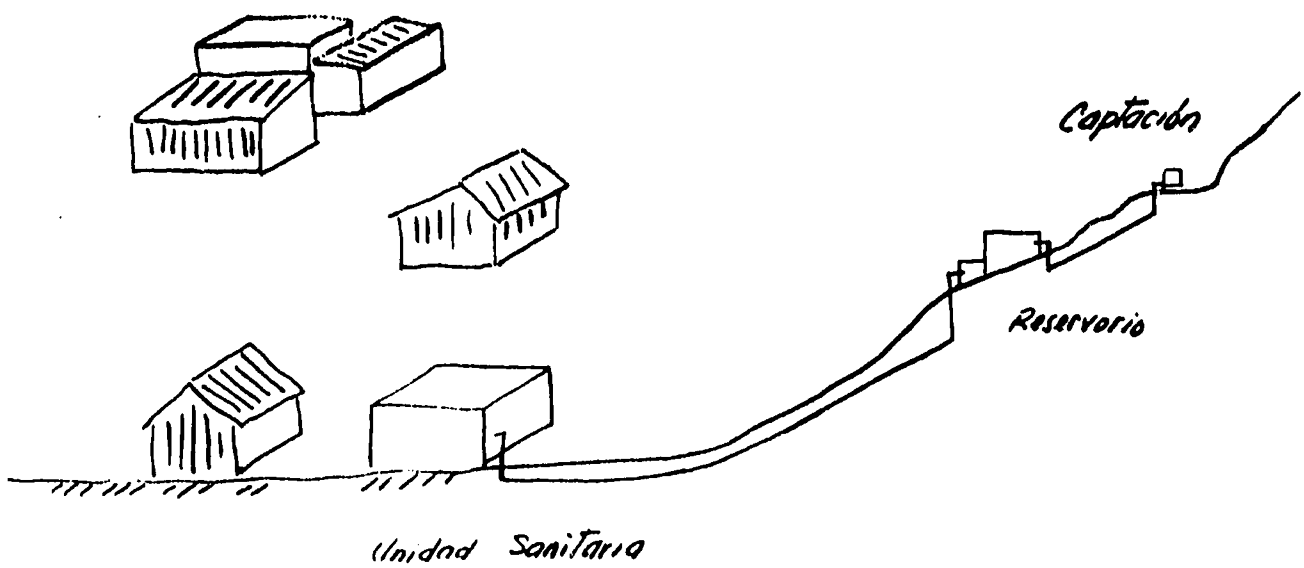
Dirección de Ingeniería Sanitaria
Proyecto : A.I.D.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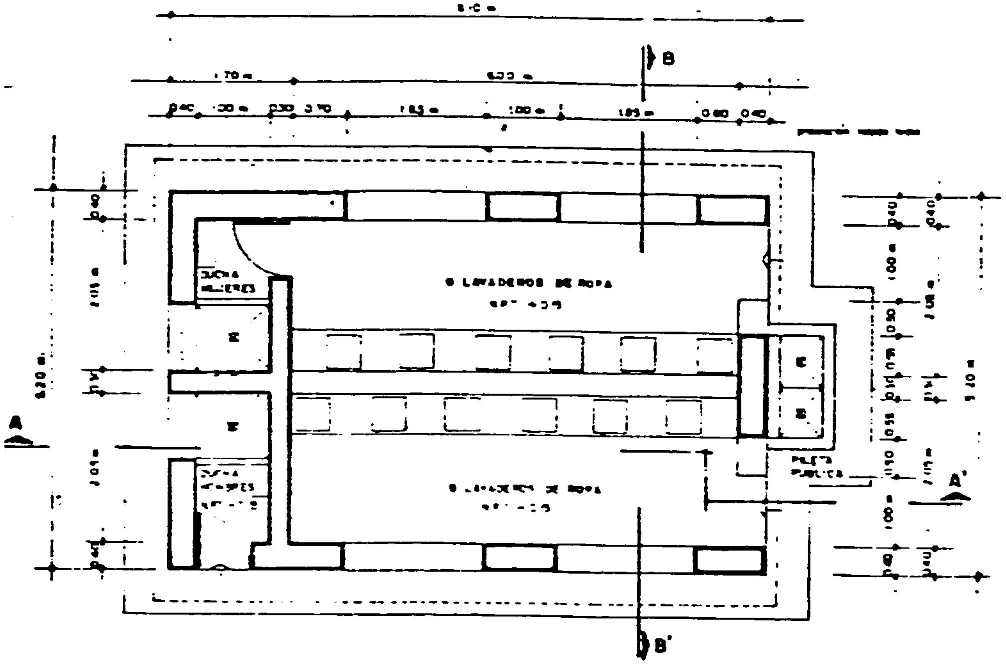

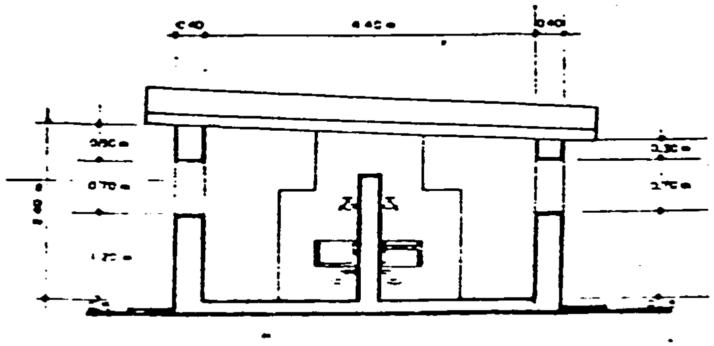

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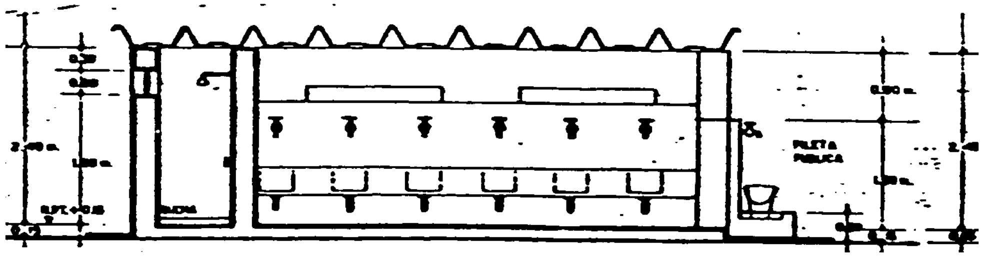

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MINISTERIO DE SALUD

Direccion General de Programas Especiales de Salud
Direccion de Ingenieria Sanitaria
Proyecto : A.I.D.

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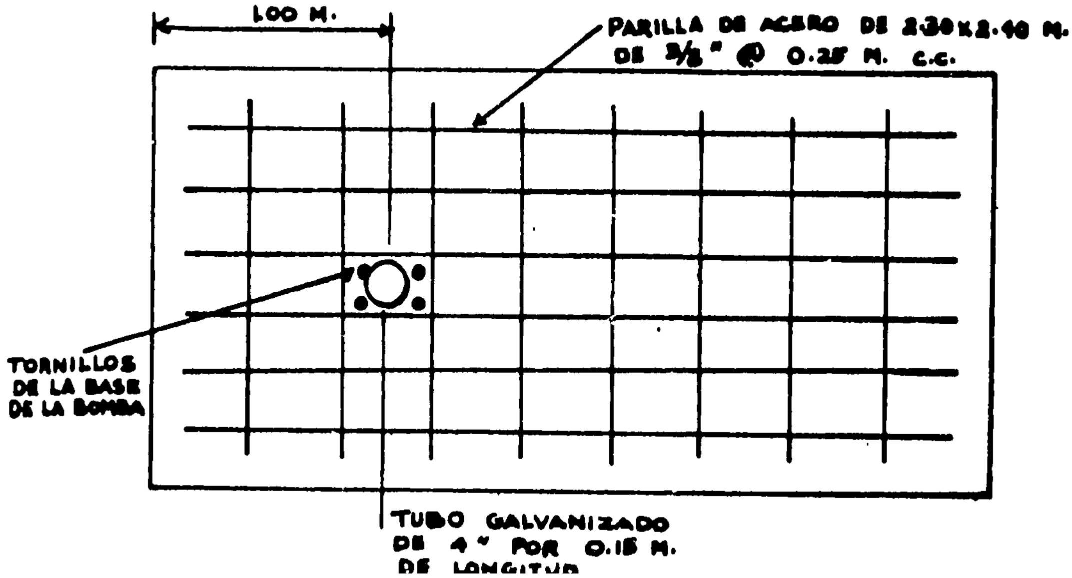

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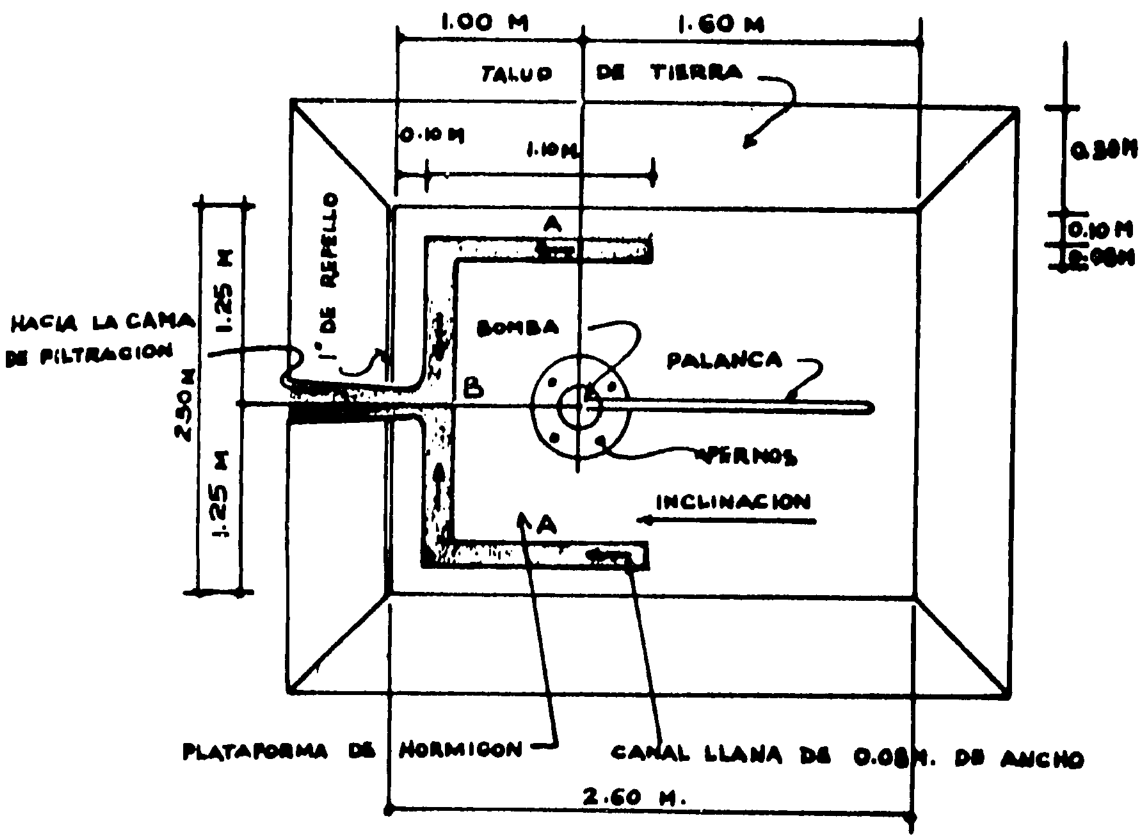

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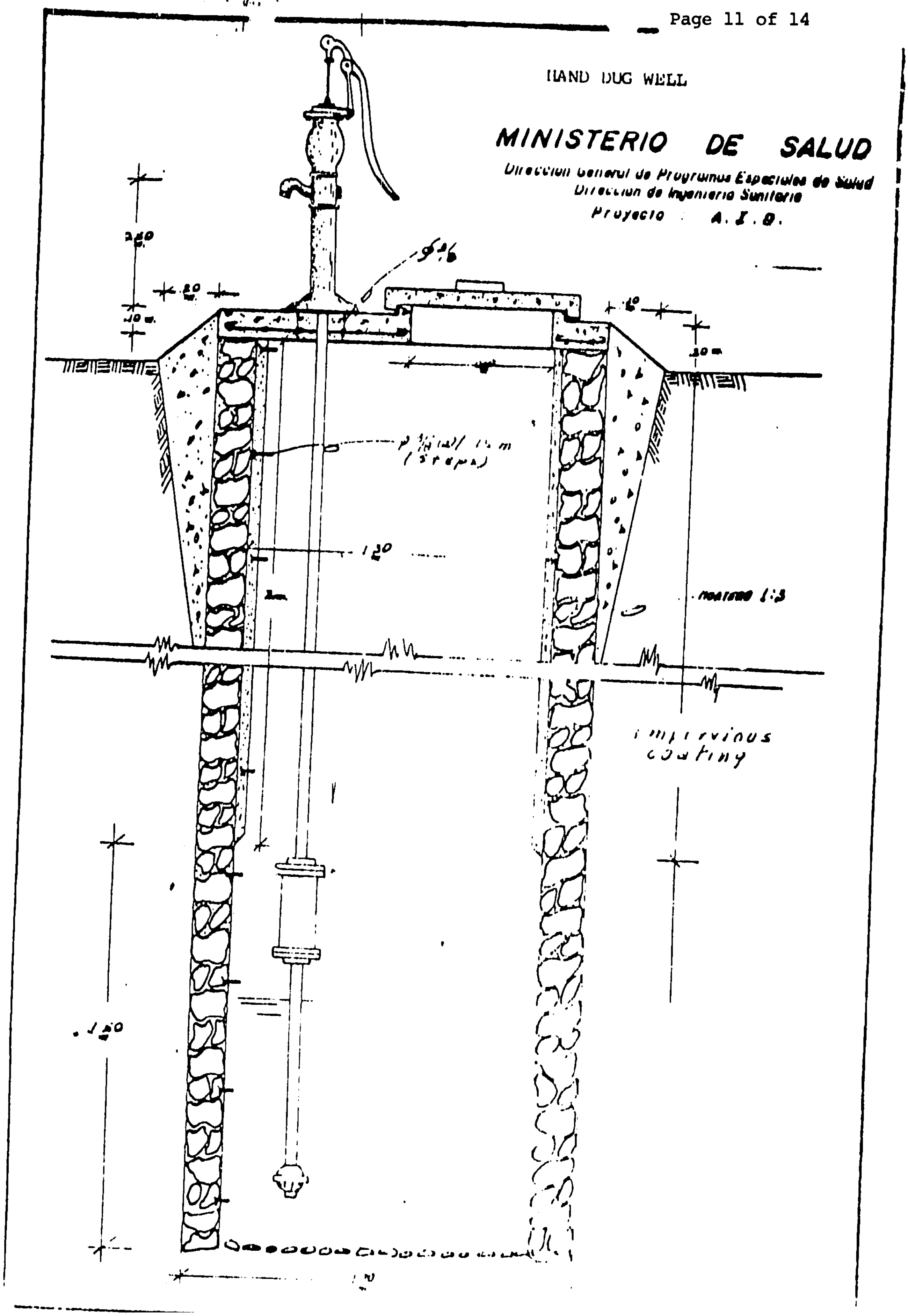

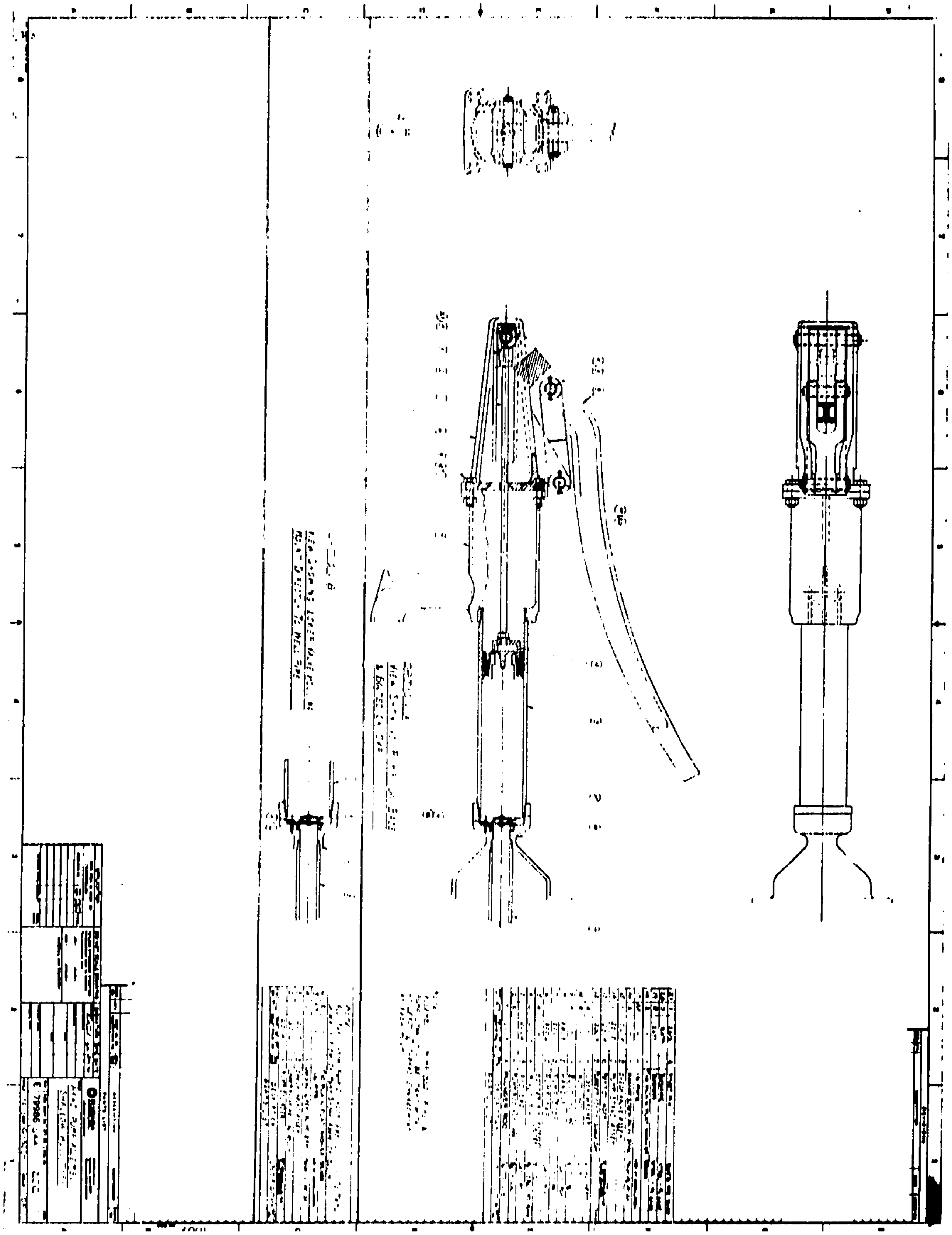

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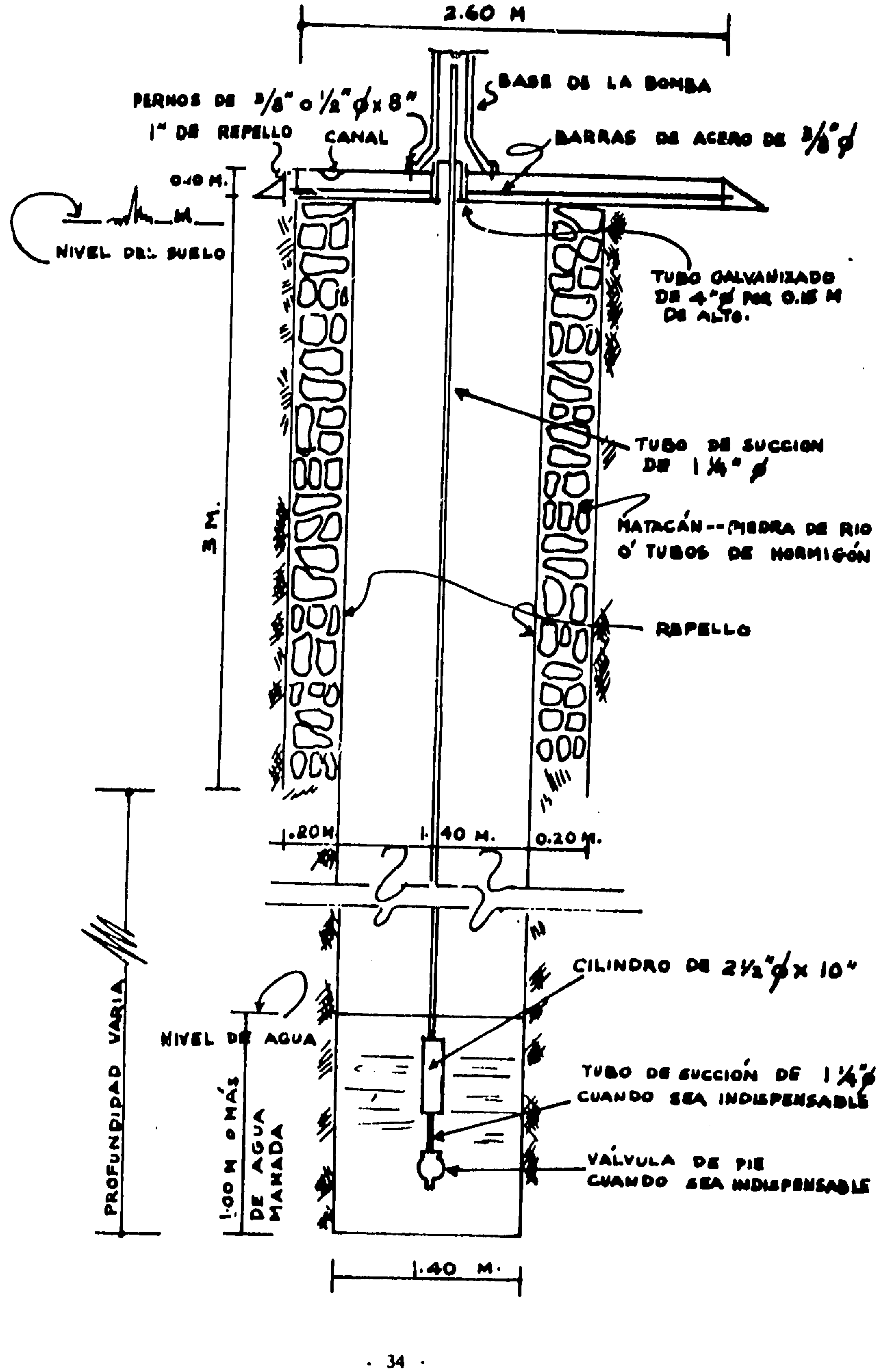

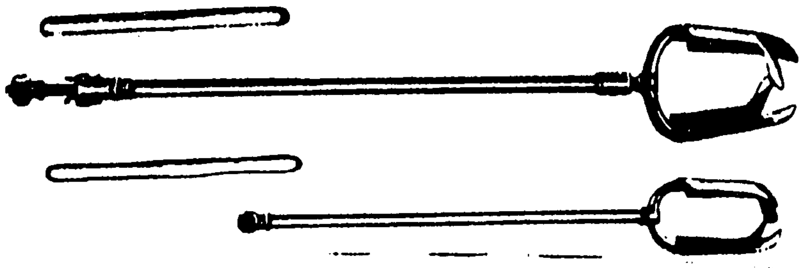

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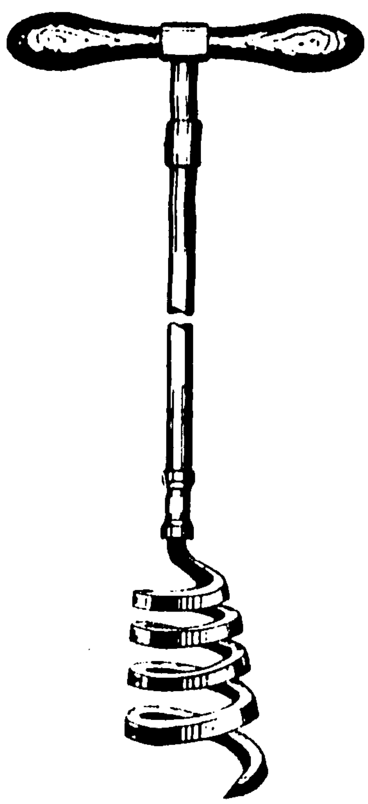

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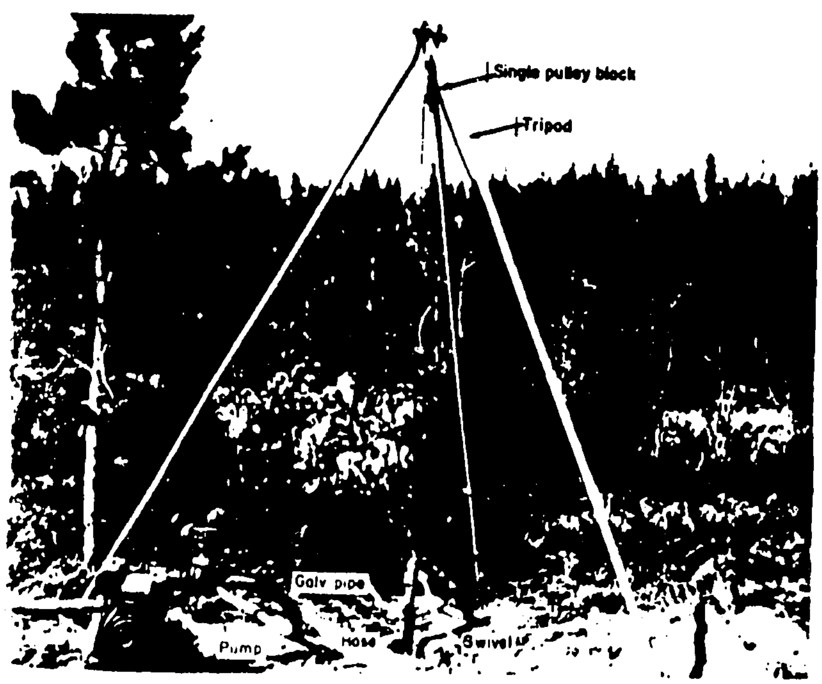

SIMPLE EQUIPMENT FOR JET OR ROTARY DRILLING.

ANNEX II
Exhibit E
Page 1 to 42

ENVIRONMENTAL ASSESSMENT OF THE UPPER HUALLAGA AREA DEVELOPMENT PROJECT

June, 1981
Lima, Peru

Prepared by Consultants to USAID/PERU

Project Consultants:

JRB Assciates

Joshua C. Dickinson, Team Leader
Douglas J. Pool
Jean-Louis Aubert
Gregory L. Morris
Joseph A. Tosi, Jr.

Consortium for International Crop Protection

William P. Morrison

Fundación Nacional para el Desarrollo

Braulio La Torre
Victor Grande
Raúl Bao
Enrique Rossl

APPENDICES*

A. Environmental Assessment of the Use of Pesticides in the Upper Huallaga Regional Development Project. W.P. Morrison

B. Climate and Hydrology of the Upper Huallaga. Gregory L. Morris.

C. Environmental Perspective and Agricultural Development in the Upper Huallaga. Douglas J. Pool.

D. Limitaciones de Usos Implicados por las Dínamicas y las Interacciones de los Diversos Espacios Presentes en la Primera Zona Prioritaria - Proyecto Alto Huallaga. Jean Louis Aubert.

E. Plan de Ejecución Forestal. Enrique Rossl.

F. Informe sobre Capacidad de Uso Mayor de las Tierras del Area de Prioridad. Raúl Bao.

G. Informe Ecológico de la Zona Denominada de Primera Prioridad del Proyecto de Desarrollo de Alto Huallaga. Victor Grande.

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* Unattached. Available at either USAID/Peru or LAC/DR.

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Tingo María

Werner Bartra

ONERN

Victor Grande
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Dale E. Bandy
Pedro A. Sánchez
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I. SUMMARY

Aside from the unavoidable impact resulting from the coca eradication program discussed below, this project can increase agricultural productivity in the Upper Huallaga Valley while sustaining the contribution of natural areas to regional development, i.e. watershed protection, forest products, etc. Optimum sustained development can be approached if the spirit of the land capability recommendations are followed, results of the specific research are incorporated in project implementation and training is carried out as outlined in this assessment.

A. Issues and Conclusions

1. Herbicide Use in Coca Eradication

The use of 2, 4-D as proposed (basal application with backpack sprayer) does not represent a significant impact on non-target plants or on man. These issues are discussed in detail in the pesticide annex. The logistic problems of carrying 1,334 liters of herbicide and kerosene mixture per hectare to remote coca plantations represent a virtually impossible limit on any total eradication program. Pressure on coca planting in proximity to the roads will probably encourage land clearing on more fragile sites (see following section).

2. Regional Impacts of Coca Eradication

Uncontrolled expansion of settlement and/or agriculture on lands adjacent to the original parcelling will be a source of major environmental impact. There is a high potential for erosion and increased runoff from much of this area of dissected terraces and mountain slopes. Coca eradication will have a double effect. First, a large number of people, probably the majority of the several thousand people outside of the parcelled area, are growing coca. Conversion of land from permanent coca production to annual crops or pasture will increase the potential for erosion on marginal sites. In addition, those families remaining on the land will be obligated to expand their land base to compensate in part for the lost coca income. Second, the pressure of coca eradication will force farmers who decide to continue in coca production to move into even more remote areas where their land clearing will have a particularly severe impact on watershed and wildlife.

This problem can be partially mitigated in the case of the non-coca farmers by utilizing the land capability maps as a basis for determining areas suitable for agriculture and utilizing land titling, credit, and extension as an incentive for the concentration of agriculture on the appropriate sites.

3. Agricultural Intensification

Widespread crop and livestock production will result in unavoidable increased fertilizer and biocide utilization which can lead to environmental degradation and long-term public health problems as these chemicals are washed into streams used for drinking water. As a mitigation measure, rural housing clusters should be provided shallow wells with hand pumps making available a supply of uncontaminated water. It is expected that use of these inputs will permit intensified cropping on level or gently sloping soils which will reduce pressure to cultivate more fragile sloping soils. Clean-tilled crops should not be planted on soils with slopes greater than 15%, perennial crops or forests should be managed on slopes up to 50% and the remaining areas greater than 50% slope should be protected for watershed conservation. Implementation of the land capability criteria developed in this EA will minimize environmental degradation by reducing deforestation and erosion. The preservation of buffer strips of natural or planted vegetation along water courses can result in a major reduction of input of sediments, nutrients and agricultural chemicals into aquatic ecosystems. Compliance with this land management practice can be encouraged through extension education and conditions imposed as a basis for granting credit (Karr, 1980).

4. Cattle

Cattle production is limited by the high rainfall occurring in the project area (more than 3 meters per year in the upper part of the project area). This limitation diminishes further north approaching Tocache. Steeper slopes are considered inappropriate for cattle due to observed and predicted erosion and mass soil movement problems. Where productivity degrades rapidly, ranchers are forced to clear more and more land resulting in continual expansion of the degradation process. More level but poorly drained sites suffer from compaction and weed invasion and are too wet for effective use of fire for maintaining grass cover. Costs of hand chemical or machine brush control render these sites non-competitive with areas such as Tarapoto (2,100 mm rainfall). The soils most suitable for pasture are generally similar to areas recommended for intensive annual crop production. Commercial ranching is considered economically marginal and environmentally hazardous over most of the area. The most appropriate areas can be identified on land capability maps.

5. Small Livestock

Swine, chickens, ducks and even sheep are established in the area as dooryard scavengers. Swine hold the greatest potential for small commercial scale production using intermediate level technology. This observation is based on small space requirement (compatible with average farm size in area) and the abundance of actual and potential food sources including yuca , various fruits, crop residues and unmarketable surpluses of various crops.

6. Irrigated Rice and Associated Crops

Some 20,000 Ha. of rice are being proposed for the area, predominantly intensive paddy rice production in rotation with other annuals such as, corn and soybeans. This orientation has been strongly influenced by Dr. Pedro Sanchez of North Carolina State University, and the experience derived from the Yurimaguas tropical soil management project.

High rainfall does not apparently limit rice production under flooded paddy management. Potential hazards from paddy rice cultivation are the effects of poor water management on adjacent dry land crops and the potential for destruction of soil structure on sites with heavy clay soils (none of these soils has been identified in the area). Both of these problems can be avoided through adequate management.

Crops recommended for use in rotation with rice, corn and soybeans, are more seriously limited by ecological factors. According to Sanchez, corn is limited at Yurimaguas by low insolation and pests. These conditions would probably be more serious in the Upper Huallaga. According to Dr. Thomas Fullerton, (INTSOY, soybean expert) conditions for soybeans improve toward the lower rainfall zone of the project area. The program for expansion of these rotation crops should be guided by the results of an adaptative on-farm research program.

7. Crop Drying and Seed Storage

The relatively high probability for rainfall and the continual high humidity during the lower rainfall period (May-September) represent ever-present hazards in drying crops in the field prior to threshing. Achieving and maintaining acceptable moisture content in crops for safe storage and shipping will require large initial investment and long-term energy costs. These factors should be included in calculating the competitiveness of the Upper Huallaga with drier producing areas. Handling of seed represents a similar problem, although one in which the volume factor is less critical.

8. Timber Extraction

Known technology for sustained yield forest management has never been successfully applied in the Upper Huallaga. A key factor has been the use of timber cutting concessions as the method for exploiting forests. The concessionaire has a minimum of interest in sustained production. It is common for farmers to invade forested areas through roads newly opened for timber extraction. Dr. J.A. Tossi of the Tropical Science Center in Costa Rica has recommended the application of the National Forest concept of sustained yield management as an alternative to concessions. Strict adherence to the land capability distinction between protection forest and production forest should be followed. Exploitation of protective areas on marginally economic steep sites will result in erosion of slopes and sedimentation and increased runoff affecting agriculture and infrastructure in the Valley.

9. Agro-Industries

Agro-industries do not pose a significant pollution hazard. The use of oxidation laggons and/or controlled application to wetlands represent low cost solutions to potential pollution problems. By-product wastes may have potential as feed for livestock or fish production.

10. Road Construction

Roads can open marginal land and forest reserves to uncontrolled exploitation and degradation. In so far as possible, road alignments should avoid marginal soils and maximize access only to prime agricultural lands. It will be impossible to protect forest reserves from spontaneous colonization without a firm government policy and vigorous and consistent enforcement.

11. Land Pressure

Because of coca production the population is maldistributed. Roughly 80% of the land being cultivated on the slopes (largely coca) should be in managed or even protective forest or highly restricted agriculture. The titling of all land with the potential for family farming and forest management should be expedited. The use of credit and extension as an incentive for following the land capability recommendations could alleviate some of the pressure on marginal land (except as noted in 2 above). Change in existing land laws to facilitate land sales and readjustment of valley parcels where all land falls into a low capability class, could increase farm production.

12. Natural Areas and Wildlife

Although only 10% of the parcelled area is in forest, large reserves remain on the steeper and more remote slopes above the valley and further north toward Campanilla. The land capability classification identifies these forested areas as having a high value to society for watershed protection, water flow regulation, non-lumber products, wildlife management, and recreation. In the valley itself, the aguajales should be kept as filters for runoff containing agricultural chemicals. Because of the lack of effective controls on land use, the most effective means of protection of these areas is not to build roads through them and to carefully screen forest product extraction permits.

B. Controversial Issues

1. Coca Eradication

There is considerable difference in professional judgment as to whether eradication of existing coca plantings will do more than cause a shift in production to remote sites in the valley or cause a shift to ecologically similar sites in Peru or elsewhere. This constitutes an unavoidable impact. The EA emphasizes the need to rationalize agriculture in these marginally productive areas to insure the well-being of thousands of farmers not now served by government support and the need to prevent further degradation of these areas.

2. Ecological Constraints

Annual monoculture crops grown in areas of extremely high rainfall such as the Upper Huallaga have not only serious biological competition largely from aggresive weeds and pests, but also physical stresses such as rapid leaching, erosion and mass movement of soils. Solutions to the competitive problem which have proven relatively effective in midlatitudes (cultivation and pesticides) are far less effective in the humid tropics. Furthermore, continually wet soils and high humidity complicate land preparation and harvest activities as well as post-harvest drying and storage.

This is not to say that intensive annual crops cannot be grown in the area; they already are. However, the multiplicity of limiting factors must be overcome at a significant material and energy cost. It is no accident that indigenous peoples living the wet tropics are dependent largely on root and perennial crops and not on grains.

The approach to agricultural development in the humid tropics therefore must contrast sharply with similar economic production strategies in midlatitudes or dry environments (Table I). The contrast in the case of the Upper Huallaga is particularly sharp.

A significant part of the crop plan for this humid environment must be devoted to crops with long term viability. To obligate the agriculturalists with cropping systems which require sophisticated technology and high material and energy inputs is to invite the type of disaster which occurred in the Upper Huallaga in the late 1960's. The complex of agricultural systems and infrastructure created by the short-term AID subsidy must be sustainable at a considerably lower level of inputs.

3. Development Strategy

Agriculture (with the exception of coca) and ag industry are presently at low levels of activity. The AID project seeks to stimulate productive activity in the Upper Huallaga. Two basic strategies are available:

Case 1: Emphasize environmental modification to accommodate desired production systems.

TABLE 1 - A COMPARISON OF MONOCULTURAL AND HIGH-DIVERSITY CROPPING SYSTEM IN THE TROPICS (DICKINSON, 1972)

	Characteristics	Intensive Annual Cropping System	Agriculture for Wet Tropics
1.	Net Production	High--given heavy fossil fuel subsity.	Moderate--but sustainable indefinitely.
2.	Dietery Contribution	Low--complete diet dependent upon assembly of food from spatially dispersed monocultures at considerable cost.	High--complete energy, vitamin, and protein from a variety of cultigens and animals at one site.
3.	Species Diversity	Low--generally devoted to a single variety of breed.	High--both in total and number of individuals of each species.
4.	Space Utilization	Poor-single strata frequently with bare earth unoccupied by photosynthetic material.	Excellent--three--dimensional space largely filled by plants adapted to direct and diffuse light.
5.	Inherent Stability	Low-dependent upon the fossil fuel economy for nutrients and chemical and mechanical control of outbreaks of host-specific pests and diseases.	High--competitive exclusion of weeds by diverse food plants, avoidable of pest epidemics through diversity of host plants. Analogous to natural systems.
6.	Nutrient Cycles	Open--large proportion of all nutrients applied to crops is lost seasonally to leaching.	Tight-minerals lost by early successional annuals taken up by perennial crop plants. Detritus cycle well developed.
7.	Economic Stability	"Boom or Bust"--with optimal environmental and market conditions and large investments of cheap fuels, high yields and profits are possible. Vulnerable to environmental stress and market fluctuations beyond the farmer's control. Labor requirements highly seasonal. Tendency for mechanization to replace human labor.	High--variety of food produced for region or national consumption assures a market for some crops. Flexibility to switch plant energy flow from direct marketing to increased animal production is practical. Low capital investment makes subsistence on a quality diet feasible. Yield can be programmed throughout the year, as can labor input.
8.	Social Viability	Volatile--economics of scale tend to concentrate management decisions, production and profit in the control of a socio-economic elite.	Emphasis on the direct involvement of small scale farmers in ecological and economically viable systems of quality food production. Low ratio of land-owning managers to agricultural laborers.

Case 2: Adapt to the innate productive capability of the environment and force change in the industrial economic sector.

In the first case significant change in human behavior is implicit. All participating farmers must change and learn to manage new crops, technology, machinery and chemical inputs. In the second case some farmers are or have in the past, managed adapted crops without benefit of auxiliary inputs, credit or marketing assistance. The natural forces driving the regional system-insolation, rainfall, and temperature cannot be changed nor can the physical and ecological processes and limitations deriving from those forces be changed.

Crop production strategies which must be maintained in spite of these natural forces are inherently unstable and expensive. In contrast fomenting change in ag industry, marketing, infrastructure, etc.,is independent of the physical/ecological environment and involves application of existing or transferable technology. Therefore, it is the position of the EA team that priority should be given to the processing of adapted crops for the national/international market. These include the already mentioned yucca, palm (oil, nuts, fruits), plantains, bananas, cacao and other appropriate tropical fruits. Furthermore, the management of natural forests for sustained yield of raw material for forest product industries such as Mapresa is a good example of an appropriate Case 2 strategy.

In contrast, a Case 1 strategy such as the double-purpose livestock proposal requires a series of special conditions such as road accessibility and farm location and considerable investment for a milk processing plant that are long-term commitments to land use and specialize infrastructure. Once these policies are established, there is the tendenc to continue subsidy of livestock production in order to justify milk plant production goals and original investment strategy, even though it is recognized that livestock production is economically marginal in the wet tropics, and environmentally unsound for the majority of the area.

C. Issues to be Resolved

Introduction. The EA has analyzed and described the existing environmental setting and a land capability mapping system has been developed and applied to one of the five development zones of the project area. Conceptual cropping systems have been proposed as an environmentally sound alternative.

An environmental assessment normally is applied to a fully developed draft plan. The proposed actions are evaluated and alternatives discussed. In the case of the Upper Huallaga project, the timing of the Project Paper preparation coincided with the period devoted to the Environmental Assessment. As a result the EA team did not have a firm set of proposed actions to evaluate as envisioned in AID's Regulation 16. Thus, the EA team proposes that the environmental management approach developed in the assessment which is designed to become an integral element of the project be implemented in the area. However, to insure that this integration is effective, it is recommended that a periodic review process and an adaptive research and training program be incorporated in the project budget.

The following recommendations will provide a substantive basis for assuring that the environmental sciences make an effective contribution to the area development project. If these recommendations are not followed, the project will not achieve the production objectives and serious deterioration in the human environment can be expected.

1. Special Project Office

The Special Project Office is the point of contact between extra-regional interest AID, Ministries, etc., and the implementation of the development effort in the Huallaga Valley.

Training at the Special Project Office level should include the use of a workshop and/or less formal seminar-session to create an understanding among the Office staff of the project goals, proposed activities, and the overall environmental management approach to integrating land capability analysis, with economic agronomic feasibility studies. Such a workshop should include an input from AID staff, the Environmental Assessment group, and selected outside experts with extensive experience in similar regional projects.

The initial orientation training should be followed up by quarterly progress review/trouble-shooting by a small group representing the original team. Responsibilities of this group would be to:

a. Review the evolution of the project in the context of the goals and objectives of the original Project Paper and Environmental Assessment.

b. Provide counsel in adjusting both objectives and implementation plans to accommodate the realities encountered in project execution.

c. Evaluate the results of training and research and make recommendations for incorporating new ideas and experience in project implementation.

d. Recommend both follow-up and new training and research as appropriate to meet future needs.

Specific responsibility within the Special Project Office should be assigned for the development and evaluation of non-conventional innovative technology, crops and management. Such a program should be adequately funded to permit funding of experimental plots, pilot plants, acquisition of materials and literature and the hiring of consultants. Activities could include:

a. Adaptation of solar or wood fired crop driers for cacao and other crops.

b. Development of small-scale hydro-electric projects to serve local energy needs.

c. Screen and test palm varieties suitable for intensive palmito production.

d. Establish several experimental fish ponds using crop residues and other non-marketable surpluses.

2. Land Capability

At the regional scale it is recommended that the land capability mapping approach applied to Zone 1 be continued for the remainder of the project area and used as the basis for locating and assisting appropriate land use. It is further recommended that this capability assessment and mapping activity be conducted as an interdisciplinary training workshop for professionals from the Special Project Office, the Ministry of Agriculture, ONERN and the universities. In support of this and other activities it is essential to have adequate photographic coverage and land use/covers mapping.

3. Environmental Management

After a period of six to nine months of project evolution a combined workshop/field course of three to five weeks duration is recommended with the following objectives:

a. Train decision makers in the application of environmental management concepts and methodologies to the specific case of the Upper Huallaga project.

b. Provide feedback to the AID Mission and the Special Project Office on the status of the project.

Such a course would be primarily for decision makers at the sector level directly associated with the project. Participants from other AID projects and from institutions such as ONERN should be included up to a total of no more than 20 people. The output of the course would be a report which would serve as an assessment for guiding environmental management in the second year of project implementaion.

The type of course envisioned was developed in conjunction with an OAS funded regional development project in Venezuela.

4. Reconnaissance Survey

Although the valley and piedmont have been massively affected by more than four decades of settlement activity in the area there remain three significant habitat types which are virtually undisturbed (except for coca). These include:

a. The steep and inaccessible slopes of the mountain ranges which flank the Huallaga Valley.

b. Isolated limestone outcrops within the valley.

c. The aguajales occupying poorly drained depressions in the valley.

These areas should be the subject of a reconnaissance survey to ascertain their: (1) ecological function within the regional system; (2) any non-lumber resources present; (3) presence of unique or rare and endangered flora or fauna. The team should recommend appropriate management practices.

Of the three, the first area of steep and inaccessible slopes should receive immediate attention because of the actual process of invasion and clearing underway and the likelihood that the eradication effort will exacerbate the process.

5. Fisheries

The fishing resource of the Huallaga and its tributaries represents a significant but poorly understood resource. A small team of international and Peruvian experts in aquatic ecology and fisheries should evaluate the river system in terms of: (1) defining the ecology of riverine fisheries; (2) assess the actual and potential fishery productivity; (3) factors currently limiting production; and, (4) recommendations for management.

6. Training in Herbicide Use

A training element should be incorporated in the herbicide use aspect of this project for at least those in supervisory capacity. In addition to training in the general area of pesticide safety, there should be subjects covered which are specific to this program. These include a knowledge that: (1) 2, 4-D will damage non-target broadleaf plants if misapplied; (2) effective basal treatment requires adequate coverage and placement of the herbicide; (3) unused material must be disposed of properly; and, (4) herbicide sprayers must be properly cleaned before using insecticide in them.

7. Herbicide Research

There are two important questions which are at present unresolved and should be addressed. Both are of importance to the environmental assessment and require research. First, the minimal effective herbicide rate (pounds of active ingredient per 100 gallons of kerosene) is not known. In order to introduce only the minimum amount of 2, 4-D into the environment, these data are needed. Secondly, the extent and rate of 2, 4-D absorption should be determined. When plants are treated basally with the herbicide, several days elapse before the plants actually die. During the interval between herbicide application and plant death, the valuable leaves could be harvested and subsequently utilized by humans. At present, the quantitative presence of 2, 4-D translocated into the leaves, as a function of post--treatment time, is not known. Research is presently being conducted to answer this question. If this research indicated unacceptable levels of 2, 4-D within the leaves of treated plants, then an alternative method of control must be utilized.

8. Adaptive on-the-farm research

At the beginning of the Upper Huallaga Development Project, an adaptive on-farm research program should be established to assist in the technology transfer between experimental research and local farmers. The purpose should be to increase on-farm net income taking into consideration, the farmer's ability to absorb new technologies and to incorporate current cultural and management practices into a stable sustained yield agriculture. The research scope needs to consider cropping schedule, fertilization rates, weed and pest control, levels of mechanization, improved harvesting, handling, and processing of intensive annuals as well as agro-silvicultural adaptations for permanent crops and pastures. In appropriate areas,small animal production should be included in the farm system, utilizing crop residuals and agro-industrial by products. Charcoal production, harvesting of aguaje palm, planting of pejebeye palm are areas in which there is little local experience, but are worthwhile considerations in improving level of income and utilization of natural resources. Review of the economic/ecological analysis of appropriate land use should also consider consequences and alternatives for farmers when external subsidies and government incentives are withdrawn. In particular, on-farm experience will help in determining viable production systems that are best adapted to areas of the wet tropics (i.e. economic return and ecological limitations of livestock production vs. agro-silvicultural systems in areas of sloping soils).

For maximum technology transfer, it is recommended to establish demonstration farms on private lands rather than next to existing experiment stations. Where appropriate, the project could subsidize farmers by paying for labor and materials while the farmer would receive the harvested products. Furthermore, the demonstration farms will serve as a focal point for neighboring farmers. Field days and special training courses for extensionists should be scheduled as an integral part of this program.

The adoptive research team should include personnel trained in soils, forestry, ecology, fruit culture, crop and animal production. A model approach could be the recently developed on-farm research and extension program directed to small scale farmers that has grown out of the N.C. State Yurimaguas Tropical Soils project.

9. Small Farm Systems

It is strongly recommended that an integrated ecological economic and socio-cultural approach to small farm systems be utilized in orienting adaptive on-farm research, extension and for determining optimum farm size and management programs. The most advanced work in this field has been done by Dr. Robert D. Hart now with Winrock in Arkansas.

An appropriate approach would be to develop a field course in small farm systems as follows:

a. One-week field reconnaissance by the course team and the professional responsible for small-farm work in the Special Project Office.

b. A six week field course/workshop with the twin objectives of (a) training professionals in the approach and (b) producing a technical and policy document for guiding small farm development during the project.

10. Review of Past Colonization

Peru's colonization of the high selva has been going on for over 25 years with generally poor results. Numerous resettlement projects in the extremely wet areas of the Upper Marañon, Puno, Cuzco, Madre de Dios and similar areas have not taken the ecological constraints into consideration in their approach to selecting appropriate development strategy. Failures are generally blamed on lack of infrastructure, credit, extension, markets, and roads rather than on fragile poor soils, high rainfall and uncontrolable pest and weed problems which limit conventional agriculture. Parts of the Upper Huallaga were originally colonized spontaneously in the 1940s and then under directed colonization with BID funding in the late 1960s accompanying the proposed construction of the marginal highway. With the exception of coca production and adapted crops such as cacao, bananas and coffee, it would be difficult to identify successful elements of an economically viable agriculture.

The proposed AID project has the opportunity to either improve on past experiences and contribute to overall regional development or repeat the mistakes of the past and obligate farmers to remain at a subsistence level. Consequently, it is recommended that a review of past colonization schemes in the high selva be conducted simultaneously with project implementation. Likewise it is recommended that investment be scheduled in short increments so that changes in policy can be incorporated in the execution of the project.

Such a review should be conducted by an interdisciplinary team with extensive tropical experience consisting of:

Crop ecologist
Soil scientist
Animal production expert
Terrestrial ecologist

Systems ecologist
Agricultural economist

Drawing on available literature, field reconnaissance and in depth interview with both technicians and colonists, the project should have as an explicit goal the output of a policy document on ecological factors in the sustained productivity of high jungle colonization.

II. INTRODUCTION

Environmental management implies the optimization of the sustained contribution of all components of the human environment to the development process. This includes the agricultural components contribution of food and fiber, goods and services from natural ecosystems, including forest products, fish and watershed protection, and the activities of the urban-industrial sector. The integrated development of the Upper Huallaga Valley requires a systems perspective ranging in scale from the economic and administrative relationships with the rest of Peru, through integration of diverse activities within the region to providing research and extension support to the individual farmer. Achievement of this integration will require a coherent, vertically integrated support effort by the AID Mission.

A. Project Objectives

The Upper Huallaga Area Development Project has the objective of developing economically viable agricultural alternatives for the people living in the Upper Huallaga valley in conjunction with a GOP program to eliminate illegal coca production in the project area.

Specific activities include:

Aerial photography and mapping	Storage
Cadaster and land titling	Forestry
Road maintenance and construction	Resource studies
Credit (agriculture and Ag Industry)	Technical assistance
Machinery	Applied research
Extension	Administration

B. Environmental Assessment Purpose and Methodology

The EA addresses those activities which directly affect the human environment or whose economic viability is affected by ecological or physical processes operative in the project area.

The analysis focused principally on coca eradication and agricultural development with secondary consideration of infrastructure (roads, agro-industry, and small hydro development). Investment in road maintenance and upgrading was considered to have little potential for affecting the productivity of the environment.

- Purpose: The purpose of the EA is to contribute to the optimum sustained development of area by bringing to bear a systematic interdisciplinary analysis by environmental scientists. Disciplinary areas represented on the EA team included:

Systems and Life Zone Ecology
Geomorphology
Hydrology (including ground, surface, and waste water)
Forestry
Soils

C. Limits and Scale of Assessment

Because of the limited time available, less than one month, the EA was directed toward the Priority Zone with analysis in the greatest detail possible. General statements have been extrapolated for the rest of the area. No land use planning can be done until further mapping is carried out. The scale chosen for the land capability mapping was 1:50,000. At this semi-detailed level, it is possible to locate and measure areas of different potential uses of the land. On-farm planning would require more detailed mapping. However, it is possible to evaluate the overall potential of farm production and establish potential mixes of land use. The scale is particularly useful for locating least-cost routing for roads.

D. Description of Date Base

Aerial photography for the area is still incomplete. Effective use was made of 1962 photos at a scale of approximately 1:60,000 covering the priority area. Soils maps at a large scale, 1:10,000 and larger, were available for the parcelized area. Using these maps, combined with earlier small-scale material from a 1962 study, it was possible to classify soils. Available Life Zone mapping was refined based on geomorphic data generated in this project.

III. EXISTING ENVIRONMENT

A. General Characteristics

1. Climatology

Moist air masses move westward accross the Amazon basin until they encounter the Andes, which forces them aloft causing orographic precipitation. The Cordillera Azul on the right bank of the Huallaga is the first mountain barrier these air masses meet as they move westward, and the foothills of the Cordillera Central on the left bank of the Huallaga are the second mountain barrier.

The Huallaga Valley itself, actually lies in a rain shadow created by the Cordillera Azul, with the intensivy of the "shadow" effect dependent on the changing topographic relationships between the two mountain chains and the changing elevation of the Huallaga Valley floor. Total rainfall tends to decrease moving downstream along the Huallaga River, as summarized below:

Town	Elevation	Average Annual Rainfall
Tingo Maria	670 m.	3325 mm.
Tulumayo	670 m.	3165 mm.
Aucayacu	650 m.	3014 mm.
La Morada	542 m.	3215 mm.
Tocache	450 m.	2408 mm.
Yurimaguas	184 m.	2110 mm.

The seasonality of rainfall is illustrated in Fig. 1 for three stations on the banks of the Huallaga River. Of particular importance is the difference in the amount of rainfall during the dry season (June-September) between the various locations.

Figure 1 also shows two types of information on evaporation. The dashed line is the potential evaporation by climax vegetation on a zonal soil, as computed from average temperature using the method of Holdridge (1967). The dotted line shows the average of Class A pan evaporation data from Tingo Maria.

Both the lowest and highest average temperatures in the Upper Huallaga Valley occur during the southern hemisphere winter. The reduced cloud cover during the dry season is the factor explaining high average temperature during the winter months.

In 10 years of rainfall data collection at La Morada (annual precipitation 3200 mm.), the largest 24-hour precipitation was only 120 mm. and occurred in the month of September. By comparison, in areas of the tropics affected by hurricanes, values of 24-hour precipitation in excess of 300-400 mm. are common once in a 10-year period. As previously shown in Appendix B, occurrence of large rainstorms (over 80 mm.) is distributed relatively uniformly throughout the year. Thus, it appears that although some periods of the year are more prone to flooding than others, there is in fact no season which can be said to be safe from flood hazard.

2. Hydrology

a. River Flow. Only one complete year of flow data for the Huallaga River at Tingo Maria is available, summarized in Fig. 2.

Residents report that portions of the valley floor, and the runway of the Tingo Maria airport, are inundated every several years. No other information is available on flooding.

PRECIPITATION & EVAPOTRANSPIRATION (mm/month)

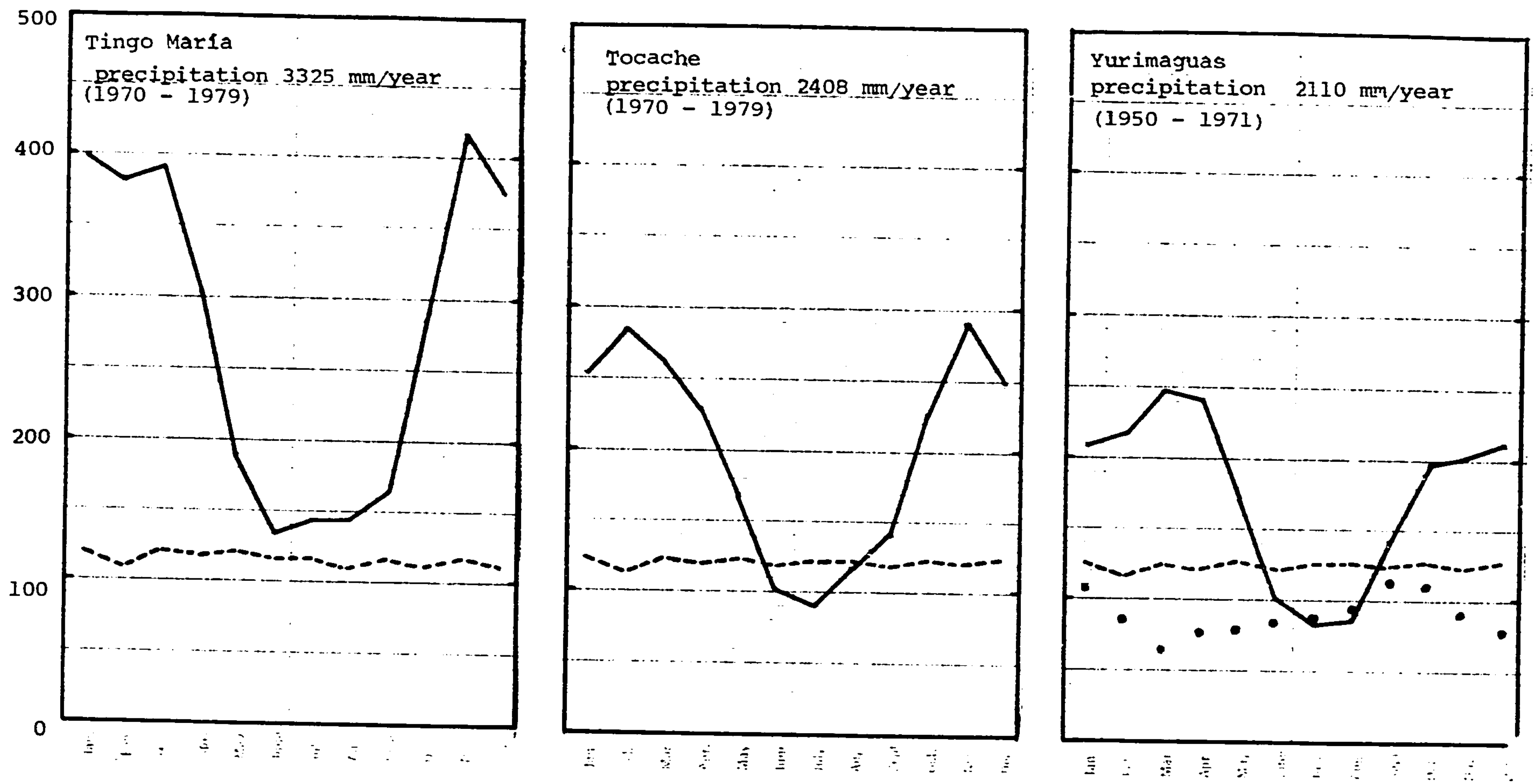

Fig. 1 : Comparison of average monthly precipitation (solid lines) and evapotranspiration (dashed lines) at Tingo María, Tocache, and Yurimaguas, Peru. Dots show measured pan evaporation at Yurimaguas, 1978 - 1979.

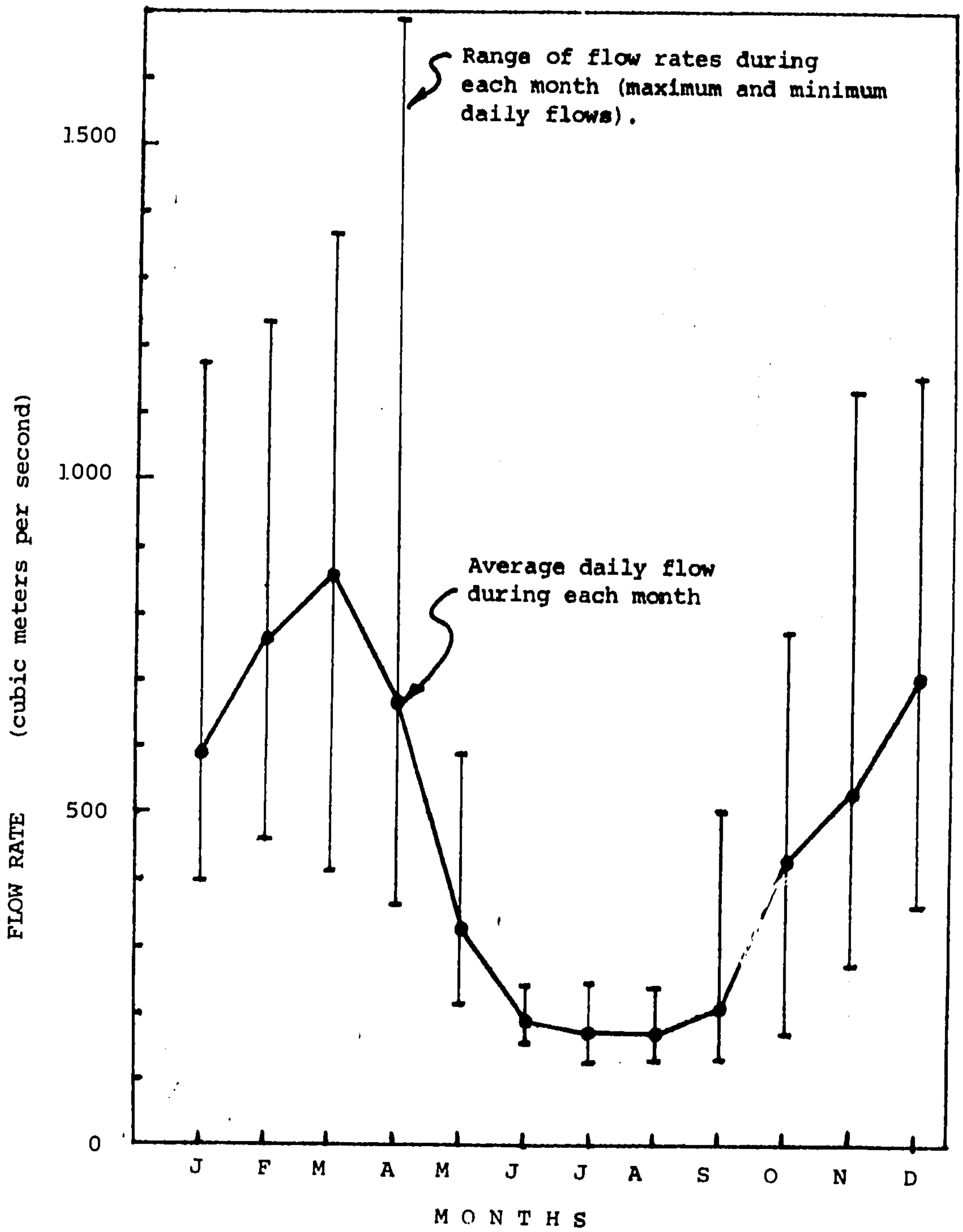

Fig. 2 . Measured flows of the Huallaga River at the Tingo María bridge for calendar year 1981, showing average daily flow and the peak and minimum daily flows which occured in each month. Source: Ministry of Agriculture and Nutrit Tingo María.

b. Groundwater. Because of the high rainfall, the groundwater table is probably above the river level throughout the valley and subsurface waters drain to the Huallaga River throughout the year. In many areas the water table is continously above the land surface; these areas of continually saturated and submerged soils are characterized by the presence of the aguaje palm vegetative association. Areas of continually standing water appear to be above the normal river level, with their formation being due to restricted surface drainage. A schematic diagram in Fig. 3 illustrates the hypothesized relationship between surface features and groundwater levels in a transect of the Huallaga Valley. However, until accurate topographic surveys can be conducted this hypothesis cannot be verified.

3. Geomorphology and Soils

A geomorphological map (Scale 1:50,000) was prepared based on data from a previous colonization project (SCIF,1962) in combination with 1962 aerial photographs and ONERN soils data. Detailed analysis of geomorphological units including a map and pertinent soils data is included in the appendix (see Aubert report and Bao report). Table 1 in the appendix briefly summarizes the characteristics of the geomorphological units that have been used as a basis for land classification.

4. Ecological Life Zones and Associations

The life zone system (Holdridge, 1967) quantitatively defines the relationship that exists between natural vegetation and climate integrating the principal climatic, edaphic, hydrographic and geomorphological factors. One of the practical values of the life zone system is the possibility of identifying zones based on visual observation of the physiognomy of the vegetation, flora and fauna,and growth conditions of natural forests. In the absence of meteorological data, actual land use, soil characteristics, cultivated crops, and location of human settlements assist in definition of life zones.

The Project area consists of five life zones including transitional zones, all of which are classified as humid or perhumid (ONERN 1966). Humid climates are characterized as areas where evapotranspiration is 50% to 100% of the total annual precipitation; in perhumid climates, the evaporation is only 25% of the total annual precipitation.

In practical terms the Upper Huallaga area has high rainfall and run-off because only part of the rain can be absorbed by the vegetation or percolated in the soil. This constraint should be considered in the planning of cropping and animal production systems in the proposed development project. Details of life zones and limitations to proposed forestry and agricultural projects are found in the Annex.

Within a Life Zone there may be a number of associations due to special edaphic, hydric, geomorphic or climatic variation from zonal conditions. Mapping of associations is based on bio-climatic data, parent material and major land forms distinguished in aerial photographs and

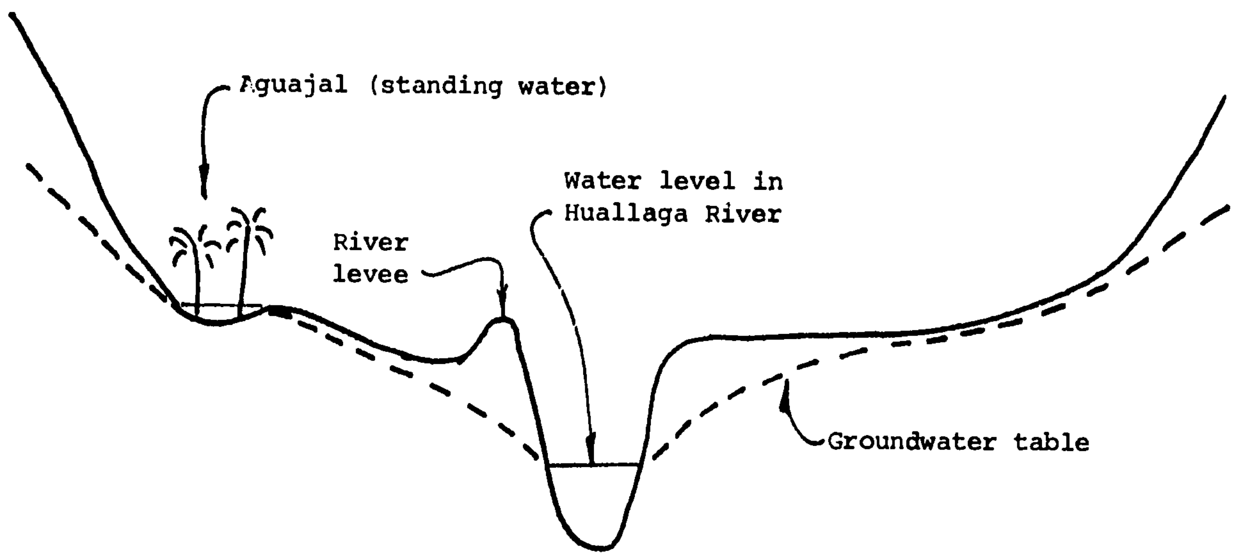

Fig. 3 : Hypothetical transect of Huallaga valley showing the hypothesized relationship of groundwater level to surface features of the landscape.

topographic maps. The associations of the study area, mapped at the scale of 1:50,000 are based on geomorphic, edaphic and hydric conditions. (See Annex for more detailed descriptions).

Once the physical relationship that distinguish the associations of each life zone are established, a land use capability map can be prepared. This map can then be utilized as a tool in orientation, planning and implementation of proposed forestry and agricultural development activities. In addition, the following predictions can be utilized for planning regional development.

a. The sustained use capacity of the land.

b. Species adapted for cultivation, soil conservation needs, fertilization, cropping production systems, scheduling of land preparation and planting, insect and weed control.

c. Management of adapted pastures and livestock, disease control, carrying capacity and probable economic yields per unit land area.

d. Adapted tree species including fruit and timber species; management practices, and potential yields.

e. The silvicultural techniques of harvest and extraction of natural forests.

f. Indications about the management of watersheds, forests, and other types of protective vegetation; wildlife management including the limits to the exploitation of fish and animals.

g. Infrastructure-environmental problems that may result from construction of roads, houses, towns, dams, hydroelectric plants and potable water systems.

h. The economic and social potential of each association for human settlements that include agriculture, forestry, fisheries, industries; development priorities, and the best alternatives to induce the desired change.

5. Environmental Sanitation

The Upper Huallaga Valley lacks basic sanitation facilities in both rural and urban areas. The problem in the outlying areas is worse than in Tingo María, which has a municipal water supply system (from groundwater) and a sanitary sewage collection system which serves the urban area. However, the collected sewage is discharged to the Huallaga river without treatment.

Approximately 20% of all deaths in the priority zone is attributable to diseases associated with poor sanitation practices (dysentery, gastroenterities and parasites).

Pre-school and school-age children constitute the group most severely affected by health problems. Malnutrition is estimated to affect 60% of the children in the area and is normally accompanied by anemia, intestinal parasites, and gastro-intestinal infections.

Existing Sanitary Practices.- Throughout the rural areas the primary source of drinking water is surface streams. These streams are readily contaminated with human fecal material due to lack of latrines. or latrines which are improperly constructed or located near water supplies Other sources of fecal contamination include dogs and livestock. The sewerage systems in Tingo María, and systems planned for other towns will worsen the sanitary condition in the Huallaga river by collecting a large volume of waste and discharging them untreated directly into the river.

Several small industries are located in the Upper Huallaga area, and focus principally on processing of local raw materials (lumber, lime-calcining, palm oil extraction, etc.). However, the small size of these industries and the characteristics of their waste flows suggest that the existing waste flows do not constitute a significant environmental hazard, and are not a threat to public health.

6. Transportation

The four major means of transport in the region are: (1) paved and unpaved roads; (2) scheduled and charter commercial aircraft; (3) river navigation; and, (4) footpaths.

Roads.- The Central Highway crosses the Andes linking the Amazon basin, the Andean Altiplano, and Lima. This all-weather road, which passes through Tingo María, should be entirely paved within the next year. It is the principal means of transport between the Huallaga Valley and other regions of Peru. Travel time from Tingo María to Lima is approximately 10 hours by automobile and approximately 20 hours by truck.

There is not yet a road linking the northern most city in the project area (Campanilla) to the road connecting the more northern towns of Yurimaguas and Tarapoto with Chiclayo on the coast. Completion of this link will greatly shorten the travel time between Lima and the northern Huallaga Valley.

The basic highway infrastructure within the project area consists of the Marginal Highway from Tingo María to Campanilla and a series of feeder roads. The Marginal Highway is paved only between Tingo María and Aucayacu; the remainder, as well as all feeder roads, consist of improved or unimproved dirt and gravel surface in various stages of maintenance.

Air Transportation.- The Tingo María airport has a gravel runway approximately 2100 m. long and 50 m. wide. There is a daily jet service to and from Lima and twice-weekly service to Tarapoto. Two single-engine charter aircraft are based at the Tingo María airport. 1/ Grass runways at Tocache and Uchiza are authorized only for use by light aircraft and commercial craft such as the DC-3.

River Navigation.- The Huallaga river has intermittent rapids upstream of Tocache and an average velocity of three knots, making it suitable for use only by smaller craft (dugout canoes with outboard motors). Use of the river transportation is very limited; it is more significant as a barrier to surface transportation.

Footpaths.- Many farm sites, and particularly the coca farms, are remote from either roads or river; they are accessible only on foot. Additionally, some farmers cannot afford the cost of vehicular freight and transport their produce along existing roads on their backs. Human portage remains an important form of transportation within the zone. Virtually no utilization of beasts of burden was observed during field visits to the area.

B. Regional Components

1. Agriculture: Existing Conditions

Agricultural conditions in the Upper Huallaga can be summarized as follows:

a. The level soils of the valley are cultivated primarily in permanent crops (bananas, citrus, pastures), or have been abandoned to natural forest regeneration. Exceptions to this pattern are found where small areas of fertile soils are intensively devoted to annuals such as rice, corn, and beans. In contrast, the sloping soils of the surrounding terraces and hills are cultivated in a patch-work pattern of annual and perennial crops (including coca), and natural forest. Further east and west away from the Huallaga River Valley floor, steeply sloping soils remain predominantly in forest cover. The farms in this zone focus on coca production, since their remote location makes transport of low-value food crops uneconomical. Remote location also reduces the risk of police intervention. Subsistence crops are often, but not always, planted on these remote farms.

b. The more fertile and level alluvial soils have already been occupied through the original land titling scheme. Production within the original colonization area can be intensified by introducing intermediate level technology which includes small machinery, fertilizers, and pesticides. Further, sub-division of existing lots would reduce farm sizes

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1/ As this report was in preparation, one of these aircraft was lost when it crash landed in the Huallaga river after losing its propeller.

to an uneconomic level. A more realistic approach to the land tenancy problems would be to facilitate the land transfer process permitting acquisition and/or consolidation of land holdings by bonafide farmers.

c. It may be necessary to redefine some farm boundaries to establish economic units. Farms are presently delimited by straight block-shaped boundaries, and may include poorly drained, nutrient poor, or sloping soils rendering the farm unit uneconomic.

2. Description of the Agro-ecosystems

a. Shifting Cultivation

There are numerous small farmers cultivating 3-5 ha. in the traditional system of shifting agriculture. Those farmers who obtain land title usually move quickly to permanent crops such as cacao, coffee, bananas, and citrus after the initial forest clearing. Typically yields are not very high due to limited fertilizer application, however, costs are also low. The dooryard subsistence crops and small animals, including guinea pigs, ducks, chickens, and pigs, augment the family diet, whereas a combination of annual and perennial cash crops are marketed in Tingo María or to truckers. This type of farmer is a survivor and has adapted this cropping pattern to the natural environment as well as the local infrastructure of markets, labor supply, credit availability, etc.

b. Small-Scale Farm

A few farms generally 5-20 ha. in size are situated on level fertile soils. These farms focus on the intensive cultivation of rice, corn, and some soybeans and require a higher level of management than the shifting cultivator. Careful management of drainage problems, soil compaction, and weed control is necessary on these intensely cultivated farms. In addition to the annual crops which are the principal source of income, this group of farmers also produces permanent crops (coffee, pantains, cacao) for sale and small animals for domestic consumption. This group of farmers could capably incorporate new intermediate level technologies to present operations and expect favorable increases in net return.

c. Livestock Farmers

The livestock producer has pasture ranging in areas from 15 to 40 ha. Unfortunately, numerous pastures have been situated in low areas with a high water table and poorly drained soils. Poor pastures and consequently poor animal production seem to be a frequent complaint of these livestock producers. In the entire project areas there are an estimated 23,265 head of livestock and approximately 31,000 ha. of pasture, with 80% of the pasture areas in native grasses (torouco) (FDN, 1981). Carrying capacity of pastures is estimated to average less than one head per hectare.

d. Cocaleros

Coca is a perennial shrub which is grown on sloping soils with good drainage throughout the Upper Huallaga area. Because of the illicit nature of much of the production, it is difficult to characterize the coca farmer. Information from farmer interviews is unreliable concerning this crop, and local government officials have diverse opinions concerning the true ownership patterns of the cocaleros. It appears that within the area subdivided and titled as the result of previous colonization projects, the coca yields belong to the title-holder. However, most of the coca is produced on non-titled lands. On the basis of interviews with local government officials it appears that there is a high proportion of absentee ownership of these coca plantings; the crop being tended by hired labor.

It has been estimated that 30,000 ha. of coca is planted in the Upper Huallaga area (Strug, 1981; USAID 1978; FDN, 1981). Virtually all of this production occurs on sloping soils (Table 1). Only occasionally is the coca interplanted with other crops, with tree crops (e.g. oranges) being planted in coca fields which are being withdrawn from production. The opportunity for introducing other crops in fields which have been in continous coca production for a number of years is constrained due to the tendency of coca cultivation to deplete nutrients on soils which are naturally very poor. Erosion was observed on steeper sites.

Coca producers within the areas of titled land parcels tend to plant coca as part of a diversified farming system. On the other hand, farms which are more remote from the road and which are not on titled land appear to plant coca as a monoculture, with only limited production of subsistence crops for household consumption. Reliable information on the ownership of these numerous remote coca farms is not available. They may be second operations run by farmers in the original colonization scheme; they may be financed by "opportunists" from the local commercial sector or from outside of the region, or they may be privately operated by former landless laborers.

3. Forests

Extraction of high value hardwood species has been going on in the Upper Huallaga Valley since the Huanuco-Tingo María-Pucallpa highway was built in 1938-40. The lumber industry continues to be the most important activity in the Pucallpa area and to a lesser extent in the Tingo María area. However, the past impetus in the Huallaga Valley took place with the building of the marginal highway, and the feeder road network, northward along the Huallaga Valley from Tingo María to Campanilla. At present there are 29 sawmills in the valley. Several sawmills are on the verge of moving northward, waiting for the marginal highway to open up new areas between Campanilla and Juanjui.

The timber activity comes under the jurisdiction of the Forest Service, Ministry of Agriculture. According to the Regional office in Tingo María, the Forest Service has granted 143 permits covering 2,415 ha. and 53 concessions covering 161,930 ha.

A permit can vary from 1 ha. to 1000 ha. and is specifically limited to the selected extractions of certain species. A forest service agent visits the site, estimates the amount of timber to be extracted, and grants a permit from one to six years. None of the 143 permits in the area have been located on a map.

Contracts or concessions, although more formal, vary in size from 1000 ha. to 5000 ha. The interested party prepared a map showing the location and size of the concession, provides an estimate of the amount of timber, by species, to be extracted and indicates the location of proposed logging roads, etc. Again, after an initial visit, the forest service has little contact with, or supervision over, the logging operation. Reforestation is required by law but is not enforced.

Since permits and concessions are granted without benefit of any resource studies, it is not known if they include areas that should remain untouched as "protection forests". Some permits and concessions fall within areas suitable for agriculture, which creates conflicts with colonization supervised by the Agrarian Office.

4. Land Capability - Land Use Management Units.

Soils, geomorphology and life zones were used as a data bank to integrate limitations of slope, soils, and climate. As a result of this exercise a land use capability map was prepared which can be used as a tool for the physical planning of appropriate production systems as well as identifying protection areas.

Annual and permanent crops and pastures can be planted on soils up to 15% slope. Only agro-silviculture practices and permanent crops are recommended for soils with 15-30% slope. Production forests can be managed on slopes up to 50-60% and areas with greater than 60% slope should be permanently protected.

Potential land capability and recommended uses have been classified by the conventional USDA system and by integrating environmental physical, and soil parameters (Tables 2 and 3).

(Maps and detailed description are found in the Appendix)

Table No. 2

Summary of Recommended Land Uses Based on Land Capability

(Prepared by Aubert)

Map Symbol	Recommended Use	Limiting Factor	% Of Mapped Priority Area
A,Ao,Al	Annual crops, or pasture.	No need for land improvement, periodic flcdding is only restriction	18
A2,A3,A4	Annual and Permanent crops.	Soils limited by low fertility, poor drainage and periodic flooding.	19
Cl,C2,C3	Agro-silviculture permanent crops, pasture	Poor soils	7
F, Fl	Production forests, agro-silviculture.	Shallow soils, slopes greater than 25%	27
X,Xl,Xa,Xb	Protection	Slopes greater than 60%, aguajales, lagoons.	29
			100 %

TABLE No.3 CHARACTERISTICS OF LAND CAPABILITY (ONRA - COLONIZATION TINGO MARIA - TOCACHE, 1968, 1969, 1970)

CLASS	GENERAL CHARACTERISTICS	RECOMMENDED USE	PROBLEMS OF SOIL MANAGEMENT
I	Alluvial, fertile, drained soil.	Intensive annuals, pasture	None
II	Land appropriate for annual and permanent crops with moderate limitations. Some of the best soils in the project area.	Rice, corn, soybeans, yucca, jute, platano, cacao, coffee, oil palm, pasture.	Acid and deficient in nutrients.
III	Soils with crop restrictions and erosional risks. Appropriate for permanent crops using soil conservation methods. This class includes lands periodically flooded and appropriate for temporary short-term crops.	Rice, corn, soybeans, yucca, yute, platano, cacao, coffee, citrus, pastures.	Acid and deficient in nutrients, erosion control, susceptible to periodic flooding.
IV	Lands appropriate for permanent crops that need special cropping practices. Low productivity. Slopes 10-50%, with high erosional risk.	Platano, coffee, cacao, citrus achiote, pastures in areas less than 15% slope. Agro-silviculture.	Acid and low fertility. Erosion control.
V	Lands with little erosional risks, but other soil limitation such as rockiness shallow or wet soils.	In humid areas, soils are good for rice. Shallow or rocky soils can be used for pastures.	Drainage, utilize adapted species.
VII-VIII	Land not appropriate for agricultural production. Steep, rocky inaccessible. Aguajales are included.	Protection forests, collection of aguaje, fruit.	High risk of erosion or water logged soils.

5. Assessment of Proposed Action and Alternative

A. Crop Production Systems

The proposed crop and livestock plan consists of 50,000 has. of annuals and perennials, 12,000 has. of African oil palm and 10,000 has. of pasture to be incorporated during a five year period. Based on incomplete soil studies and other estimates (F.D.N., 1981) there is sufficient land available for agricultural development. (See annex for details).

The estimates of land available for project incorporation have been based on the following constraints:

1. Previous agricultural development projects in Peru have successfully incorporated only 2,000 has. of new lands per year. However, the Upper Huallaga has an infrastructure (roads, government support agencies, etc.) established that will allow for rapid incorporation of appropriate areas if incentives and inputs are available as described.

2. There are over 6,000 farmers in the project area of which an estimated 80-90% will be incorporated in the project at the end of five years. It is imperative that during the first stages of project implementation that appropriate soils, extension, credit and other necessary inputs be well-planned in order to insure the future success of the project. Happy farmers realizing a profit will be the best promoters of an agricultural development program.

3. Future development is limited by the existence of land parcelization. The land tenancy policy of the project areas must be liberalized in order to give the landholders the freedom to buy, sell or exchange their lands.

4. Several thousand farmers are operating outside the parcelized area without land title, access to credit, assistance or transportation. Many grow coca. Their agricultural productivity and well-being is of critical importance because they will be most severely affected by coca eradication.

Crop Selection

Crops that are ecologically adapted and economically beneficial under existing conditions in the Upper Huallaga include rice, cacao and plantains and to a lesser extent African oil palm. Additional annual crops and permanent tree crops are and will be planted, but are either subject to fluctuating markets or have not been proven commercially. Portions of the proposed crops are already established and require upgrading and maintenance (cacao, coffee, citrus) while the widespread planting of rice will be established for the first time on abandoned or under utilized lands.

Soybeans and peanuts have been recommended as rotational crops with rice, but these are recently introduced crops that have little commercial experience especially in the high rainfall areas of the Upper Huallaga. Since harvesting of either soybean or peanuts requires a dry-season, these crops may be more successful if planted further north toward Tocache. Jute may be considered as an alternative rice roration crop.

Additional crops that were not considered in the preliminary analysis but are adapted to the existing ecological conditions and should be considered include pejebeye palm (heart of palm and fruit), Euterpe palm, aguaje, citrus, and other tropical fruits.

Based on ecological constraints, project goals, and existing socio-economic conditions the following guidelines should be considered:

1. Initiate the crop production plan in the priority zone until more detailed information is available to locate appropriate livestock producing areas.

2. Emphasize rice, cacao and plantains before encouraging implementation of non-tested or non-commercial crops.

3. Include non-conventional crops (i.e., palms) and small animal production in the adaptive on-the-farm research program.

Major Crops

The proposed cropping plan is divided into major and minor crops. With the exception of soybeans, major crops are categorized as ecologically adapted, marketable, and currently produced in the area.

Caution is needed in planning the crops to be rotated with irrigated rice. Although corn and soybeans could both serve as rotation crops, high rainfall could limit soybean production due to the lack of a definite dry season for harvest and drying. Further north, in Tocache where the rainfall is less than the priority zone, soybean may be more successful.

Currently an estimated 250 ha. of soybean are produced in the Upper Huallaga (Fullerton memo, May, 1981). Furthermore, farmers interviewed said they would consider producing soybeans if there was a ready market. Consequently, before planting large areas, further information is needed concerning markets, and the feasibility of constructing an oil extraction plant and related facilities for preparation of soya-based foods.

Cacao is highly adaptable to the climate and soils of this area and is one of the permanent crops to be encouraged in the project. It is already widely planted in the area and is a highly marketable product.

When grown under partial shade, cacao requires less intensive management and less fertilizer. In the Upper Huallaga high timber species, pejebeye palm, and/or leguminous native forest species can be used for shade. Present yields in the area are approximately 400 kg/ha; with improved management, yields could be expected of 800 kg/ha. Fermentation is the most important step in processing high quality chocolate, according to Dr. Pablo Alvim. Before drying, wet beans require five days of fermentation. Local practice is only to ferment for three days. Considering the high cost of fossil fuels, wood burning fueled driers need to be considered for this project. This type of drier is currently used in Brazil.

The production system for the major crop should include low to medium level technology such as extension and credit, for existing farmers. The target group will include a large number of small (10 ha.) farmers and to a lesser extent larger farmers (50 ha.).

Technology might include small tractors and related equipment in the 14-25 Hp range which are readily adapted to small scale operations and currently being tested by farmers near Yurimaguas. Project planning should avoid promoting government administered machinery pools and encourage individual farmers to purchase their own machinery and operate in cooperation with neighbors.

Minor Crops

The minor crops can be grown in the priority area, but lack a steady market before production is initiated on a commercial scale. Citrus. papaya, yuca and other tree crops could be produced on a larger scale if agro-industrialization can provide the outlets. Consequently, production of minor crops should commence in the second or third year of project implementation in order to research market and industrialization possibilities. It is strongly recommended that an adaptive research program should consider non-conventional crops such as pejebeye, aguaje, jute, etc., as potential crops for commercialization.

Integrated Pest Management

Insect, disease, nematodes, and weed pests will require the discretionary use of pesticides if acceptable economic yields are to be obtained. There are two characteristics which might provoke such conditions.

1. Environmental conditions are favorable for pest and disease proliferation.

2. Under the proposed project considerable more lands will be intensively cultivated (in space and time) in a monocultural system as compared to the widely dispersed intercropped, polycultural planting system of shifting agriculture. The more intense cropping systems will only be incorporated at the individual farm unit, but will also form part of the

of the regional pattern particularly concentrated in mechanizable areas of fertile alluvial soils on the valley floor.

Where appropriate, non-chemical control methods will be incorporated into the proposed cropping system to the extent that such technology and experience are available. This would include the use of hand weeding or hoeing, water level management (particularly in rice), and intercropping to control weeds; resistant varieties for plant pathogens and polycultural cropping system which take advantage of natural predators of insect pests.

Pest build up can also be expected in stored grain but can be controlled using fumigants and experience from other grain storage centers in Peru. An alternative to avoid stored grain pests is to immediately move the grain out of the project area after harvest, thus reducing the need for large storage facilities.

B. Evaluation of Livestock Potential in the High Selva

The intensification of livestock production in humid lowland tropics has received much attention since there are large extensions of land available. However, these lands are not necessarily appropriate for livestock production. The constraints to successful livestock in the Upper Huallaga are summarized as follows:

1. Low meat production (150 kg/ha/year) results in marginal economics under even ideal conditions.

2. Degraded pastures due to weed invasion results in poor animal nutrition. The good growth of improved pastures based on fertilization or rapid growth following forest clearing and burning lasts approximately four years. As pasture quality is reduced the carrying capacity is reduced from 2-3 head per hectares to less than one head per hectare. In the Upper Huallaga there are many abandoned fields where planted pasture has completely disappeared and natural grasses (torourco) have invaded the area due to loss of soil fertility or conditions of poor drainage.

3. Grazing in areas of high rainfall results in costly programs of animal health and present potential soil compaction problems.

4. High cost of land clearing and fencing need to be calculated as long term expense.

5. Research results for livestock production from El Porvenir Experimental Station near Tarapoto have been inferred to be applicable to the Upper Huallaga. Growing conditions for livestock and pasture are much more favorable in the El Porvenir area because it receives less than 50% of the total rainfall of the Upper Huallaga project area.

Several livestock specialists have claimed that the pastures in the Upper Huallaga have deteriorated due to poor management including lack of fertilization or supervised maintenance. However, poor animal production and degraded pastures are more likely due to the ecological limitations, primarily the humid environment and poor soils. In conclusion, the project area is not competitive with other meat producing areas with large extensions of natural pastures which have lower costs of production.

Major and Minor Livestock

Livestock: The FDN proposed the establishment of 500 units of 20 has. each to produce double purpose (meat and milk) cattle. The exact location of this 10,000 has. of pasture has not been identified. Should the recommendation be implemented, the areas must be carefully selected in order to avoid soil compaction. Since the Upper Huallaga is extremely wet, areas with steep slopes or poorly drained soils must be avoided. In addition, pastures established on Class II or III soils would be underutilization of the soils resource. The best pasture soils are also those same areas considered for intensive rice production. Consequently, the only appropriate pasture areas are terraces of soils with less than 15% slope. The potential for improved pasture grasses and legumes is largely unexplored in this region.

Further northward toward the Huallaga Central or Tarapoto would be a natural area more conducive for livestock production since that area receives less than 50% of the rainfall that falls near Tingo María.

An additional constraint to livestock production is the criteria that pastures need to be located next to accessible roads since milk has to be collected twice daily.

Pigs, Chickens, Ducks: Although there has been little planning effort to increase small animal production, there exists a potential to utilize by-products such as rice hulls, or excess production of citrus, yucca or plantains. There are two distinct levels of production that need to be considered in project planning. The first is designing a project that will help raise the level of protein in the diet of the small scale farmers. Pigs could be left free to consume yucca, plantains, any household garbage that is available. Likewise, chickens eat insects and rice and corn that is spilled around the patio but do not necessarily need to be fed expensive imported concentrates. Ducks, naturally adapted to wet climates, could live on poorly drained or depressional areas. Any combination of raising a small number of pigs and chickens would improve the diet and any excess production would be sold to neighbors or marketed locally to Tingo María.

The second type of project should consider swine production on a commercial scale utilizing by-products and feeds produced in the area. There has been very little adaptive research on use of pelleted yucca leaves, citrus waste, or rice hulls as a feed source for livestock or small animals.

Expansion of such enterprises will depend on available feeds from crops grown for this purpose; particularly grains, and plantain. It is feasible to harvest plantain used as shade plants in coffee and cacao plantings, for feeding pigs. Enlargement of swine production in the region will depend in part on available markets for pork. Present supply of protein feeds for crops should be increased substantially.

C. Forestry

In the past there has been very little emphasis on natural forest management in the Upper Huallaga. Consequently, the proposed forestry plan should incorporate the needs of the MAPRESA chip board plant and manage those appropriate forest lands for sustained yield production.

In disturbed forest areas agro-silviculture represents an adaptive system which emphasizes the production of high value timber species planted in combination with other permanent crops or pastures in selected areas.

Agro-silviculture permits a sustained economic yield as well as a prolonged utilization of sloping soils subject to erosion and land slippage. The timber can be harvested on 15 to 20 year rotation, while permanent crops, once established, provide a steady income.

Supervised timber extraction and management of natural forests for sustained yield production is considered to be one of the most important economic activities for the project area. Therefore, the recommendations are summarized as follows:

1. Forest Cadaster

The first task will be to identify and map all permits and concessions. In addition, it is important to map those areas that will be utilized for agriculture, wood extraction and protective forests and cancel those concessions and permits that are in protective forest.

2. Forest Service

The regional forestry office needs to be provided sufficient personnel, equipment, vehicles, and funds to control and supervise the logging in the project area. A program of forestry training can be incorporated as an integral part of the environmental managemental management course that will include foresters as well as farmers interested in growing trees.

3. Forest Reserves

Utilizing the resource cadastral information, the project will establish areas for agro-silviculture, plantations and management of natural forests. The sustained yield and management of natural forest should be at least 5000 - 10,000 ha. in area and preferably in a relatively undisturbed area.

4. Feasibility Study

A feasibility study is recommended that identifies priorities for a forest management and protection plan that includes review of permit and concession process, control of lumber movement, alternative uses for unutilized timber, management of natural forest for sustained production and identification of forest protection areas. These findings and recommendations will serve as the basis for the second phase of the forestry investment program.

D. Agricultural Industry

The agro-industrial processing plants proposed for the project area do not pose a significant water or air pollution hazard. The use of oxidation lagoons and or controlled application to wetlands represent low cost solutions to potential pollution problems.

E. Infrastructure

Roads

The project envisions improvements to the Marginal Highway as well as improvement and extension of feeder roads. The primary impact of this road construction will be to improve access throughout the area, which can encourage growth in the number of settlers and also expand the area where settlement and agricultural activities are feasible. To the extent that this settlement occurs on lands of excessive (over 50%) slope which are designated for preservation, this impact will be environmentally detrimental, contributing to erosion, land slippage, and unnecessary reduction in wildlife habitat. Vigilance and enforcement activities, if applied, can limit settlement to areas having suitable land resources, and not identified for preservation.

Because of the high rainfall, particular attention will need to be directed to the provision of adequate drainage across the highway alignment. If accepted design and construction practices are followed, the highway should not adversely affect natural drainage patterns.

Hydropower

Potential hydropower sites on streams flowing into the Huallaga have been located at 16 sites on the right margin and at 9 sites on the left margin of the Huallaga.

The total firm capacity of all 25 sites is estimated at 8939 kw.; only three sites can be developed to a capacity in excess of 1000 kw., and no site can continually generate as much as 2000 kw.

It is proposed to develop these sites to utilize run-of-the-river flow rather than to rely on impoundment. No significant adverse environmental impact is forseen to accompany this hydropower development.

Industries

A variety of industries is being considered for development within the proposed project. These industries may discharge wastes to streams which degrade the environment and impair the quality of drinking water supplies. These detrimental effects should be largely avoided by utilizing inexpensive waste treatment systems such as oxidation pounds.

F. Coca Eradication

The use of 2, 4-D as proposed (basal application) does not represent a significant impact on non-target plants or on man. The logistical problems of transporting the herbicide mixture and the proposed pesticides that will be recommended for substitute crops are discussed in detail in the appendix.

Uncontrolled expansion of settlement and/or agriculture on lands adjacent to the original parcelling will be a source of major environmental impact. Coca eradication will have a dual effect. First, the conversion of land from coca to annual crops or pastures will increase the potential for erosion on marginal sites. Second, the pressure of coca eradication will force farmers who decide to continue coca production to move into even more remote areas where land clearing will have a particularly severe impact on watershed and wildlife.

This problem can be partially mitigated in the case of the non-coca farmers by utilizing the land capability maps as a basis for determining areas suitable for continuous agriculture and utilizing land titling, credit. and extension as an incentive for the concentration of agriculture on the appropriate sites.

6. Environmental Consequences

A. Unavoidable effects

1. If accessible coca is substantially eradicated, coca production can be expected to expand into remote mountains with serious impact on watershed functions and wildlife, scientific and aesthetic values.

2. A substantial increase in pesticide use can be anticipated as agriculture is intensified. Wildlife, fish, livestock and people will be affected due to lack of experience in handling toxic materials. Increased build up of resistant pest populations can be expected resulting in increased pesticide utilization.

3. General intensification of agricultural and forestry activities will result in loss of natural habitat for fauna and increase runoff affecting development downstream.

4. Increased technification of agriculture will result in increased dependence on national and international sources of material and energy inputs.

B. Short-term vs. Long-term Use of the Environment

The major thrust of the environmental management contribution to the project formulation and recommendations has been toward sustained production alternatives. Sustained production forestry has been emphasized as an ideal use of much of the area because of the limitations imposed on conventional crop and pasture systems in the wetter parts of the area. The current practice of giving uncontrolled timber concessions has resulted in long term loss of productivity.

C. Irreversible and Irretrievable Commitments

1. Any commitment to major infrastructure investment such as a suggested milk plant creates a justification for further investment regardless of the actual success of the supporting agricultural activity. It has been recommended that agro-industry be based on proven tropically adapted crops and upon managed natural and planted forests.

2. It has been recommended that the new road construction should be oriented toward areas of good soils to prevent settlement and degradation of marginally productive land.

3. Use of 2,4-D and kerosene in coca eradication represents an irretrievable commitment of non-renewable resources.

D. Conflicts with Plans and Policy

The final plan should be evaluated in terms the effectiveness of its commitment to provide for the well-being of displaced coca growers.

E. Mitigation Measures

1. Coca eradication using a combination of cutting, burning, and kudzu sowing offers a labor intensive alternative to herbicide. Feasibility has not been evaluated.

2. Beyond no action there is no apparent mitigation to potential expansion of coca cultivation into fragile environments under pressure from eradication on accessible sites.

3. Effects of increased pesticide use could be substantially mitigated by (a) applying integrated pest management techniques as recommended in Morrison's report (appended to this EA), (b) utilizing buffer strips along natural and artificial water sources (see Karr reference), (c) improving extension education on pesticide use; (d) maintenance of agricultural diversity and (e) use of adapted resistant crops such as yuca and kudzu.

4. Maintenance of diversity in agriculture and the use of buffer strips will mitigate the impact of land clearing on wildlife.

5. Explicit attention to the use of intermediate technology and adapted agricultural systems can significantly reduce the irretrievable commitment of fossil fuels and non-renewable material resources.

LIST OF PREPARERS

NAME	PROFESSION	ADDRESS
Dr. J.C. Dickinson III	Systems Ecologist - Team Leader	6124 S.W. 30th Ave. Gainesville, Florida 32601
Jean Luis Aubert	Geomorphologist	CIDIAT Aptdo. 219 Merida, Venezuela
Douglas J. Pool	Crop Ecologist	P.O. Box 26 Santa Isabel, Puerto Rico 00757
Dr. Gregory L. Morris	Hydrologist	P.O. Box 5811 Puerta de Tierra, San Juan Puerto Rico 00906
Dr. Joseph A. Tosi Jr.	Land Use Ecologist	Tropical Science Center San José, Costa Rica
Dr. William P. Morrison	Entomologist	Texas Tech. Dept. of Entomology Lubbock, Texas
Victor Grande	Forester - Supervisor of Ecology and Forestry	ONERN Lima, Perú
Raul Bao	Agronomist - Supervisor of Soils and Physiography	ONERN Lima, Perú
Braulio La Torre	Agronomist	Universidad Nacional Agraria La Molina - Perú
Enrique Rossl	Forester	Universidad Nacional Agraria La Molina - Perú

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Road Maintenance

TABLE No. 1

ROAD MAINTENANCE EQUIPMENT LIST

I BASIC EQUIPMENT:

1	ea	Bulldozer	$ 96,000	
2	ea	Motorgraders	120,000	
1	ea	Front loader	60,000	
1	ea	Roller vibratory	48,000	
4	ea	Dump trucks	160,000	
1	ea	Flat bed cargo truck	40,000	
1	ea	Truck with 1200 gal. water	25,000	
1	ea	Agricultural tractor	25,000	
1	ea	Air Compressor and tools	50,000	
1	ea	Concrete mixer	7,000	
1	ea	Trailer mounted water pump	4,000	$635,000

II SUPPORTING EQUIPMENT:

1	ea	Truck tractor w/winch	60,000	
1	ea	Low bed trailer 40 tons	28,000	
1	ea	Truck w/2000 gal. fuel	44,000	
4	ea	Pick ups	44,000	
1	ea	Trailer w/tools	35,000	
1	ea	Trailer w/lubricating unit	8,000	
2	ea	Trailer 700 gal. fuel	3,200	
2	ea	Trailer 700 gal. water	3,200	$225,400

III AGGREGATES MOBIL PLANT:

1	ea	Portable rock crusher and screening Plant	150,000
1	ea	Front loader	60,000
3	ea	Dump trucks	120,000
1	ea	Generator	12,000

1	ea	Pick-up	$ 11,000	
1	ea	Trailer w/lubricating unit	8,000	
1	ea	Trailer w/tools	35,000	
2	ea	Trailer 700 gal. fuel	3,200	
1	ea	Trailer 700 gal. water	1,600	
1	ea	Watchmen unit	2,500	$403,300

Sub-Total	$1,263,700
20% Spare parts	252,740
	$1,516,440
20% Insurance and freight	$ 303,288
Total	$1,820,728

TABLE 2

SHOP EQUIPMENT LIST FOR THE HUAYRANGA MAINTENANCE CENTER

DESCRIPTION	QUANTITY	US$ UNIT COST	US$ TOTAL COST
Air compressor, stationary	1	1,200	1,200
Portable jet steam cleaner	2	3,200	6,400
Swivel grip oil filter wrenches	1	10	10
Timing light	1	30	30
Easy tool socket wrench	1	5	5
Giant adjustable wrenches	1	75	75
Hydraulic push puller, 17 1/2 tons	1	6,000	6,000
Battery Charger	1	2,000	2,000
Tire Demounter	1	1,500	1,500
Fluid lubricant gun	3	15	45
Mechanic's hand tool sets Type 1	2	2,500	5,000
Mechanic's hand tool sets Type 2	2	2,000	4,000
Mechanic's hand tools sets Type 3	2	800	1,600
Mechanic's hand tool sets Type 4	2	600	1,200
Bench grinder	1	300	300
Heavy duty pedestal grinder	1	800	800
Torque wrench, 1/2 inch, square drive	1	40	40
Torque wrench, 3/4 inch, square drive	1	50	50
Electric welder, 400 AMP	2	6,000	12,000
Welding and cutting equipment	2	1,200	2,400
Generator set 35 KW with diesel engine	1	12,000	12,000
Bench vice	1	50	50
Bench vice	1	100	100
One each forge, Blacksmith type	1	2,800	2,800
Blacksmith anvil	1	150	150
Blacksmith straight pein hammer	1	10	10
Blacksmith hard hammer	1	10	10
Blacksmith tongs straight lip tongs	1	15	15
Blacksmith flat jaw gad tongs	1	15	15
Brake bleeder set	1	120	120

DESCRIPTION	QUANTITY	US$ UNIT COST	US$ TOTAL COST
Battery terminal cleaner set	1	15	15
Hand hoist Type 1	1	200	200
Hand hoist Type 2	1	150	150
Lubrication unit, stationary	1	5,000	5,000
Heavy duty lifting crane 4,000 lbs capacity	1	3,200	3,200
Load rotor positioning sling	1	300	300
Diesel fuel injection nozzle tester	1	400	400
Portable electric sander and grinder	1	200	200
Air impact wrench 1/2 inch square drive	1	160	160
Air impact wrench 3/4 inch square drive	1	180	180
Air impact wrench 1 inch square drive	1	240	240
Body Jack Set	1	1,800	1,800
Electric drill heavy duty Type 1	1	40	40
Electric drill heavy duty Type 2	1	70	70
Electric drill heavy duty Type 3	1	100	100
Other equipment			10,000
Total			81,980
20% insurance and freight			16,396
Estimated Grant Total:			$ 98,276

Construction Costs for Huayranga Maintenance Center

Construction of Open Area (2,000 m^2 at $75)	$ 150,000
Construction of Roofed Area (300 m^2 at $ 180)	54,000
Procurement of shop equipment and tools	98,000
Total:	$ 302,000

TABLE No. 3

ANNUAL ESTIMATED LABOR COSTS

(312 working days)

I - Field Personnel

2	ea	Supervisors	at	$14.20/day	=	$ 8,861	
5	ea	Foreman	at	$12.30	=	$ 19,188	
8	ea	Equipment Operators	at	$11.40	=	$ 28,454	
5	ea	Mechanics	at	$11.40	=	$ 17,784	
16	ea	Drivers	at	$ 9.90	=	$ 49,421	
8	ea	Workman	at	$ 9.90	=	$ 24,710	
50	ea	Common laborer	at	$ 9.40	=	$ 146,640	$ 295,058

II - Shop Personnel (For one maintenance center)

1	ea	Supervisor	at	$14.20/day	=	$ 4,431	
2	ea	Foreman	at	$12.30	=	$ 7,675	
9	ea	Mechanics	at	$11.40	=	$ 32,011	
8	ea	Common laborer	at	$ 9.40	=	$ 23,462	$ 67,579

TABLE No. 4

ANNUAL ESTIMATED COSTS FOR FUEL, OIL, SPARE PARTS, ETC.

(312 working days)

- Heavy equipment (tractors, motorgraders, etc.) 8 units at $72/day	$179,712
- Air compressor, generator 2 units at $50/day	$ 31,200
- Trucks 9 units at $46/day	$129,168
- Pick ups 5 units at $30/day	$ 46,800
- Shop equipment and tools (for maintenance center)	$ 25,000
- Other field minor equipment 16 units at $15/day	$ 74,880
	$486,760

TABLE No. 5

SUMMARY ANNUAL MAINTENANCE COSTS

Labor Costs	
1. Field Personnel	$ 295,000
2. Shop Personnel	68,000
Costs for Fuel, Oil, Spare Parts, etc.	487,000
Materials and Tools for Field Labor	20,000
	$ 870,000

TABLE No. 6

INSTITUTIONAL DEVELOPMENT
(Annual Estimate)

1 ea Chief Engineer	$1,650 x 12 =	$ 19,300
1 ea Equipment Maintenance Specialist	$1,400 x 12 =	$ 16,800
		$ 36,600

TABLE No. 7

SUMMARY COMPONENT COSTS

Implementation of Maintenance Center	$ 300,000
Procurement of Road Maintenance Equipment	1,850,000
Operational Costs	2,740,000
Institutional Development	110,000
	$ 5,000,000

DATA TABLES AND RELATED NOTES

DATA TABLES AND RELATED NOTES

DATA TABLES AND RELATED NOTES (continued)

Note: Tables 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 19 are based upon data from survey of 385 farm operators in Project Area.

TABLE 1

DISTRIBUTION OF FARM SIZE (SAMPLE CONTAINING 385 FARMS)

Area in Hectares	Tingo María		Aucayacu		La Morada		Uchiza		Tocache		Entire Region	
	cases	%	cases	%	cases	%	cases	%	cases	%	cases	%
0.01- 5.00	10	14.7	-	-	-	-	-	-	-	-	10	2.6
5.01-10.00	21	30.9	7	5.5	-	-	2	2.2	8	11.6	38	9.9
10.01-15.00	10	14.7	18	14.1	-	-	20	22.5	8	11.6	56	14.5
15.01-20.00	8	11.8	36	28.1	1	3.2	30	33.7	11	15.9	86	22.3
20.01-25.00	-	-	26	20.3	2	6.5	8	9.0	10	14.5	46	11.9
25.01-30.00	8	11.8	13	10.2	10	32.2	1	1.1	7	10.1	39	10.1
30.01-35.00	2	2.9	7	5.5	-	-	1	1.1	5	7.2	15	3.9
35.01-40.00	-	-	3	2.3	1	3.2	3	3.4	1	1.4	8	2.1
40.01-45.00	3	4.4	2	1.6	2	6.5	1	1.1	1	1.4	9	2.3
45.01-50.00	2	2.9	3	2.3	2	6.5	12	13.5	4	5.9	23	5.6
50.01-65.00	3	4.4	7	5.5	10	32.2	7	7.9	6	8.7	33	8.6
65.01-85.00	-	-	4	3.2	-	-	3	3.4	5	7.2	12	3.1
85.01-100.00	-	-	-	-	3	9.7	-	-	2	2.8	5	1.3
over 100	1	1.5	2	1.5	-	-	1	1.1	1	1.4	5	1.3
Total	68	100.0	128	100.0	31	100.0	89	100.0	69	100.0	385	100.0

Source: F.D.N., Plan de Ejecución del Proyecto de Desarrollo Rural Integral del Alto Huallaga (Convenio AID No. 527-0166-C-00-1018, Lima, Perú, June 1981), cuadro 2.1.2.- 2

TABLE 2

CROPS (ANNUAL & PERMANENT); AND NUMBER OF FARMERS WHO GROW EACH CROP

Crop	Tingo María	Aucayacu	La Morada	Uchiza	Tocache	Entire Region
Corn	37	84	23	64	52	260
Rice	18	48	15	46	54	181
Cassava	39	82	24	52	39	236
Beans	4	10	6	7	11	38
Plantains	39	66	23	66	56	250
Cacao	34	71	13	35	24	177
Citrus	14	26	3	9	12	64
Coffee	33	52	6	5	6	102
Coca	28	66	1	33	8	136
Total of Above	246	505	114	317	262	
Total Cases	68	128	31	89	69	385

Source: F.D.N., Plan, op. cit., cuadro 2.1.2.- 5, and cuadro 2.1.2.- 6.

TABLE 3

CASES OF FARMS/RANCHES WITH IMPROVED AND UNIMPROVED PASTURES

	Tingo María	Aucayacu	La Morada	Uchiza	Tocache	Total
Farms/Ranches with:						
Cultivated/Improved Pastures	12	22	25	36	26	121
Rustic Pastures	15	40	11	47	9	122
Farms/Ranches with:						
Cultivated/Improved Pastures of Following Sizes:						
less than 1.00 hectare	1	5	-	9	2	17
1.01 - 5.00 hectares	7	7	10	19	10	53
5.01 - 10.00 hectares	2	4	6	2	5	19
10.00 - 20.00 hectares	2	3	4	3	3	15
20.01 and over hectares	-	3	5	3	6	17
Farms/Ranches without:						
Cultivated/Improved Pastures	56	106	6	53	43	264
Rustic Pastures	53	88	20	42	60	263

Source: F.D.N., Plan, op. cit., cuadro 2.1.2.- 7.

TABLE 4

PRINCIPAL OCCUPATION AND NUMBER OF OCCUPATIONS OF HEAD OF FAMILY

Description	Tingo María		Aucayacu		La Morada		Uchiza		Tocache		Total	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Principal Occupation												
Crop-Grower	64	97.0	112	87.5	17	54.8	80	89.9	62	90.0	335	87
Rancher	1	1.5	11	8.7	14	45.2	6	6.8	3	4.3	35	9
Commercial	-		1	0.8	-		1	1.1	1	1.4	3	1
Artesan	-		-		-		-		-		-	
Worker-Agriculture	-		-		-		-		-		-	
Worker-Non Agric.	-		-		-		-		-		-	
Family Work	-		-		-		-		-		-	
Housewife	-		1	0.8	-		1	1.1	1	1.4	3	1
Student	-		-		-		-		-		-	
Other	1 a/	1.5	3 b/	2.2	-		1 c/	1.1	2	2.9	7	2
Total	66	100.0	128	100.0	31	100.0	89	100.0	69	100.0	383	100
Number of Occupations												
One	48	70.6	84	65.6	12	38.7	65	73.0	43	62.3	252	65
Two	15	22.1	38	29.7	16	51.6	21	23.6	24	34.8	114	30
Three	4	5.9	6	4.7	3	9.7	2	2.2	2	2.9	17	4
Four	1	1.4	-		-		1	1.2	-		2	1
Total	68	100.0	128	100.0	31	100.0	89	100.0	69	100.0	385	100

Source: F.D.N., Plan, op. cit., cuadro 2.1.6. - 2 and cuadro 2.1.6. - 3

Notes: a/ A public sector employee and teacher.

b/ A public sector employee, a chaufer, and a poultry farmer.

c/ A manager of a brick factory.

TABLE 5

USE OF UNPAID AND PAID LABOR AND CASES OF PAID PERMANENT AND OCCASIONAL LABOR BY NUMBER OF PERSONS SO EMPLOYED

		Tingo María	Aucayacu	La Morada	Uchiza	Tocache	Total
Total Cases		68	128	31	89	69	385
Unpaid Labor (Cases)							
Does utilize		64	121	28	84	66	363
Does not utilize		4	7	3	5	3	22
Paid Permanent Labor (Cases)							
Does utilize		11	31	7	13	11	73
Does not utilize		57	97	24	76	58	312
Number of Persons Employed	(1)	5	18	5	6	5	39
	(2)	2	8	-	2	1	13
	(3)	4	4	-	1	3	12
	(4)	-	-	2	3	-	5
	(5)	-	-	-	-	1	1
	(6 and over)	-	1	-	1	1	3
Paid Occasional Labor							
Does utilize		47	99	22	63	57	288
Does not utilize		21	29	9	26	12	97
Number of Persons Employed	(1)	5	12	4	10	3	34
	(2)	11	24	6	17	20	78
	(3)	7	16	1	13	11	48
	(4)	4	19	2	5	8	38
	(5)	7	3	2	5	4	21
	(6)	2	5	3	2	4	16
	(7)	3	3	-	2	-	8
	(8 and over)	8	17	4	9	7	45

Source: F.D.N.. Plan, op.cit., cuadro 2.1.6. - 6 and cuadro 2.1.6. - 7

TABLE 6

PLACE OF WORK OF HEAD OF FAMILY (HF) AND OTHER FAMILY MEMBERS (OF)

Place of Work	Tingo María		Aucayacu		La Morada		Uchiza		Tocache		Total		
	HF	OF	HF	OF	HF	OF	HF	OF	HF	OF	HF	OF	Both
Family Farm/Ranch	67	127	124	219	31	70	86	145	66	131	374	692	1,066
Non-Agricultural Family Work	-	2	1	1	-	-	1	2	1	2	3	7	10
Private Ranch	-	14	3	1	-	1	-	2	-	-	3	18	21
Production Coop.	-	-	-	-	-	-	-	-	-	-	-	-	-
Service Coop.	-	1	-	-	-	-	-	-	-	-	-	1	1
Non-Ag. Private Firm	-	2	-	-	-	1	2	-	-	3	2	6	8
Government	1	3	-	1	-	-	-	2	2	1	3	7	10
Not Specified	-	6	-	-	-	-	-	1	-	1	-	8	8
TOTAL	68	155	128	222	31	72	89	152	69	138	385	739	1,124

Source: F.D.N., *Plan. op. cit.*, cuadro 2.1.6. - 5

TABLE 7

AGE AND SEX DISTRIBUTION

Age	Tingo María		Aucayacu		La Morada		Uchiza		Tocache		Total		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total
0 - 4	30	23	56	63	8	7	36	43	32	24	162	160	322
5 - 9	28	26	65	56	11	14	53	51	45	35	202	182	384
10 - 14	35	34	77	69	21	16	43	39	46	24	222	182	404
15 - 19	35	34	54	62	16	13	28	38	33	25	166	172	338
20 - 24	26	26	54	20	20	12	36	16	26	12	162	86	248
25 - 29	14	17	16	21	11	4	17	13	15	11	73	66	139
30 - 34	11	14	19	21	2	2	18	16	14	12	64	65	129
35 - 39	14	8	18	19	4	3	12	11	12	12	60	53	113
40 - 44	12	13	27	27	7	9	12	16	13	10	71	75	146
45 - 49	11	14	26	10	6	8	9	7	8	7	60	46	106
50 - 54	9	6	12	15	6	1	7	7	8	9	42	38	80
55 - 59	9	3	8	3	2	-	4	5	3	3	26	14	40
60 - 64	5	2	6	4	-	-	7	2	1	1	19	9	28
65 and over	6	5	4	3	1	1	2	2	5	2	18	13	31
TOTAL	245	225	442	393	115	90	284	266	261	187	1,347	1,161	2,508

Source: F.D.N., *Plan*, *op. cit.*, cuadro 2.1.5. - 2

TABLE 8

LABOR FORCE DISTRIBUTION

(Working, symbol W; not working, symbol NW)

Age	Tingo María		Aucayacu		La Morada		Uchiza		Tocache		Total		
	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW	W+NW
6 - 10	-	59	1	122	2	20	-	89	-	78	3	368	371
11 - 15	8	61	17	130	6	34	4	72	4	58	39	355	394
16 - 20	32	40	73	48	19	7	41	23	41	14	206	132	338
21 - 25	38	19	41	11	26	4	48	2	31	3	184	39	223
26 - 30	23	6	24	6	10	2	34	-	27	1	118	15	133
31 - 35	20	-	39	1	1	-	26	-	23	-	109	1	110
36 - 40	26	1	48	2	10	1	31	-	28	3	143	7	150
41 - 45	19	3	41	4	14	2	17	2	16	-	107	11	118
46 - 50	21	3	30	3	7	-	15	2	16	-	89	8	97
51 - 55	12	2	18	4	6	-	10	-	10	2	56	8	64
56 - 60	7	2	8	1	1	-	5	4	5	-	26	7	33
61 - 65	10	-	7	4	-	-	6	-	1	-	24	4	28
66 and over	7	1	3	2	1	1	4	1	5	1	20	6	26
TOTAL	223	197	350	338	103	71	241	195	207	160	1,124	961	2,085

Source: F.D.N., *Plan*, *op. cit.*, cuadro 2.1.6. - 1

TABLE 9

EDUCATIONAL LEVEL

(15 years of age and over)

Educational Condition	Tingo María		Aucayacu		La Morada		Uchiza		Tocache		Total		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total
Illiterate	15	28	12	48	3	10	14	32	9	25	53	143	196
Primary Incomp.	46	44	98	71	18	17	46	40	35	31	243	203	446
Primary Complete	38	32	78	47	31	15	46	29	60	27	253	150	403
Secondary Incomp.	27	20	33	26	15	8	28	26	14	12	117	92	209
Secondary Comp.	14	15	17	5	5	3	15	5	13	6	64	34	98
Higher Education	10	13	2	1	1	-	3	1	6	1	22	16	38
Not Specified	-	-	-	-	2	-	1	-	1	2	4	2	6
TOTAL	150	152	240	198	75	53	153	133	138	104	756	640	1,396

Source: F.D.N., Plan, op. cit., cuadro 2.1.5. - 4

TABLE 10

MIGRATION STATUS, AGE OF HEAD OF FAMILY AT TIME OF IMMIGRATION, AND PERIOD OF RESIDENCY IN AREA

	Tingo Maria	Auca-yacu	La Morada	Uchiza	Tocache	Total	
	(- - - - - - - - - - - - - cases	- - - - - - - - - - - - - -)					
Migration Status							
Native	3	2	-	25	10	40	10.4
Immigrant	65	126	31	64	59	345	89.6
Age of Head of Family at Time of Immigration							
1 - 4	1	1	-	1	-	3	0.7
5 - 9	-	2	-	1	1	4	1.2
10 - 14	8	8	1	3	3	23	6.7
15 - 19	14	16	1	5	8	44	12.8
20 - 24	10	23	13	9	11	66	19.1
25 - 29	9	27	5	14	8	63	18.3
30 - 34	7	26	6	10	9	58	16.8
35 - 39	6	10	1	5	4	26	7.5
40 - 44	6	5	2	6	5	24	7.0
45 - 49	1	8	2	2	4	17	4.9
50 - 54	3	-	-	3	2	8	2.3
55 - 59	-	-	-	3	2	5	1.4
60 - 64	-	-	-	2	2	4	1.2
Total	65	126	31	64	59	345	100.0
Period of Residency in Area							
(Years) less than 1	-	2	-	-	-	2	0.6
1 - 5	9	12	6	19	8	54	15.6
6 - 10	5	17	6	27	27	82	23.8
11 - 15	5	33	2	6	9	55	15.9
16 - 20	12	39	7	7	8	73	21.2
21 - 25	5	12	5	2	2	26	7.5
26 - 30	12	6	3	2	1	24	6.9
31 - 35	7	1	1	-	4	13	3.8
36 - 40	5	3	-	1	-	9	2.6
41 and over	5	1	1	-	-	7	2.0
Total	65	126	31	64	59	345	100.0

Source: F.D.N., Plan, op. cit., cuadro 2.1.7.-1, cuadro 2.1.7.- 2, and cuadro 2.1.7.- 5

TABLE 11

UTILIZATION OF IMPROVED INPUTS ON CROPS; (FARMERS WHO USE THE FOLLOWING INPUTS ON CROPS INDICATED)

	Corn	Rice	Cassava	Plantains	Coffee	Cacao	Coca	Total
Guano (Bird Manure)	2	-	-	1	2	3	5	13
Urea	1	-	1	1	2	2	10	17
Superphosphate	-	-	1	-	-	-	1	2
Potassium	1	-	-	-	-	-	-	1
Combined Chem. Fertilizer	-	-	-	5	2	3	2	12
Insecticides	5	3	2	36	12	28	33	119
Fungicides	6	2	-	5	11	12	20	56
Improved Seed/Plantstock	71	68	38	11	1	7	2	148
Number of Farmers Growing Crop	260	181	236	250	102	189	136	1,354

Source: F.D.N., Plan, op. cit., cuadro 2.1.2.- 5, cuadro 2.1.2.- 6, and cuadro 2.1.[illegible].- 1

TABLE 12

LEGAL LAND TENURE STATUS OF FARM OPERATOR

	Tingo María	Aucayacu	La Morada	Uchiza	Tocache	Entire Region
1. Recognized Legal Right to Land						
a. A Title of Adjudication or Certificate Possession	14	79	16	45	39	193
b. Recognition of Right in process	6	9	1	2	1	19
(1) due to lapse in Certificate of Possession	(4)	(7)	(1)	-	(1)	(13)
(2) due to estate settlement	(2)	(2)	-	(2)	-	(6)
2. State That They Hold A Certificate of Possession	19	22	8	16	20	85
(1) due to purchase	(16)	(22)	(8)	(14)	(18)	(78)
(2) due to invasion	(3)	-	-	(2)	(2)	(7)
3. State That They Do Not Hold A Certificate of Possession	24	18	6	26	8	82
(1) due to purchase	(15)	(12)	(5)	(16)	(7)	(55)
(2) due to invasion	(9)	(6)	(1)	(10)	(1)	(27)
4. State That They Rent Land	3	-	-	-	1	4
5. Total	66	128	31	89	69	383

Source: F.D.N., <u>Plan de Ejecución</u>, <u>op. cit.</u>, pp. 57-60, Cuadro 2.1.3. - 1.

TABLE 13

STORAGE CAPACITY FOR RICE, SOYBEANS, AND CORN

Project Area, 1981 (in MT)

Agency	Tingo María	Aucayacu	Uchiza-Progreso	La Morada	Tocache	Total
ENCI (soybeans, corn)	2,000	--	1,500	--	1,500	5,000
ECASA (rice only)	2,000	--	--	--	--	2,000
Min. Ag.	--	500*	500*	400*	300*	1,700*
Private	252	--	--	--	--	252
Central de Cooperativas	--	1,305	--	--	150*	1,455
						8,557
TOTAL	4,252	1,805	2,000	400	1,950	10,407*

* Rehabilitation required. Not in use.

TABLE 14

EXIT OF AGRICULTURAL PRODUCTS REGISTERED BY

TINGO MARIA GARITA DE CONTROL, COMPILED BY MA TINGO MARIA 1/

(metric tons)

Spanish name of commodity	1972	1973	1974	1975	1976	1977	1978	1979	1980
Aji	219.7	245.6	288.6	102.4	260.8	149.6	256.8	418.7	264.0
Almidon	174.6	201.3	110.2	91.3	196.1	70.2	23.0	n.a.	n.a.
Maiz	10,995.2	7,826.3	7,264.4	5,042.2	11,655.2	16,911.5	9,181.7	5,356.2	2,307.7
Naranja	1,954.9	2,255.6	910.4	2,053.0	2,922.7	4,510.0	2,501.7	2,139.2	2,708.0
Palta	941.2	375.5	17.0	48.0	55.4	34.6	62.2	241.6	129.6
Piña	53.0	10.3	42.5	34.2	58.9	37.0	19.3	n.a.	n.a.
Papaya	240.8	113.4	176.9	166.4	217.7	533.9	259.6	148.4	413.0
Plátano	41,826.7	31,624.6	30,468.3	26,041.0	25,935.8	33,224.5	42,596.8	35,743.2	27,367.6
Yuca	623.8	912.0	599.6	3,855.6	2,204.5	1,832.2	731.4	1,282.3	2,657.8
Soya				120.6	84.0	27.6	6.0	9.5	22.0
Vacuno						517.9	740.9	305.6	48.3
Aceite Palma						2,663.7	3,078.4	913.0	1,882.7
Cacao		224.6	127.0	293.0	294.5	n.a.	555.0	507.0	415.0
Café	2,596.5	842.9	2,837.0	946.3	1,276.6	n.a.	1,056.7	960.1	691.6
Limones	81.8	81.3	15.4	49.0	92.8	56.5	48.7	37.0	38.6
Coca		1,082.5	1,019.9	1,045.8	1,128.8	n.a.	871.9	943.3	384.8
Té	439.0	357.4	253.2	372.1	437.3	n.a.	399.2	460.1	398.1

Source: Field trip to Tingo María, R. Adler, July 8-10, 1981

1/ Tabulations of an 89 farm subset from the F.D.N. survey of 385 farms indicate the following percentages of farm production as sold off farm: corn, 77.5%; rice, 73.8%; plantains, 77.0%; cacao, 97.1%; citrus, 95.8% and cassava, 59.7%. The remainder is consumed on farm or used as seed.

TABLE 15

ENTRY OF AGRICULTURAL PRODUCTS REGISTERED BY

TINGO MARIA GARITA DE CONTROL, COMPILED BY MA TINGO MARIA

(metric tons)

Spanish name of commodity	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
cebolla	344.8	215.4	301.4	442.6	250.3	560.6	690.6	618.4	639.1	938.5
papa	705.4	1,603.7	740.0	777.8	698.7	2,257.2	2,288.6	4,055.0	3,395.5	3,059.0
fideos	n.a.	n.a.	n.a.	n.a.	n.a.	919.7	786.9	1,111.1	903.6	1,201.3
vacuno	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	55.7	206.7	112.7	98.1
harina	n.a.	n.a.	n.a.	n.a.	n.a.	823.4	776.3	912.1	663.3	1,028.8
leche evaporada	n.a.	n.a.	n.a.	n.a.	n.a.	439.4	538.7	654.3	592.5	730.8
manzana	13.7	4.6	35.1	n.a.	n.a.	n.a.	n.a.	n.a.	84.6	119.0
zanahoria	45.5	242.6	141.6	n.a.	n.a.	n.a.	n.a.	n.a.	257.9	136.1
tomate	197.4	88.1	190.5	n.a.	n.a.	n.a.	n.a.	n.a.	280.3	371.1

Source: Field trip to Tingo María, R. Adler, July 8-10, 1981

TABLE 16

ESTIMATED PRODUCTION FUNCTION OF ONE HECTARE
OF COCA LEAF IN THIRD AND SUBSEQUENT YEARS

	Days Per Operation	Times Per Year Minimum	Times Per Year Maximum	Total Days of Labor Minimum	Total Days of Labor Maximum
Utilization of Labor					
1. Weedings	14	3	4	42	56
2. Application of Fertilizer	10	3	4	30	40
3. Root Pruning & Cultivation	14	1	2	14	28
4. Application of Pesticides	10	3	4	30	40
5. Sub-Total				116	164
6. Harvest of leaf	13	3	6	39	78
7. Hauling of Leaf	3	3	6	9	18
Days of Labor for all Operations				164	260
Days of Labor Excluding Application of Fertilizer				134	220
Days of Labor Excluding Application of Fertilizer & Reduction of Weeding				113	192
Person Years of Labor (Assume 260 days of Labor Per Year)					
All Operations				.63	1.00
All Operations Excluding Application of Fertilizer				.52	.84
All Operations Excluding Application of Fertilizer and One-Half of Weedings				.43	.73

Source: Prepared by USAID/Peru; based on consultation MA officials (Tingo María) and Table 17.

TABLE 17

PRODUCTION COSTS FOR ONE-HECTAR
OF ESTABLISHED COCA

Production cost per hectare per year were estimated in by a UNAS professor for 1980 as follows (in soles). Labor time is valued S/. 800 per day.

Labor Costs for Maintenance	104,000
Labor Costs for Harvest	60,000
Drying and Packing	50,000
Inputs (fertilizer, pesticides)	166,250
Materials	65,500
Depreciation of Equipment	33,000
Legally Obligated Benefits	45,530
Administration	60,000
Taxes	32,100
Unforseen contingencies	144,380
TOTAL	688,660

The UNAS cost data do not appear to be wholly consistent. However, without a very precise and detailed inquiry improvement is unlikely. The in logic presented below suggests that pickers were paid between S/. 1,212 and S/. 1,322 per day. Other labor was paid S/. 800 per day. Also in regard to harvest production, the statement of 100 arrobas appears to exceed the green weight equivalent.

TABLE 17 (continued)

Given:

1. A picker can pick 1.5 arrobas per day and this amounts to 55 to 60 kilograms in green leaf. (Source: MA official Tingo María).
2. One dry arroba equals 11.2 kilograms and dry away is somewhat more than 3 to 1. (Source: MA official in Tingo María).
3. The harvest is 6,000 pounds of green leaf. (UNAS cost data)
4. A picker is paid S/. 10 per pound . (UNAS cost data).

Results :

1. Conversion of kilograms to pounds signifies that a picker can pick 121.5 to 132.28 pounds of green leaf per day.
2. Harvest of 6,000 pounds requires 45.4 to 49.5 days of labor.
3. One green arroba equals 36.7 to 40.0 kilograms.
4. Dry arroba is .280 to .305 of green arroba.
5. The 6,000 pounds of harvested green leaves equals 2,721.6 kilograms and from 752.0 to 830.1 kilograms of dry leaf and 68 to 74 dry arrobas.
6. Pickers are paid S/. 60,000 for entire harvest, and this is equivalent to S/. 1,212.1 to S/. 1,321.6 per day.

The cost data presented on the following two pages were obtained from INM.

TABLE 17 (continued)

(UNAS) COCA

COSTO DE PRODUCCION POR HECTAREA - AÑO 1980

RUBRO	UNIDAD	NUMERO UNIDAD	VALOR UNITARIO	TOTAL (soles)
A. GASTOS DIRECTOS				
1. Mantenimiento				104,000
Abono basal	Jornal	20	800	16,000
Abono nitrogenado	Jornal	30	800	24,000
Abono foliar	Jornal	20	800	16,000
Deshierbos	Tarea	60	400	24,000
Conteada	Tarea	20	400	8,000
Control fito-sanitario	Tarea	20	800	16,000
2. Cosecha				60,000
Recolección de hojas	Libras	6,000	10	60,000
3. Beneficios				
Maguado y selección	Jornal	25	400	10,000
Secado y enfardelado	Arroba	100	400	40,000
4. Insumos				166,250
Fertilizantes (NPK)	Saco	15	4,100	61,500
Urea	Saco	10	4,600	46,000
Abono foliar	Litro	30	1,100	33,000
Adherente	Litro	0.5	2,500	1,250
Insecticidas	Kg.	10	2,450	24,500

TABLE 17 (continued)

RUBRO	UNIDAD	NUMERO UNIDAD	VALOR UNITARIO	TOTAL (soles)
5. Materiales				65,500
Canastas		30	400	12,000
Jerga	Metros	40	300	12,000
Lampas		8	2,000	16,000
Machetes		8	1,200	9,600
Costales		15	400	4,500
Latas		2	200	400
Cilindro		1	3,000	3,000
Zarandas		2	4,000	8,000
6. Equipo				33,000
Fumigadora Manual	Mochila	0.20 %	90,000	18,000
Fumigadora a motor	Bomba	0.05 %	300,000	15,000
7. Otros				
Leyes Sociales	%	58 %	78,500	45,530
		Total Gastos directos	:	524,280

B. GASTOS INDIRECTOS

1. Gastos de Administración	60,000
2. Impuesto Unico a la Producción (S/. 30 x Kg.)	32,100
3. Imprevistos: 10 % del total de los Gastos Directos	52,280
Total Gastos Indirectos :	144,380

Total Gastos Directos	524,280
Total Gastos Indirectos	144,380
COSTO TOTAL DE PRODUCCION	668,660

TABLE 18

RETURNS TO LABOR WITH TRADITIONAL TECHNOLOGY, NO START-UP COSTS (Average yield, 1980 prices)

	Gross Value of Production	Purchased Inputs (a)	Net Returns to Land & Labor	Person Days of Labor	Return to One Day of Labor
Upland Rice	133,500	12,505	120,995	114	1,061
Corn	46,080	11,320	34,760	82	424
Cassava	187,500	37,164	150,336	119	1,263
Soybeans	151,200	13,588	137,612	117	1,176
Plantains	360,000	22,589	337,411	90	3,749
Cacao	232,000	9,911	222,089	58	3,829
Coffee	162,900	23,180	139,720	32	4,366
Oranges	240,000	81,212	158,788	104	1,526
Coca Leaf (b)	1,200,000	236,063	963,937	182	5,296
Coca Leaf (c)	509,063	236,063	273,000	182	1,500

Notes:

(a) Inputs include non-labor purchased inputs and transportation. As of January 1981 and assumes inflation at
75 % p.a. or 4,8 % p. month & so
July 1980 = 1/1.32485 = .75

(b) At a price of S/. 1,500 per kg. (S/. 16,800 per arroba).

(c) At a price of S/. 636 per kg. (S/. 7,127 per arroba).

TABLE 19

UTILIZATION OF FARM LAND FOR AGRICULTURAL PURPOSES (Survey of March-April, 1981)

	Tingo María	Aucayacu	La Morada	Uchiza	Tocache	Entire Region
	-in hectares-					
Average Size of Land Use for Farms Having:						
Land in Annual Crops	1.52	2.86	5.06	2.99	4.96	3.27
Land in Perennial Crops	4.41	3.40	2.78	3.17	2.44	3.36
Land in Improved Pastures	3.54	7.80	9.76	5.32	9.73	7.46
Land in Natural Pastures	5.37	8.44	10.77	4.75	2.83	6.44
Land in Fallow	6.19	9.13	9.00	9.74	11.68	9.33
	number of farms					
Number of Farms Having:						
Land in Annual Crops	53	110	27	78	66	334
Land in Perennial Crops	67	123	25	75	61	351
Land in Improved Pastures	12	22	25	36	26	121
Land in Natural Pastures	15	40	31	47	9	122
Land in Fallow	49	117	22	79	65	332
Total Sample	68	128	31	89	69	385

Source: F.D.N., Plan, op. cit., pp. 28-56. Data were presented in averages only for farms having each of these categories. Subsequently, we multiplied each statistic by the particular number of related farm cases to derive sample averages for each zone and entire region. These derivated statistics are presented in Table II-4.

NOTE A

AN EXAMINATION OF UPPER HUALLAGA CROP PRODUCTION DATA

The gross value of agricultural production is a function of the number of crops considered, estimates of area harvested, estimates of yield per hectare, and estimates of farmgate prices. Even though various elements of these data are opened to question, any approximation of Project Area agricultural production involves judgements in the attempt to eliminate contradictions and disparities. An examination of data from the 1972 agricultural census, estimates prepared by the F.D.N. for 1975 and 1980, tabulations from the F.D.N. survey of 385 farmers in the project area (March-April 1981) and data of regional exports and commercialization indicated that the disparities could be reduced only by a detailed examination of crop areas and yields.

Data on agricultural production in the project area are nearly non-existent. Ministry of Agriculture (MA) officials in Tingo María stated that they have not prepared any worthwhile estimates after 1976. They were also not a primary source for data used by researchers from the F.D.N. After examining data from the 1972 agricultural census and debate by the Project Committee concerning the inconsistencies in the trend of crop production derived from F.D.N. estimates for 1975 and 1980, we decided to focus solely on crop production aggregates for 1980 and not upon the trend in production. The trend for a particular crop based on MA data could result from successive years of over-statement of output for followed by a cleansing resulting from field work to derive new estimates. This phenomenon may relate also to successive "adjustments" in field estimates by MA offices as it is sent from field offices, to regional offices, to Lima, and these "adjustments" may relate more to political than to statistical considerations. F.D.N. estimates were, reportedly, based on the information from the MA Huánuco regional office.

The statement presented by the F.D.N. recognizes the agricultural data problem and is as follows: " The present area of annual and perennial crops and forest in the Tingo María-Tocache colonization are not registered in a complete and consistent manner. The statistics of the various agricultural agencies do not agree for the same zones, are incomplete, and, in general, do not include sufficient proof. In some cases there are no statistics, and estimates made at the office without field visits are used. Data on production and present gross value of production are, consequently, of little value and should be used with great caution. In this sense, it is unfortunate that in spite of the assignment of personnel to the statistical section of the Tingo María Agricultural District, it does not have the facilities necessary for adequately executing this work." 1/

1/ F.D.N., Plan, op. cit., p. 174

As is shown in Table 20, we state estimates of area and of yield along with statements of maximum acceptable versions of area and yield for the major crops except for palm oil, tobacco and tea for which data is from an independent source. Available estimates of area and yield are presented in Table 21. Estimates of maximum potential yield are presented in Table 22.

In regard to estimates of area harvested (see Table 21) there are four sources of data: the 1972 agricultural census, estimates presented by the F.D.N. in its 1980 study (Estudio Preliminar), and in its 1981 study (Plan de Ejecución). Tabulations of the F.D.N. survey of 385 farmers provide an additional source of information on area harvested which was expanded by a survey factor of 13. The survey-based data would probably underreport coffee because it excluded the Monzon district of Tingo María. Perennial crops pose a special problem because area harvested includes areas not yet at mature production levels; this is important for cacao and oranges. As compared with the F.D.N. second estimate (Plan de Ejecución), our chosen area statistic (see Table II) is lower for rice, the same for corn, higher for cassava, lower for plantains, higher for cacao (1,650 ha. in production per F.D.N.), the same for coffee, and the same for oranges. Estimates of plantain and cassava areas are obviously the most difficult due to on-farm consumption, and as compared with F.D.N. estimates we lowered area in plantains (by 35%) and increased the area in cassava (by 10%).

Table 20 also presents maximum acceptable statements of area. These maximums were not used to derive production estimates but serve as a control. Statements of crop area higher than these maximums could be considered as quite liberal and in some cases would not be confirmed by the related commercialization statistics. For cacao and oranges the difference between accepted and maximum may be only the effect of very recent plantings (which would also substantially alter the related yield statistic).

In regard to yields (see Table 21), for most crops there are four sources of yield data: the 1972 agricultural census, the F.D.N. 1980 estimate, a set of average yield estimates given to us by MA officials in Tingo María, and average of yields obtained by the subset of 89 farmers tabulated out of 385 farmers surveys by F.D.N. in March-April, 1981. The F.D.N. estimate and the MA estimates are of similar magnitude for most crops except plantains and oranges. For most crops these estimates are also higher than those tabulated from the 1972 agricultural census data and from the tabulation of the 89 farmer subset of the March-April 1981 farm survey. (These latter yields calculated as the arithmetical average of farm yields and not as the total output divided by total area.) Except for cassava and cacao, yields of most crops derived from the farm survey were not greatly higher or lower than yields reported in the 1972 census. The maximum acceptable estimate of yield stated in Table 20 is the same as MA estimate of average yield for rice, corn, cassava, and cacao; it is higher for beans, soybeans, tobacco, and coffee; and it is lower for plantains and oranges.

In addition to selecting reasonable averages for yield, we also note the results of high yields as tabulated from the survey of 385 farmers and judgments by the F.D.N. and MA officials concerning possible or potential maximum yields. In Table 22, we present averages of the top two yields for each zone (after eliminating the single highest yield of all reported) and an average of the second highest yields for each zone. For rice and corn, the survey revealed higher possible yields than MA estimates; for cassava and coffee the highest yields were about the same; and for plantains, cacao, and oranges MA statement of maximum possible yield was higher than the maximum yields reported by farmers.

In assessing the estimates of average yields and average area in production, stated in Table 20, what difference to "accepted" versus "maximum acceptable" estimates make? For the nine crops included in this exercise, the combination of accepted average area and accepted average yield gives a farmgate gross value of production (GVP) of S/. 4,075 million. The combination accepted average area and maximum acceptable yield gives a farmgate GVP of S/. 5,456 million, i.e., an increase of 33.9 percent. The combination of maximum acceptable areas, and maximum acceptable yield give a farmgate GVP of S/. 8,319 million, i.e., an increase of 104.2 percent. Thus, apparently small differences in area and yield estimates have important consequences.

Palm oil, tobacco, and tea were not included in the crops discussed above. The basic data on these crops is presented in the following paragraphs:

The production of palm oil is, at present, represented in the area by ENDEPALMA. In 1978 it had 3,800 ha of palm oil trees planted of which 1,718 ha were in production. In 1980 it has 4,850 ha of which 3,250 ha are in production. The F.D.N., Estudio Preliminar (p. 210) states area as 3,125 ha yield as 1,417 MT, and an agricultural value as S/. 230 per kg. These data are stated in crude palm oil and not palm oil fruits; the press-out ratio is approximately 5 to 1. The yield of 1,417 kg represents an average of crude palm oil derived from a planting in various stages of maturity. By 1985, when ENDEPALMA has 5,000 ha in mature production, the yield per hectare should be about 20 MT of palm fruit from which 4 MT crude palm oil are pressed.

The production of Virginia flue-cured tobacco was initiated in the area by Tabacos del Perú, S.A. (a subsidiary of the state enterprise Empresa Nacional de Tabaco) in 1973 and production area expanded as follows (hectares in parentheses: 1974 (85), 1975 (110), 1976 (125), 1977 (158), 1978 (187), 1979 (215), 1980 (216). This firm buys uncured tobacco and undertakes drying at four sites in the area (Aucayacu, Uchiza, Tocache, and Bambamarca). In 1980, the purchase price of uncured tobacco leaf was S/. 30 per kg at farmgate. All expenses of transport, drying, and processing were paid by the firm. The F.D.N. Estudio Preliminar contains conflicting information on yield stating an average yield of 16,000 kg of green leaf (210). A drying weight reduction of 9 to 1 and cured leaf weight of 388 MT (p. 272) suggest 3,492 MT as green weight, but a 16,000 kg average yield suggests 3,456 MT.

The essential data on tea were prepared by the F.D.N. in Estudio Preliminar using data from CAP Jardines de Té and CAP Té-Café. The former has an average yield of 5,600 kg per hectare in green leaf which, when dried, amounts to about 1,470 kg per hectare. These two producers have 570 hectares in production and expected a 1980 production of 806.4 MT of dried leaf. The farmgate price per kilogram of S/. 594 was calculated from discussion on the above-cited F.D.N. document on pp. 285-286; however, S/. 485 was presented in p. 210.

TABLE 20

ESTIMATES OF ACCEPTED AND MAXIMUM ACCEPTABLE AREA AND YIELD FOR UPPER HUALLAGA CROP PRODUCTION (1980)

	Average Area (Ha)		Average Yield (in Kg/Ha)		Production	Commercialization
	Accepted	Maximum	Accepted	Maximum	(in MT)	Check (in MT)
Annual Crops						
Rice	2,200	2,600	1,500	2,000	3,300	2,870--ECASA, 1981 purchase program
Beans	200	600	700	1,000	140	
Corn	7,000	7,200	1,200	1,500	8,400	3,650--65% of TM (Tingo Maria) truck control
Cassava	2,200	2,900	12,500	15,000	27,500	1,013--65% of TM truck control
Tobacco (green)	216	--	--	--	4,096	388--(b)
Soybeans	40 (a)	560	1,800	2,000	72	46--ENCI purchase 1980
Peanuts	10 (a)	--	1,500		15	
Perennial Crops						
Palm Oil (pressed)	3,125	--	1,417		4,428	5,000--(c)
Tea (dried leaf)	600	--	1,420		852	806--(d)
Plantains	5,200	8,100	6,000	8,400	31,200	22,968--65% of TM truck control
Cacao	2,000	3,700	400	600	800	558--CAS Naranjillo 1980 purchase
Coffee	3,500	4,900	450	500	1,575	1,289--CAS Naranjillo 1980 purchase
Oranges	500	1,300	8,000	10,000	4,000	1,620--65% of TM truck control
Pineapple	--	--	6,500			
Coca leaf	12,000	--	800	1,200	9,600	

Notes:

(a) The F.D.N. survey subset of 89 cases has total of 4.1 ha. of soybeans and 1.1 ha. of peanuts.

(b) F.D.N., Estudio Preliminar del Proyecto, op. cit., p. 210; estimate of Tabacos del Perú, S.A.; ratio of green to dried is approximately 9 to 1.

(c) F.D.N., ibid, p. 279, estimate of crude palm oil and palm kernels is 650 MT.

(d) F.D.N., ibid, p. 285; estimate based on CAF Jardines de Té and Café with a total of 570 ha. and 804.6 MT of dried leaf

TABLE 21

COMPARISON OF ESTIMATES OF CROP AREA AND YIELDS

	Area in Hectares				Yields in Kilograms per Hectare				
	1972	1980	1980	1981	1972	1980	1980		1981
	Census	F.D.N. Estudio Preliminar p. 120	F.D.N. Plan de Ejecución p. 176	Survey 385 Farmers (c) Mar.-April	Census	Estudio Preliminar p. 120	MA (Tingo María) estimate	(e)	Tabulation of 80 of 385 farmers Mar.-April
Annual Crops									
Rice	1,893	2,170	4,000	2,597	1,858	1,707	2,000	38	1,452
Beans		600	--	195	n.a.	1,083	800	6	657
Corn	4,646	7,200	7,200	7,027	1,559	1,904	1,500	57	1,213
Cassava	780	1,126	2,000	2,900	4,354	15,600	15,000	47	12,318
Tobacco		216	n.a.	n.a.	1,489	18,963	13,000	--	n.a.
Soybeans	9	565	n.a.	n.a.	n.a.	1,500	1,500	5	1,853
Perennial Crops									
Palm Oil	n.a.	3,125	n.a.	n.a.	n.a.	1,417	n.a.	--	n.a.
Tea	n.a.	695	800	n.a.	n.a.	3,058	3,600	--	n.a.
Plantains	5,602	8,100	8,000	3,867	5,198	7,686	15,000	50	5,952
Cacao	658	1,612 (a)	3,500 (b)	3,695	951	500	600	45	375
Coffee	4,886	3,500	3,000	2,100	399	500	450	27	500
Oranges	n.a.	220	500 (d)	1,316	n.a.	20,000	15,000	11	7,871
Coca Leaf	2,099	--	--	1,492	562	--	--	49	783

Notes:
(a) 400 ha. in production & harvested.
(b) 1,650 ha. in production.
(c) Survey frequency tabulation serves as basic data and reasonable assumptions regarding average hectarage in each range was used to calculate total area for sample; this sum was expanded by a factor of 13.
(d) 800 ha. planted.
(e) Number of farmers in subset of 89 included in tabulation of yields.

TABLE 22

COMPARISON OF ESTIMATES OF MAXIMUM YIELDS

	Maximum Potential Yield (Kilograms per Hectare)			
	MA Tingo María 6/81	Average Drawn From Sample Survey For Each Zone (a)		F.D.N. Crop Production Plan (b)
		Top 2	2nd highest	
Annual Crops				
Rice	3,000	3,683	3,367	3,000
Beans	1,500	n.a.	n.a.	n.a.
Corn	2,500	3,003	2,848	3,200
Cassava	20,000	19,400	18,000	20,000
Tobacco	15,000	n.a.	n.a.	n.a.
Soybeans	2,500	n.a.	n.a.	2,200
Perennial Crops				
Palm Oil	n.a.	n.a.	n.a.	n.a.
Tea	6,000	n.a.	n.a.	n.a.
Plantains	21,000	13,387	11,600	12,000
Cacao	800	507	467	800
Coffee	650	711	500	998
Oranges	20,000	9,725	6,950	22,000
Coca Leaf	1,800	2,027	1,785	n.a.

Notes: (a) After discarding single highest reported yield.

NOTE B

SEQUENCE OF ANNUAL ACTIVITIES UNDERTAKEN BY TYPICAL FARMER IN THE TINGO MARIA - AUCAYACU AREA

The following comments are based on conversations held by Mission Staff on a field trip to Tingo María July 8-10, 1981 with three MA Tingo María experienced extension agents, who were asked to put together a composite picture of the time sequence of production activities through a one year period by a farmer using traditional technology. The interpretations are by USAID/Peru agricultural and economic staff. It suggests some significant relationships that constrain production and have led the farmer to view perennial crops as less risky than annual crops and perhaps a more profitable alternative. It sheds some light on the issue of fallow land and the relationship between farmer behavior and the constraints imposed by the physical environment.

Time Sequence of Activities

1. Clearing and burning is undertaken in the period from May to July, the relatively dry season. This is done by axe and machete, using family labor. Before burning, an activity known as chunteo, involving the cutting up and stacking of the material to be burned, takes place. The most that can be cleared during this period is approximately two ha (4.94 acres). Further, the clearing of two ha appears to be almost a full-time activity, requiring from 40 to 50 days of labor per ha. Large tree roots are left in place.

2. The planting of corn follows the urning, in August-September. Corn is planted with a stick; no land plowing or preparation is undertaken. Planting requires about four days per ha. Again, family labor is used. Seed is purchased from other farmers or taken from the farmers own stocks.

3. Approximately one month later, when the corn is about one meter high, plantains (platanos) may be planted within the corn field. The planting of plantains requires approximately 15 days of labor per ha. Plantain shoots are typically obtained from other farmers.

4. With the beginning of a heavy rainy season in September agricultural activities decline, though weed control is continuous. Other activities related to housing construction, fishing, gardening, building of corrals, are undertaken. Off-farm work may also be undertaken.

5. Corn is harvested approximatley five months after planting: December through February. This involves the harvest, desgrane (husking by hand), drying, and bagging. The process requires some 15 to 20 days of labor. Sales of corn are to ENCI and to transportistas (broker-truckers). While corn is delivered to ENCI in Tocache, it is necessary to go to ENCI's office at the small town of Naranjillo (near Tingo María) to receive payment.

6. In January or February with the corn out of the way, cacao, or sometimes coffee, is planted under the plantains. Planting requires 5 to 7 days of labor per hectare. Seed or shoots are generally obtained from other farmers. There are complaints that the cost of transporting bagged plants from MA and UNAS nurseries is prohibitive. One ha of cacao requires 625 plants. Each bag weighs 2-6 kg. Transport cost is S/. four per kg for less than 30 km and S/.10 per kg for greater distances. Thus in the Tingo Maria-Aucayacu area, the transport cost per ha of cacao is S/.5,400 to S/.15,000. The cost of seed per hectare is S/.1,200 to S/.2,400.

7. The months of February through April have heavy, daily rains. Little agricultural work, other than weed control is undetaken. In April, plantains are ready for harvest, but this can go on sporadically throughout the year.

8. An alternative to the above sequence is to forego the plantains/cacao, and follow the corn harvest with the planting of rice in January. Upland rice is planted with a stick, requiring 15 to 20 days of labor per hectare, applied at a rate of 20 kg of seed per ha. Rice seed from the MA costs S/.180 per kg. However, area farmers use seed from previous harvests if possible. The farmer attempts to complete the planting by the end of January to take advantage of February-April rains. Again, weed control after planting is important.

9. Rice harvest occurs in June-July. Harvest is by hand. Post harvest activities include drying and golpea (striking the rice against a bar so the grains fall on a blanket). Harvesting through golpea requires 2 to 3 weeks per ha.

Interpretation

The advantages of the corn-plantains-cacao system are fairly obvious. It provides an income stream for the short, medium, and long term. Reliance on hired labor is minimal. The market for plantains and cacao have been good in the past. In the subsequent dry season, the cacao and plantains will require some continuing care, but there is family labor available for additional land clearing. Therefore, in this dry period, the amount of land cleared will be somewhat lower than in the previous year.

If the farmer plants rice in January for harvesting in June, family labor available for additional land clearing is greatly reduced. If little or no new land is cleared, he is literally stuck with his original 2 ha which, having already produced corn and rice, will require purchased inputs to maintain fertility and reduce plant pests. Given that average yields for upland rice are low, the harvest of rice will not permit self-financing of these inputs and income to carry over to the next harvest. Nor can the farmer assume bank financing will be readily available. Thus the labor time competition between rice harvest and land clearing, declining soil fertility, and increasing plant pests on annual crops (requiring offsetting purchased inputs) probably tends to make farmers view the rapid establishment of perennial crops as the most secure means of maintaining land in production and guaranteeing an income stream. This may also partially explain why the nurseries indicate a strong demand for citrus plant stock now that the prices of alternative perennial crops (cacao and coffee) have fallen. The market for citrus appears secure. In terms of volume, citrus (oranges plus lemons) is the number two crop export from the region (see Table 14) despite the fact that the area does not appear to produce particularly good oranges and lemons.

The competition for labor time during the dry season does not explain why the farmer allows crop land to return to fallow. Comparing maximum yields (Table 22) notably for rice, corn and cassava with average crop yields (Table 21) suggests that the cost of maintaining high yields must be high or is perceived to be high. This high cost probably derives from depletion of land fertility and from successive increases in plant pests. Since the fallow rotation system can be observed on the most fertile, alluvial soils (Class II Soils), the suspicion in favor of burning to exterminate plant pests in anticipation of a couple of crop years appears more impressive than the use of fallow to restore fertility. The higher incidence of use of pesticides and fungicides (Table 11) also suggests the latter.

ANNEX II
EXHIBIT H

AGRICULTURAL CREDIT

AGRICULTURAL CREDIT

The FND sample and the universe of farm households outside Monzon can be distributed among the six credit/coca groups of interest. The FND sample is a self-weighting cluster sample in which the selection rate was 1:13. To extrapolate sample information to the universe, therefore, all one needs to do is use an expansion factor of 13. In all, the FND collected socioeconomic data on 385 households, which represent 5,005 households in the project area. Of these households, it is estimated that only 21.5 percent currently receive credit for crop-related activities. Moreover, 89.2 percent of the credit recipients (962 of 1,079 farm households) are estimated to be households that do not produce coca. Both of these findings are consistent with the notion that little formal credit is required in a coca-producing region, since coca producers can generally be expected to be able to take care of themselves.

According to Table 1, only 1,638 households are estimated to be coca producers. This contrasts sharply with ENACO's records, which indicate that there are 4,513 registered coca producers in the Department of Húanuco. Even allowing for coca production outside the project area, this discrepancy is severe, particularly since the 1,638 producer estimate includes producers in the Department of San Martín. One of three possible explanations for this discrepancy suggest themselves: either the Green Sea operations have substantially discouraged legitimate coca production in the area, more farm households are registered with ENACO than actually produce coca, or, most likely, survey respondents simply did not report their coca cultivation.

For the purpose at hand, this probable underreporting does not create a severe problem. In the tables in Annex II, Exhibit H, the average net crop incomes of the six categories of farm households are gradually pieced together. The major ingredients in these calculations are gross value of crop production and cash costs of crop inputs. Each of these variables is estimated by summing over the different crops that farm households report. If a respondent household fails to report its coca production, therefore, coca enters on neither the positive nor the negative side of the income ledger--and, to this extent, estimated net crop income is independent of whatever coca activity may actually take place. Nevertheless, to the extent that the crop mixes of coca and non-coca producers are different, the estimates presented here may be subject to some distortion. As discussed below, however, reported crop mixes are quite consistent with *a priori* expectations and, thus, bias, at leas on this account, is probably not that serious an issue.

Since lengthy calculations are required to estimate the variables of interest in Tables 1-5, these tables are based on a sub-sample of the FND sample. The universe size for each category of farm household is presented in the last row of Table 1. It is particularly important to note the small universe sizes for categories V and VI. These few observations do not reflect any vagaries in sampling procedures. Rather, they hinge on the fact that categories V and VI reflect a very atypical phenomenon: a coca-producing farm household that uses formal credit.

As prelude for understanding differences in net crop income estimates, Table 1 presents the average crop mix of each farm household category. A number of rather distinct patterns emerge from the table:

- Cassava hecterage increases as coca hectareage increases. This is consistent with the a priori expectation that cassava is used as a "wage good" to feed coca leaf harvesters.

- Coffee hectareage also appears to be positively associated with coca hectareage, at least on farm with no credit. (The failure of a consistent pattern to emerge across the last three categories may be because of the few observations for categories V and VI). This probably reflects the fact that much coca land may be suitable for no other non-coca crop except coffee.

- Plantain and cacao hectareage are inversely related to coca hectareage. (This is consistent across all categories for plátano; for cacao, it is consistent across only the first three categories--which may be due again to the paucity of observations for categories V and VI). This reflect two phenomena: first, the plantain is often used to shade cacao plantings; and, second, that in the absence of programs to promote other crops plantain and cacao may be the crops that will expand the most in the project area upon coca eradication.

- Corn hectareage is positively associated with credit (at least if category VI is ignored because of its small subsample size). This suggests that credit, when it is used, is often associated with land clearing and expansion--since corn is the crop most commonly planted on freshly cleared land.

The survey results presented in Table 2 parallel the results in Table 1, except that the entries are presented in value rather than hectareage terms. The table shows dramatically the importance of coca in gross crop income. With the exception of the deviation from the pattern by farm household category V, gross value of cro production rises as coca hectareage rises. Moreover, for farmers with no credit and up to one hectare of coca, coca production accounts for almost one third of the gross value of production; for farmers with no credit and more than one hectare of coca, the percentage rises to almost two thirds. At pre-Green Sea prices, these percentages would be even higher. The table also reveals that the other major contributors to gross crop income are cassava, cacco, plantain, and, for certain farm household categories, corn and rice.

Table 3 complements Table 2 by presenting a breakdown of the average cash costs of crop inputs for each category of farm households. Three items are worthy of particular note:

- First, there is wide variation in the use of cash inputs. Levels range from a low of S/.36,035 for category V to a high of S/.1,257,300 for category VI. Moreover, even if these categories are ignored because of small subsample size, there is still well over a threefold spread between the cash inputs reported by category IV households and the cash inputs reported by category II households.

- Second, for all categories of farm households, labor makes up the lion's share of cash costs. Crop production in the Upper Huallaga is clearly labor intensive.

- Third, cash input use does not appear to bear a direct relation to credit use. Again, this finding is consistent with the hypothesis that credit use may be primarily associated with land clearing.

Table 4 present the average levels of credit received by the different categories of Upper Huallaga farm households. The levels are relatively small and, with the exception of category IV, most credit is short-term. At first blush, this finding appears to contradict the hypothesis of a positive association between credit and land clearing but may in fact reflect nothing more than the greater availability of short-term rather than medium-term financing: if short-term credit can be obtained, it frees up household resources for medium-term investments.

Table 5 integrates the findings presented in Tables 1-4 and sets the stage for the actual estimation of crop input credit requirements for the project area following coca eradication. The table reveals a number of important, if complex, relationships:

- For farm households without credit, net crop income rises as coca hectareage rises, though perhaps not as dramatically as one might expect for category II.

- The net crop incomes of credit recipients with coca are lower than the net crop incomes of credit recipients without coca. This result may be due to the small subsample sizes in categories V and VI but, more likely, reflects the probability that these categories of households are incipient coca producers. Established coca producers would be expected to have little need for formal credit. It would only be incipient producers who would be unable to finance their cash costs out of coca earnings.

- The differences in net crop income between categories IV and I suggests that credit can be expected to have sizable positive impact. This is true even if category IV's strinkingly low level of cash inputs is increased to the category I level.

- The estimates of net crop income per hectare are somewhat surprising, even if the incipient coca production explanation is accepted for categories V and VI. One surprising result is the lower net crop income per hectare estimate for category II than for category I. It is important to note, however, that the hectare figure used in these calculations is the average crop hectareage reported by respondents for their farms as a whole. In contrast to the figures in the last row of Table 1, it is not built up by summing over individual crops. If the Table 1 figures, which include multiple cropping and intercropping, are used in the net crop income per hectare calculations, then a different picture emerges, with estimates of S/.95,470 and S/.124,151 for categories I and II, respectively. 1/ Thus, the counterintuitive result in Table 5 is probably due to more intensive cropping (either multiple cropping or intercropping) on non-coca farms. A second surprising result is the relatively low per hectare net crop income estimate for category IV. In this case, the explanation is most likely a data error. The figures in the last row of Table 1 should be equal to or greater than the corresponding amounts in Table 5. For category IV, however, the two estimates are 7.355 and 11.0, respectively. Unfortunately, existing information is not adequate to resolve this obvious discrepancy but if the lower figure is accepted (and it is this figure on which the calculation of gross crop income and cash costs is based), category IV's per hectare net crop income estimate becomes S/.160,993, which falls more into line with <u>a priori</u> expectations.

- The cropping patterns of category I farm households are probably closest to the patterns that would characterize the Upper Huallaga upon the eradication of coca and in the absence of infusions of additional liquidity into the project area. At an exchange rate of US$1.00 = S/.400.00, the per capita net crop income of these households is approximately $181. Even if we made the liberal assumption that net crop income makes up only one third of total household income, this would mean that the typical non-coca producing Upper Huallaga farm household member would have an income of less than $550, which is the cutoff that is commonly used to characterize AID target groups. Thus, the FND survey data suggest that the beneficiaries of this project are households falling within AID's Congressional mandate.

1/ The differences in the category II estimates are probably attributable to rounding error in estimating average crop hectareage in Table 1.

Estimation of the requirements of the Crop Input component of the credit program is premised on the crop patterns of category IV farm households. In the absence of coca in the project area, it is assumed that a typical Upper Huallaga farm household would require approximately S/.136,929 of crop input financing a year. It is important to note that this figure may be an underestimate. As discussed above, the actual requirement may be closer to category I's level of cash inputs, namely, S/.216,988. Thus, the use of the category IV estimate is an appropriately conservative measure of need.

With 5,000 credit-eligible farm households in the project area, the total amount of crop input financing required in any one year will be S/.684,645,000. Since part of this liquidity would be used for the establishment of permanent crops, however, the entire amount can not be expected to turn over each year. From the FND data, it is estimated that 48.6 percent of category IV farm households' cash inputs are associated with permanent crops. Part of this percentage is undoubtedly associated with permanent crops that are already in production. With coca eradication, however, a relatively high proportion of permanent crop cash inputs can be expected to be used for the establishment of permanent crops. It is assumed in what follows, therefore, that 40 percent of crop input requirements will be medium-term requirements. It is also assumed that this financing can be expected to turn over every 2.5 years. Under these assumptions, gross crop input requirements can be estimated as:

Short term (.60 x S/.684,645,000)	S/. 410,787,000
Medium terms (2.50 x .40 x S/.684,645,000)	684,645,000
Total:	S/.1,095,432.000

These are gross requirements. To arrive at net requirements, that is, the level of financing required for the Crop Input component of the credit program, current credit availability, which will be assumed to continue in the future, must be substracted from the gross amount.

TABLE 1

Crop Mix of Upper Huallaga Farm Households by Credit Use and

Hectareage in Coca Production*

	Farm Household Categories											
	I No Credit No Coca		II No Credit ≤ 1 Ha.Coca		III No Credit > 1 Ha.Coca		IV Credit No Coca		V Credit ≤ 1 Ha.Coca		VI Credit > 1 Ha.Coca	
Crop	Ha.	%	Ha.	%	Ha.	%	Ha.	%	Ha.	%	Ha.	%
Maíz	1.152	20.5	.910	20.6	.648	10.4	2.775	37.7	2.000	34.6		
Arroz	1.050	18.7	.180	4.0	.312	5.0	.520	7.0	.357	6.1	3.000	42.8
Yuca	.522	9.3	.780	17.6	1.296	20.9	.585	7.9	.785	13.5	1.500	21.4
Soya			.025	0.5			.220	2.9				
Maní	.025	0.4					.030	0.4				
Frijol	.050	0.8	.012	0.2			.025	0.3	.018	0.3		
Té					.199	3.2						
Plátano	.940	16.7	.650	14.7	.525	8.4	1.200	16.3	.514	8.8	.500	7.1
Cacao	1.302	23.2	.585	13.2	.224	3.6	1.080	14.6	1.600	27.6		
Cítricos	.150	2.6	.275	6.2			.345	4.6	.071	1.2		
Café	.060	1.0	.440	9.9	1.001	16.1	.575	7.8	.071	1.2		
Jebe	.350	6.2										
Coca			.500	11.3	1.780	28.7			.290	5.0	2.000	28.5
Piña			.060	1.3	.175	2.8			.071	1.2		
Otros Cultivos					.025	0.4						
Total	5.601	100.0	4.417	100.0	6.185	100.0	7.355	100.0	5.777	100.0	7.000	100.0
Farm Universe Euch Category	2,405		780		741		962		91		26	

*Source: Fundación subsample. Totals include multiple cropping and intercropping. Percentages do not sum to 100 percent because of rounding.

TABLE 2

GROSS VALUE OF CROP PRODUCTION OF UPPER HUALLAGA FARM HOUSEHOLDS BY CREDIT USE AND HECTAREAGE IN COCA PRODUCTION *

	Farm Household Categories											
	I No Credit No Coca		II No Credit ≤1 Ha. Coca		III No Credit >1 Ha. Coca		IV Credit No Coca		V Credit ≤1 Ha. Coca		VI Credit >1 Ha. Coca	
Crop	S/.	%	S/.	%	S/.	%	S/.	%	S/.	%	S/.	%
Maíz	81,330	10.8	52,500	5.0	34,830	1.8	163,388	12.0	91,432	17.5		
Arroz	86,856	11.5	27,081	2.5	33,390	1.7	50,920	3.7	21,821	4.1	534,000	31.3
Yuca	179,857	23.9	99,672	9.5	206,753	10.7	166,397	12.2	54,286	10.4	315,000	18.4
Soya			2,250	0.2			58,500	4.3				
Maní	8,250	1.0					5,907	0.4				
Frijol	2,000	0.2	1,500	0.1			1,950	0.1	714	0.1		
Té					32,400	1.6						
Plátano	102,900	13.6	142,393	13.5	43,375	2.2	448,380	33.1	65,571	12.5	90,000	5.2
Cacao	237,600	31.6	202,703	19.3	48,720	2.5	211,470	15.6	101,263	19.4		
Cítricos	45,000	5.9	68,250	6.5			48,342	3.5	3,750	0.7		
Café	7,920	1.0	90,540	8.6	147,263	7.6	198,750	14.6	7,543	1.4		
Coca			310,458	29.6	1,242,700	64.7			173,880	33.3	764,750	44.8
Piña			50,318	4.8	131,250	6.8			1,143	0.2		
Total	751,713	100.	1,047,665	100.0	1,920,681	100.	1,354,004	100.0	521,403	100.0	1,703,750	100.0

* Source: Fundación subsample. Percentages do not sum to 100 percent because of rounding.

Cash Costs of Crop Inputs of Upper Huallaga Farm Households by Credit Use and Hectareage in Coca Production *

	Farm Household Categories											
	I No Credit No Coca		II No Credit ≤ 1 Ha. Coca		III No Credit > 1 Ha. Coca		IV Credit No Coca		V Credit ≤ 1 Ha. Coca		VI Credit > 1 Ha. Coca	
Input	S/.	%	S/.	%	S/.	%	S/.	%	S/.	%	S/.	%
Mano de Obra	209,632	96.6	478,400	95.8	371,965	88.2	124,000	90.5	26,286	72.9	1,220,000	97.0
Abonos	2,610	1.2	1,875	0.3	14,183	3.3	150	0.1	664	1.6	4,750	0.3
Pesticidas			12,903	2.5	31,309	7.4	3,539	2.5	4,225	11.7		
Semilla Mejorada	4,746	2.1	6,111	1.2	4,095	0.9	9,240	6.7	4,860	13.4	32,550	2.5
Total	216,988	100.0	499,289	100.0	421,552	100.0	136,929	100.0	36,035	100.0	1,257,300	100.0

*Source: Fundación subsample. Percentages do not sum to 100 percent because of rounding.

TABLE 4

Credit Received and Estimated Interest Paid by Upper Huallaga Farm Households for Crop-Related Activities by Credit Use and Hectareage In Coca Production 1/

(Soles)

	Farm Household Categories					
	I No Credit No Coca	II No Credit ≤ 1 Ha.Coca	III No Credit >1 Ha.Coca	IV Credit No Coca	V Credit ≤ 1 Ha.Coca	VI Credit >1 Ha.Coca
Monto						
Corto Plazo				75,700	32,571	100,000
Mediano Plazo				124,000 2/	7,857	
Total				199,700	40,428	100,000
Intereses						
Corto Plazo 3/				15,613	6,718	20,625
Mediano Plazo 4/				17,360	1,100	
Total				32,973	7,818	20,625

1/ Source: Fundación subsample

2/ Includes S/. 9,250 for "Construcción e Instalación." It is possible that part or all of this amount may have been for livestock-related activities.

3/ For short-term loans, it is assumed that the interest rate is 27.5 percent annually and that loans are repaid in nine months.

4/ For medium-term loans, it is assumed that the interest rate is 14 percent annually.

TABLE 5

Net Crop Income of Upper Huallaga Farm Households by Credit Use and Hectareage in Coca Production*

(Soles).

	Farm Household Categories					
	I No Credit No Coca	II No Credit ≤1 Ha. Coca	III No Credit >1 Ha. Coca	IV Credit No Coca	V Credit ≤1 Ha. Coca	VI Credit >1 Ha. Coca
Gross Value of Crop Production	751,713	1,047,665	1,920,681	1,354,004	521,403	1,703,750
Cash Costs of Crop Inputs	216,988	499,289	421,552	136,929	36,035	1,257,300
Interest				32,973	7,818	20,625
Net Crop Income	534,725	548,376	1,499,129	1,184,102	477,550	425,825
Ha. in Crops	4.0	4.5	6.0	11.0	5.9	7.0
Net Crop Income/ Ha. in Crops	133,681	121,861	249,855	107,646	80,941	60,832
Household Size	7.4	6.8	7.1	7.1	7.9	7.5
Net Crop Income Per Capita	72,260	80,644	211,145	166,775	60,449	56,777
	180	201	528	417		

*Source: Fundación subsample.

ANNEX II
EXHIBIT I

INSTITUTIONAL ANALYSIS OF ADDITIONAL IMPLEMENTING AGENCIES

INSTITUTIONAL ANALYSIS OF ADDITIONAL IMPLEMENTING AGENCIES

National Agrarian Research and Promotion Institute (INIPA)

Research and extension activities in the Project Area will be implemented through an agreement between the Special Project and the National Agrarian Research and Promotion Institute (INIPA). The process of combining agricultural research and extension in one decentralized governmental agency at the national level began in the final months of the Revolutionary Military Government (1979/1990.) During the latter half of 1979, USAID/Peru financed a joint GOP/US Title XII University baseline study of the Peruvian agricultural research, extension, and education (REE) system. One of the principal conclusions of the REE baseline study was the recognition of the need to integrate, to the maximum extent possible, the functions of research and extension, especially at the field level.

Acting upon this conclusion, the outgoing Minister of Agriculture ordered the creation of an autonomous agricultural research agency (The National Institute for Agricultural Research - INIA) as a first step towards the creation of an independent institute which would combine agricultural research and extension. The Minister was convinced of the need to join research and extension but decided that the outgoing military government should leave the implementation of that task to the incoming elected government. One of the first orders of business of the Belaunde administration was to undertake an in-depth evaluation of the Ministry of Agriculture (including a through review of the REE baseline study) which resulted in the passage of a new organic law for the Ministry. A principal feature of the new law was the establishment of the National Agricultural Research and Promotion Institute (INIPA) which combined research and extension in a single semi-autonomous institution. The head of the new institute and key staff were named in March 1981, and are currently in the process of transferring personnel from various elements of the Ministry and the former INIA into the new structure of INIPA. Field activities of INIPA will be carried out by 18 decentralized units called Agricultural Research and Promotion Centers (CIPAs). In the Project Area, INIPA is establishing a zonal office which will report to the regional CIPA in Huanuco.

1. Extension Activities

INIPA is currently involved in a complete reorganization of field staffing and personnel for its extension activities. Prior to the reorganization, 18 professionals and 29 agricultural technicians (sectoristas) were assigned to four Ministry of Agriculture extension agencies in the Project Area:

AGENCY	AGRONOMISTS	VETERINARIANS	TECHNICIANS
Tingo Maria	7	1	8
Aucayacu	4	1	9
Uchiza	1	1	8
Tocache	2	1	4
	14	4	29

Some of these personnel are being transferred to INIPA and others are being retained by the MA General Directorate of Agriculture and Livestock to work in MA control, inspection, and licensing activities.

With an estimated 6,000 farm families in the area, the ratio of extension personnel to farmers was approximately 1:128. The limited outreach of the extension service was further handicapped by the lack of vehicles and operating funds for gasoline and other expenses as well as the complete lack of extension materials and in-service training programs to upgrade their limited technical skills.

The extension service impact on adoption of new agricultural technology has been extremely limited over the past several years. The expansion and upgrading of the extension service as well as the procurement of vehicles, equipment and supplies, and the funding of operating expenses proposed under the Project should allow the extension service to play a strong role in delivering improved technology to the farm level. Special attention will be given to intensive refresher training and continuous in-service training to assure that extensionists are up-to-date on new technology which will assist farmers in maximizing production and income.

2. Agricultural Research Activities

INIPA operates an experimental station at Tulumayo, about midway between Tingo Maria and Aucayacu. The station is located on some 429 hectares of flat and gently sloping ground adjacent to the Marginal Highway near the confluence of the Tulumayo and Huallaga rivers. Some 10 hectares are planted in experimental crops. The Tulumayo Experimental Station has been in existence since 1963 and is currently operating with a greatly reduced staff of five researchers and four technicians plus a crew of farm laborers. Research work is concentratated on rice, soybeans, corn, cacao, coffee, aguaje (a native palm), and pastures. The station does not have laboratories nor equipment for analyzing field experiments and soil testing. The National Agrarian University has provided some limited technical backstopping in soils analysis and special research projects in corn and citrus. In addition to short staffing and lack of equipment, the Tulumayo station has also been seriously handicapped by budgetary limitations.

The Tulumayo Experimental Station has two sub-stations located at La Lisoria and at Tocache. The crop research at La Divisoria is concentrated on coffee, tea and potatoes and at Tocache on rubber, cassava and soybeans. The staffing increases, facilities improvement and expansion, equipment procurement, and increased operating budget proposed under the Project should enable the station at Tulumayo and sub-stations at La Divisoria and Tocache to develop a series on income maximizing technological packages for dissemination by the extension service.

The National Agrarian University of the Jungle (UNAS)

The National Agrarian University of the Jungle was established in 1964, occupying and expanding upon the facilities used by the original U.S. Government Institute of Inter-American Agricultural Affairs (IIAA) Experimental Station at Tingo Maria. The current enrollment at UNAS is approximately 900. In July 1981, some 45 students graduated including 20 agricultural engineers, 12 zootechnical engineers and 13 food-processing engineers. Another 15 students will graduate in December 1981. The UNAS has recently added a program for a degree in renewable national resources. The UNAS has 76 faculty members with plans to increase to 100 in 1982. Thirty-five of the 76 faculty members have Master of Science degrees and two are currently studying for Masters Degrees in the U.S. under LASPAU scholarships.

Under an agreement with the INM office of the U.S. Embassy, the UNAS is conducting an adaptive research/extension program at 11 pilot centers in the Project Area. Each center serves an area of 20 km2 and 15-30 farmers with one agricultural engineer and one agricultural technician providing technical advice on demonstration plots in cacao, tea, coffee, corn, rice, bananas, cassava, and papayas. INM is also financing a program under which the UNAS provides seedlings to farmers interested in switching from coca production to other crops. The UNAS has a rudimentary soils lab and pilot food processing plant. Additional equipment and supplies are required to make the soils lab reasonably functional. The pilot food-processing plant has serious limitations with respect to size and efficiency of operation, and will not be assisted under the Project.

Credit Institutions

1. The Agrarian Bank of Peru

The Agrarian Bank is a public sector banking institution which has been in existence since 1931. The Agrarian Bank has some 3,316 employees and operates 19 branch offices and 64 agencies country-wide. During 1980, the Bank made 107,744 loans totalling $585,700,000 at the 1980 exchange rate.

The Agrarian Bank is now in the process of transition. During the period of the Military Revolutionary Government (1968-1980), the

Bank concentrated on providing credit to the associative enterprises (production cooperatives and social interest societies) created under the Velasco government's agrarian reform program. Service to independent small and medium-sized farmers dropped off markedly during this period. The Belaunde administration has made a major effort to reorient the Agrarian Bank towards independent producers and has increased the Bank's authorized capital from $150,000,000 in 1980 to $250,000,000 in 1981.

In the Project Area, the Agrarian Bank operates a branch office in Tingo Maria and agencies in Aucayacu and Tocache. (See Section II.B.3. Agricultural Services and IV.B.2. for additional information on Bank operations in the Project Area.)

2. The National Cooperative Bank (BANCOOP)

The National Cooperative Bank (BANCOOP) was established in April 1967 to provide financial services to its member cooperatives. It now has 12 branch offices operating in various parts of Peru in addition to its Lima office. Several branches also have agency offices. Starting in 1976, BANCOOP evolved into a financial institution that both captured resources from the general public and lent to individuals not just cooperatives. BANCOOP is very small compared to most commercial banks in Peru. Its loans in 1980 did not exceed nine percent of the loans made by any one of the top eight commercial banks. With total assets of S/. 4,761,000,000, BANCOOP made loans totalling S/. 3,370,000,000 in 1980, more than 265% of the amount made in 1979. This rapid growth in loans was made possible by the BANCOOP's success in resource mobilization which was enhanced by a two-year AID-assisted project. BANCOOP was the first cooperative institution in Peru to implement a policy of both paying and charging real interest rates on both savings and loans.

In the Project Area, BANCOOP has both a branch office in Tingo Maria and an agency in Aucayacu. Another agency office is planned about midway between Tocache and Tingo Maria. In 1980, BANCOOP loans in the Project Area were up over 436% form 1979 levels and totalled $764,000. The December balance of loans for direct agricultural purposes in 1980 was $218,000. Most of the loans made for agricultural purposes in the area were made to cooperatives for short-term commercialization and not to individuals.

BANCOOP is not a full-service commercial bank. It issues sight drafts rather than real checks and their clearance is dependent upon maintenance of agreements with specific commercial banks. The national decline in the viability of cooperatives has played a large part in BANCOOP's shift to doing business with individuals rather than cooperatives. The Project contemplates providing the incentives required to permit BANCOOP to increase its lending.

Marketing and Storage Institutions

1. National Agricultural Input Marketing Enterprise (ENCI)

ENCI was created in 1974 as a public sector commercial enterprise charged with the responsibility for nationwide fertilizer distribution. This involves domestic purchase (estimated at 60% of total ENCI purchases in 1979) and import of fertilizer and its transport, storage, and retailing through some 380 fertilizer sales outlets. Some 85% of these outlets are licensed private sector agents and the remaining 15% are cooperative enterprises. Of the outlets 16% are located on the coast, 76% in the sierra, and 8% in the selva.

In mid-1979, the Public Enterprise for Agricultural Services (EPSA) was merged into ENCI to form a single integrated state enterprise responsible for agricultural input and output marketing. EPSA had previously handled the government price support/purchasing programs in corn, soybeans, potatoes, and other food crops. ENCI continues to operate a purchasing program for corn and soybeans but is no longer involved in the purchase of other commodities.

In the Project Area, ENCI markets fertilizer through its regional warehouse/office in Tingo Maria as well as through the Agricultural Services Cooperative Naranjillo in Tingo Maria and a private distributor in Aucayacu. ENCI also purchases corn and soybeans in the Project Area at its buying stations in Tingo Maria, Nuevo Progreso (Uchiza), and Tocache. ENCI and EPSA both suffered from poor management, inadequate budgets, and liquidity constraints which consistently hampered their effectiveness. The Belaunde administration is working on plans to greatly reduce or eliminate the role of the state (i.e. ENCI and ECASA) in produce marketing and to encourage the private sector to take a much stronger role in such activities. As an interim measure, the Ministry of Agriculture is considering a merger of ENCI and ECASA.

A continuing Project Area complaint against ENCI (and its predecessor EPSA) is related to its failure to make payment consistently and rapidly upon receipt of commodities from farmers. The inability to purchase or the prolonged delay in payment was caused by ENCI/EPSA's lack of liquidity at peak harvest periods. GOP plans to combine and streamline ENCI and ECASA operations should assist in overcoming the liquidity problem and also would make more efficient use of ENCI and ECASA's grain reception and storage facilities. The technical assistance proposed under this Project will contribute to improving local purchasing and storage procedures and will identify requirements for additional improvements, operating capital, and investments.

2. The Rice Marketing Enterprise (ECASA)

ECASA was created in mid-1980 to operate the national rice purchasing and distribution monopoly, formerly the responsibility of EPSA and then absorbed by ENCI in the 1979 merger of the two institutions. ECASA inherited the nationwide bying station and warehouse network from ENCI/EPSA which includes buying stations at Tingo Maria, Aucayacu, and Tocache in the Project Area.

In general, ECASA has operated more efficiently than its predecessor agencies and has not been plagued as much by bureaucratic delays and liquidity problems, due in large part to the intense and continuing interest of the Minister of Agriculture (a former rice producer) in rice marketing. The proposals for combining and streamlining ENCI/ECASA operations should contribute to even better service for farmers. Under an agreement with ECASA and ENCI (or the proposed combined marketing agency), the Special Project will contract for construction of a new grain storage facility in Tocache and the procurement of specialized equipment related to grain storage. The Special Project Office will maintain close liaison with both ECASA and ENCI to ensure that Project storage and marketing requirements are met.

Institutions Involved in the Development of Resource Information

1. Ministry of Agriculture Sector Statistics Office (OSE)

The Sector Statistics Office is a staff unit of the Ministry of Agriculture, responsible for collecting, processing, and publishing agricultural statistical information. OSE has 35 employees in Lima and 280 field personnel located throughout the country. Three OSE technicians are assigned to the Project Area. The Peruvian agricultural data system has experienced a steady deterioration over the past five years due to extreme budgetary deficiencies and the continuing confusion generated by three major reorganizations of the Ministry of Agriculture. Many of the most qualified personnel have left to seek other employment and those who have remained have been handicapped by low budgets and mediocre leadership. A major effort will be required to revamp and revitalize the agricultural statistics system. Towards this end, USAID/Peru has assisted in introducing a centrally funded AID/W project to apply the area sample frame methodology in two *sierra* departments.

2. National Office of Natural Resources Evaluation (ONERN)

ONERN was established in April 1962 as a division of the Ministry of Development and Public Works. Following intra-governmental transfers to the National Planning Institute (INP) and the Office of the Presidency, ONERN became a decentralized public entity under the Office of the Prime Minister in 1973 and was just recently (1980) repositioned under the INP. ONERN employes 58 professionals, 30 technicians, and 66 administrative and support personnel--all located at ONERN's Lima office. Under this Project, the Special Project Office will enter into an agreement with ONERN to finance the preparation of a resource study of the Project Area.

The objectives of ONERN are: a. to prepare integrated natural resource inventory studies oriented to the economic and social development of Peru. b. to cooperate with the National Planning Institute in the formulation of policies for the use and conservation of natural resources; and, c. To study the inter-actions at the national level between man and his natural environment with the intention of proposing measures to preserve balanced ecological development.

ONERN has been an important institution in high jungle development; its resource studies have served as the basis for investment projects in such areas as Jaen/Bagua/San Ignacio and Huallaga Central/Bajo Mayo, and are also being used as the basis for the AID and IDB projects being developed for the Pichis/Palcazu/Pachitea area. The initial IDB colonization project (1965 – 70) in the upper Huallaga area was based upon the first reconnaissance-level resource study prepared by the Servicio Cooperativo Interamericano de Fomento (SCIF), the predecessor organization of ONERN. Since that first venture, ONERN has completed over 50 resource studies and is recognized as one of the leading institutions in its field in Latin America. AID supported ONERN in the late 1960s with a $1.8 million loan to prepare resource inventories for key coastal river valleys. In addition, AID is financing a $1 million FY 1981-83 grant project to assist ONERN to upgrade its technical capacity to use advanced technology for environmental planning and resource conservation.

3. The National Rural Cadaster Office (OGCR)

OCGR is a staff office of the Ministry of Agriculture responsible for carrying out and maintaining a cadaster of the rural areas of Peru. OGCR employs six professionals, 64 technicians, and 16 administrative and support personnel at its Lima headquarters. In addition, about 60 cadaster technicians are assigned to the regional offices of the Ministry of Agriculture, including five technicians in the Huanuco office which serves the Project Area. In addition, one professional and three technicians are assigned to the MA office in Tingo Maria, and are responsible for maintaining and expanding the rural cadaster for the Project Area.

In general, the OGCR is considered a technically competent institution, although continual budgetary constraints have resulted in program shortfalls and inability to maintain the rural cadaster in an effective manner. The majority of the original titling for the Project Area was carried out during the IDB-supported colonization project, particularly in the area to the north of Tingo Maria. The cadaster for about half of the Project area was updated in 1979/1980.

Ministry of Transportation and Communications (MTC)

The Project is located within the area served by the Huanuco Regional Office and the Tingo Maria Subregional Office of the Ministry of Transportation and Communications (MTC). The Tingo Maria office operates four maintenance camps which are located along the Marginal Highway between Tingo Maria and Puerto Pizana. The camps are under-equipped and understaffed and, as a consequence, the Marginal Highway and the supporting feeder road network are inadequately maintained. Two of the MTC camps are currently being used for the road upgrading and construction which is being carried out between Aucayacu and Madre Mia and between Puerto Pizana and Campanilla.

When the Ministry of Transportation and Communications was reorganized under the Military Revolutionary Government, a semi-autonomous new agency called the Mechanical Equipment Service (SEM) was created. SEM's function is to rent the heavy equipment needed for road construction and maintenance to the MTC regional offices. The rationale for this arrangement was that if part of its income were dependent upon equipment rental, SEM would be more likely to keep the equipment in satisfactory operating condition. Unfortunately this reasoning did not work and SEM's record of equipment availability and maintenance is very poor, in large part because SEM does not have adequate maintenance facilities and has not had sufficient liquidity and reserves to purchase the continuing supply of spare parts necessary to keep the machinery operational. SEM equipment in the Project Area consists of a D7 tractor, a motorgrader, a front loader, 4 dump trucks, a lubrication truck, a roller, and 2 pick-ups. In general, the condition of this equipment is poor with long idle periods due to lack of maintenance and spare parts.

The current MTC practice is to contract for most major road construction and upgrading jobs. For example, the upgrading of the Marginal Highway between Aucayacu and Madre Mia and Puerto Pizana and Campanilla and repair of the bridges at Cachiyacu and Punta Areas have been contracted out. Some smaller jobs such as the upgrading of parts of the feeder road network have been done by force account although this work has been extremely limited due to the lack of operating equipment and budgetary resources.

In the Huallaga Central/Bajo Mayo Project area, the Special Project has entered into an agreement with the Ministry of Transportation and Communications to review and approve all road design and construction contracts and also to assist the Special Project in supervising the construction of roads and bridges financed under the Sub-Tropical Lands Settlement Project. The Special Project has then contracted directly with private firms for road design, construction, and supervision. The system has worked well and has allowed road design and construction to move at a faster pace.

The maintenance portion of the Sub-Tropical Lands Development Project also operates on the basis of an agreement between the Special Project and the MTC under which road maintenance equipment is purchased by the Special Project Office and then turned over to MTC along with supplementary budget support for maintenance of the road system in the Project Area.

It became clear fairly early in Project implementation of the Sub-Tropical Lands Development Project that the lack of an adequate equipment maintenance capability was a major constraint to keeping the roads well maintained in the Project Area. With the heavy seasonal rainfall in the area, the major trunk roads between Tarapoto and Juanjui and Yurimaguas, were frequently in very bad condition. Based upon this experience with road maintenance under the Sub-Tropical Lands Development Project, emphasis has been placed upon providing for adequate road maintenance in the upper Huallaga Project Area.

Ministry of Health, Directorate of Sanitary Engineering

The entity which will plan, implement and manage the potable water and environmental sanitation component of the Project is the Directorate of Sanitary Engineering (DSE) of the Ministry of Health(MOH). The MOH is responsible nationwide for the construction of water and sewer systems in communities under 2000 population. At both the central level and in the field, the DSE coordinates and supervises the environmental sanitation programs of the Ministry. For the past 15 years, the DSE has demonstrated its capacity to design, implement, and manage rural sanitation projects throughout Peru, including a several-phased IDB loan and a $5.5 million AID loan (527-U-074).

Currently, the DSE has a sub-regional office in the Tingo Maria Hospital Area which serves the provinces of Leoncio Prado in the department of Huanuco and Mariscal Caceres in the department of San Martin and thus encompasses the entire Project Area. The Tingo Maria office has one sanitary engineer and support personnel from the Hospital Area staff. Over the five-year life of the Project, the DSE sub-regional office will be responsible for implementing 10 gravity systems with sanitary units, 70 deep wells with manual pumps, 40 shallow wells, and 145 latrines.

ANNEX II
EXHIBIT J

GRAIN STORAGE AND DRYING INSTALLATION

GRAIN STORAGE AND DRYING INSTALLATION

Grain Storage

The analysis shows that for an installation of 2,100 MT, the optimum bin size is 24ft x 33ft. For taller bins, the cost per bin of stored grain is normally higher than this size because of heavier structural requirement. If the height is less than 33 ft, the cost per bin of stored grain increases. The installation of seven 24-ft diameter x 33-ft cane height corrugated grain bins is recommended. The design takes into consideration the need for future expansion. Present flat storage for bagged grain needs to be used along with the proposed bulk storage.

The proposed system will also have a bagging facility. The layout of the proposed system is presented in Figure 1. Trucks will enter into building (29). No. 27 represents the office room required for record keeping, grading, and temperature monitoring of the stored grain. A rise in temperature of about 10°F or above the level of ambient temperature indicates grain heating. If the grain heats up, the bin should be emptied and grain put in another bin or, preferably, marketed quickly.

The incoming bags will be weighed in the weighing station (30) which will be provided with a few platform scales. After grading is done, a decision will be made if the grain requires cleaning. Cleaning provides insurance against grain spoilage and insect infestation. If the grain needs cleaning, it goes to first intake point (10) which is a precleaner. The bags are opened manually, and grain enters into the boot of the elevator attached to the precleaner. After cleaning, the grain can either be put into the drying bin (1) or into any of the seven storage bins (2 to 8) according to the moisture level, by using bucket elevator (9) with a distributor. We recommend drying the grain to 13% mc. The peak of the drying bin is only about 18 ft up in the air while that of the storage bins is about 40 ft, which is why drying bin can be filled by gravity spouts while (4), (5), and (8) cannot. Nos. (13) to (18) represent gravity spouts, while (19), (20), and (21) are bin-filling auger conveyors installed on the bin top. For unloading grain from the bins, bin-unloading augers (31) to (38) will be used; the unloading augers will deposit the grain to the U-trough augers (22) through (25), for carrying the grain to the elevator boot. U-trough (26) will need underground installation for facilitating truck movement over it.

The elevator will elevate the grain to a bagging surge bin (11) underneath which the bagging garner bin and the pneumatically operated bag closers will be located. The bag conveyor (12) will then carry the grain to the waiting truck. The bagging machine can be set for standard weight of grain in the bag as desired. Platform scales will only be needed fof random check to determine if the weighing machine needs adjustment. Whenever a shortage of space in the storage bins is anticipated, the grains should be moved to the existing warehouse after bagging.

Based on the above-mentioned system, a cost estimate was developed and is attached. The estimated total cost, excluding freight and construction, is $331,245. Equipment will be imported from the U.S.A. Need for export crating will increase the cost by about 10%. Considering overseas travel, mobilization of resources and some inconveniences, many erectors may charge more than 25% of the cost of equipments for their services.

Total ex-factory (FOB) price of equipments	$ 270,045.00
Export crating at 10%	27,005.00
Erection cost at 25%	67,511.00
Ocean and inland freight at 15%	41,000.00
	405,561.00
Local cost of building offices and housing	61,200.00
	$ 466,761.00

Based on current prices for administrative expenses, supplies, supervision, and overhead, the Project will cost approximately $500,000. This cost estimate assumes that no taxes will be levied on the imported materials and equipment.

Drying Facilities

The Project Area has enough storage capacity to handle the expected increase in the grain production for the first two years, except in Tocache. The present storage spaces are under-utilized due to a lack of grain-drying facilities. The drying needs of this area are pressing and dryers will be installed in both Tingo Maria and Progreso. These dryers will dry about 1,000 MT of corn in a 30-day period. The dryer capacity is 55 bushels per hour:

$$\frac{(1000)\quad(2204)}{(30)\ (56)\ (24)} = 55 \text{ Bw/hr}$$

= 3080 lb/hr

Water removed/lb. of grain (22% to 13% m.c.)

= 0.1166 lb/lb

Rate of water removed/hr. = (0.1166) (3080)
360 lb/hr

Airflow dfm = (33) (452.16) = 14921.28 cfm

Airflow, lb/hr = $\frac{14921.28 \times 60}{13.55}$

= 66072 lb/hr

Rate of Diesel oil = (0.1622) (360)

= 58.4 lb/hr

Heat from Diesel, Bhr/hr = (0.8) (18500) (58.4)

= 864320 Bhr/hr

Bhr added to air, Bhr/lb = $\frac{864,320}{66072}$ = 13.1 Bhr/lb

Enthalpy of the hot air = 29.3 + 13.1

= 42.4 Bhr/lb.

A dryer similar to the one in Tocache will be adequate. The dryers will have similar specifications to Satake dryers presently under use in the ECASA Tingo Maria facility with 250 kg per hr drying rate each. Six such dryers will be needed. The dryers are estimated at $18,500 each, based on current market prices. For Tingo Maria and Progreso, the investment for dryers is $220,000, or $110,000 for each warehouse. The power source including electrical system and one stand-by generator is estimated at $75,000.

COST ESTIMATE

COST ELEMENT	UNIT COST (US$)	QUANTITY	TOTAL COST (US$)
A) Bins			
(1) Stor-N-Dry Bin 24' x 11' with walk-in door	3,700.00	1	3,700.00
(2) Storage bin stiffened 24' x 33' with square access door.	9,950.00	7	69,650.00
B) ACCESORIES.			
(3) Outside ladder package for Stor-N-Dry bin.	60.00	1	60.00
(4) Outside ladder package for storage bin with safety cage and platform.	950.00	7	6,650.00
(5) Inside ladder package for storage bin.	160.00	7	1,120.00
(6) Roof safety rings for 24' dia. bins (operator safety & temperature cable supporting strength)	190.00	7	1,330.00
(7) Roof reinforcing ribs. 24 ft. dia. bins for temperature cables.	15.00	24	360.00
C) BIN FLOORS			
(8) Perforated floor for 24 ft. dia. bins, 20 gage (0.038 in.) material with at least 12% open area.	1,165.00	8	9,320.00
(9) Steel substructure for drying floor, 13 in. Plenum 24 ft. dia. bin.	655.00	1	655.00
(10) Steel substructure for storage bin floor, 13 in. plenum 24 ft. dia. bin.	1,240.00	7	8,680.00
D) BIN UNLOADING AUGER			
(11) 8 in. dia. tube and sump for unloading auger (full opening gate, tube, tube cap and bin flange)	300.00	8	2,400.00
(12) 6 in. bin unloading auger kit with 1 1/2 motor.	465.00	8	3,720.00

COST ELEMENT	UNIT COST (US$)	QUANTITY	TOTAL COST (US$)
(13) 6 in. - 4 in. O.D. bin sweep augers with 1 HP motor.	465.00	8	3,720.00
E) DRYING SYSTEM			
(14) Heating Unit consisting of Diesel Oil burner with 2 million Bhi/hr. output 15,000 cfm at 3 in. of water and 15 HP motor.	15,700.00	1	15,700.00
(15) Diesel oil storage tank about 9 ft. dia. x 8 per API spec.	2,080.00	1	2,080.00
F) - (16) Bin-Temperature indication system.	6,000.00	1	6,000.00
G) - (17) 6. in. dia. bin filling auger 30 ft. long with 3 HP motor.	1,170.00	3	3,510.00
H) U-TROUGH CONVEYORS			
(18) 9 in. U-trough augers maximum 50 ft. long with 3 HP motor.	1,640.00	5	6,560.00
I) BUCKET ELEVATOR:			
(19) 1000 bu/hr bucket elevator 80 ft. discharge height with 7 1/2 HP motor.	15,700.00	1	15,700.00
J) PRECLEANER			
20) 200 Bu/Hr precleaner with aspiration system and 1 HP motor.	3,000.00	1	3,000.00
K) GRAIN FUMIGATION:			
(21) Automatic pellet dispenser for phostoxin.	580.00	1	580.00
(22) 6 in. dia. 12 gage (0.100 in.) spout - 350 ft. long	1,550.00	1	1,550.00
M) - (23) 45% Manual distributors with 6-6 in. dia. openings.	500.00	1	500.00
N) - (24) Graner bin and bag closers	3,500.00	1	3,500.00
O) - (25) Buildings Offices and housing	61,200.00	1	61,200.00
P) - (26) Power plant including electrical system and back up generator	100,000.00	1	100,000.00
Estimated total cost excluding freight and erection		=	$ 331,245.00

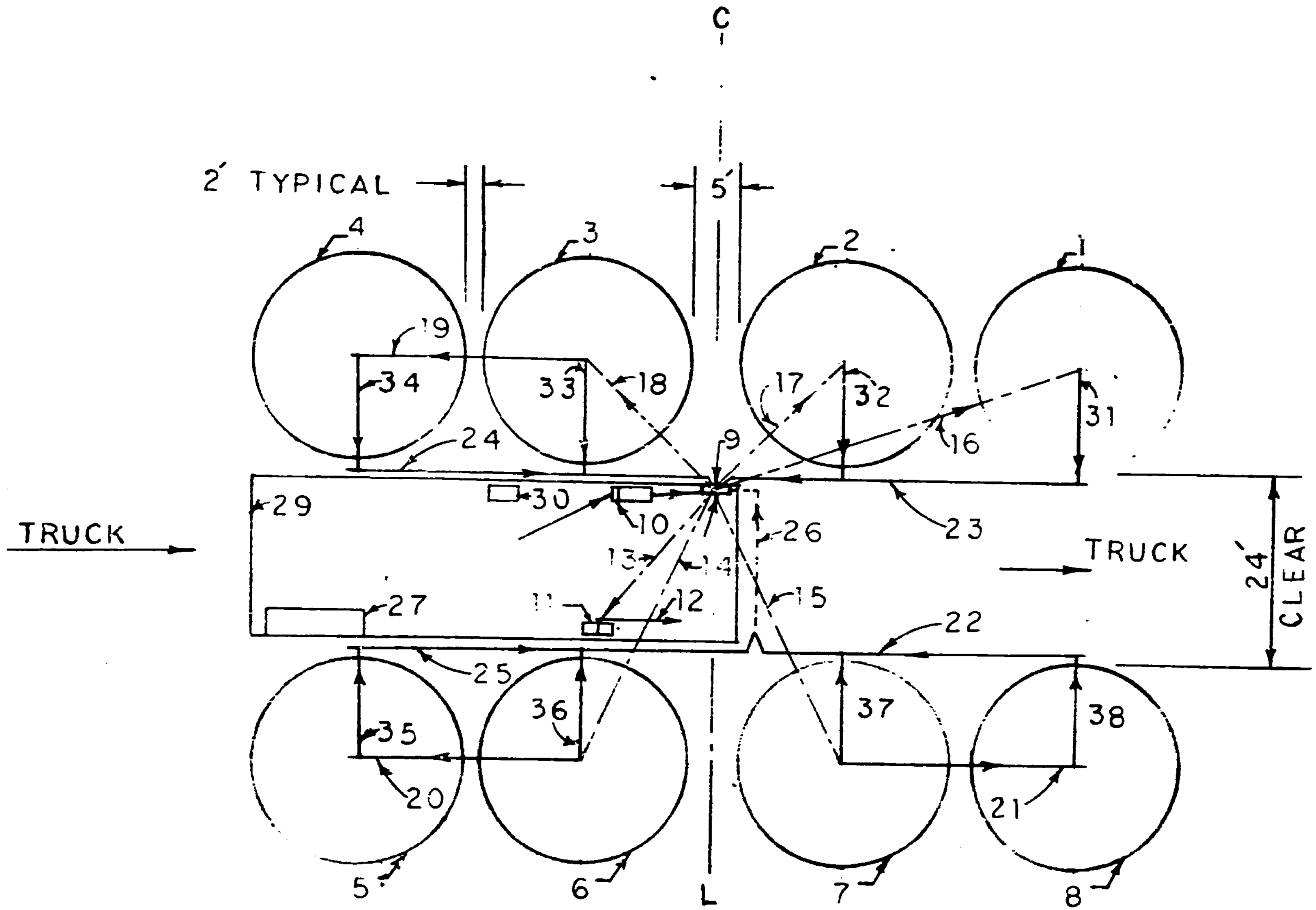

Figure 1: Layout for the proposed grain storage and drying installation at Tocache, San Martin, Peru.
(See next page for description of machinery)

NUMBER ON FIGURE 1	DESCRIPTION
1	24 ft. dia. x 11 ft. eave height drying bin.
2 - 8	24 ft. dia. x 33 ft. eave height storage bins.
9	A) 1,000 bu/hr. 80 ft. discharge height with 5 HP motor.
	B) 6 point distributor
10	Precleaner with elevator
11	Bagging surge bin, garners and bag closers.
12	Bag conveyor
13 - 18	Filling spouts
19 - 21	Filling augers
22 - 24	U-trough conveyors.
26	U-trough conveyor
27	Office, grading, temperature recording and record keeping.
29	Driveway and building.
30	Platform scales
31 - 38	Bin unloading augers.