

Volume I

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Central Selva
Resources Management

FILE

Project Synthesis

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CASTRO



CENTRAL SELVA
NATURAL RESOURCES MANAGEMENT PROJECT
USAID PROJECT No.527-0240

VOLUME I

Project Synthesis Paper
Annex A - Environmental Assessment
Annex B - Social Analysis
Annex C - Colonization Systems Analysis

Lima, Perú
October, 1981

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PROJECT SYNTHESIS PAPER

CENTRAL SELVA NATURAL RESOURCES MANAGEMENT PROJECT
USAID PROJECT No.527-0240

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Lima, Peru
October, 1981

V

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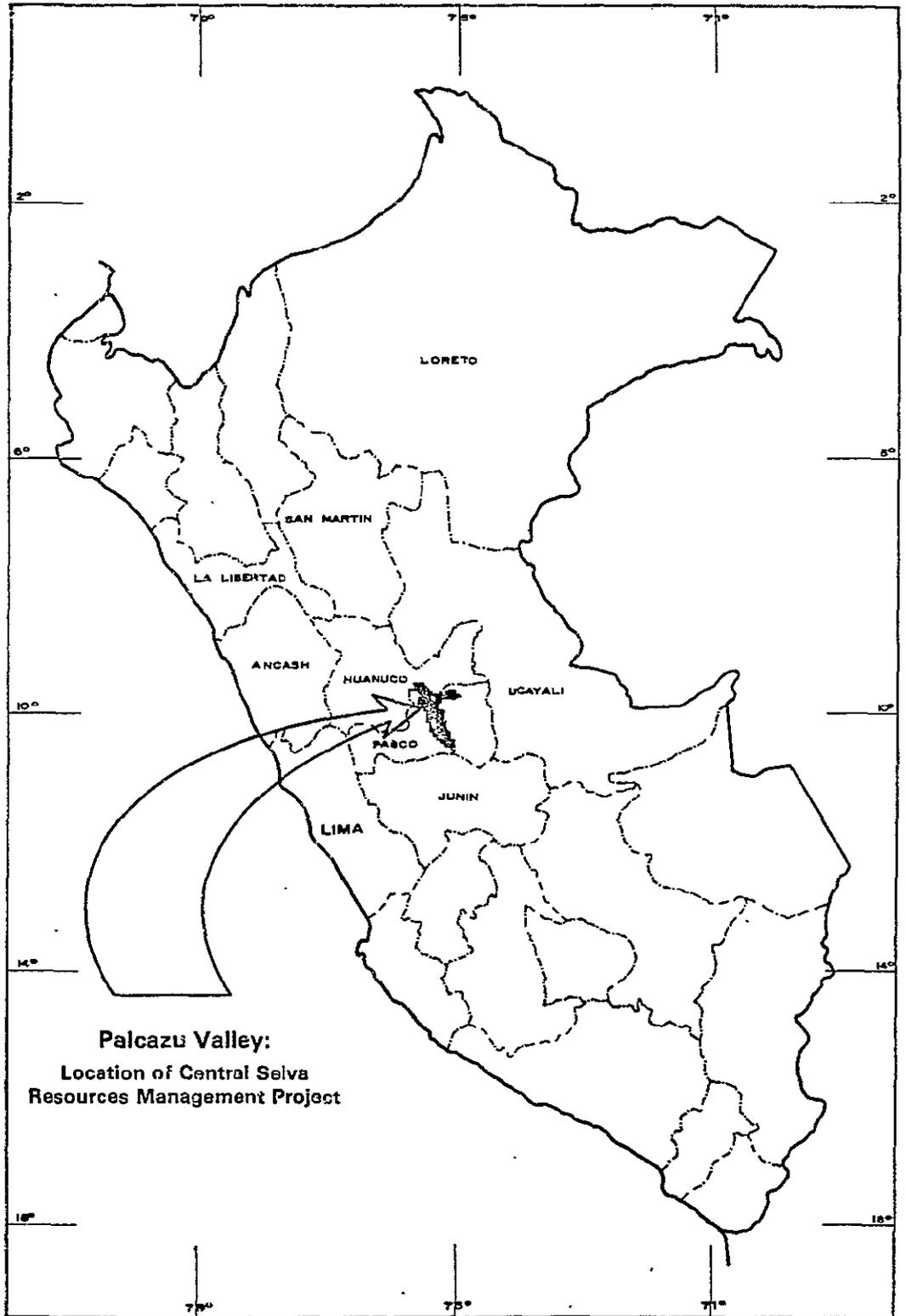
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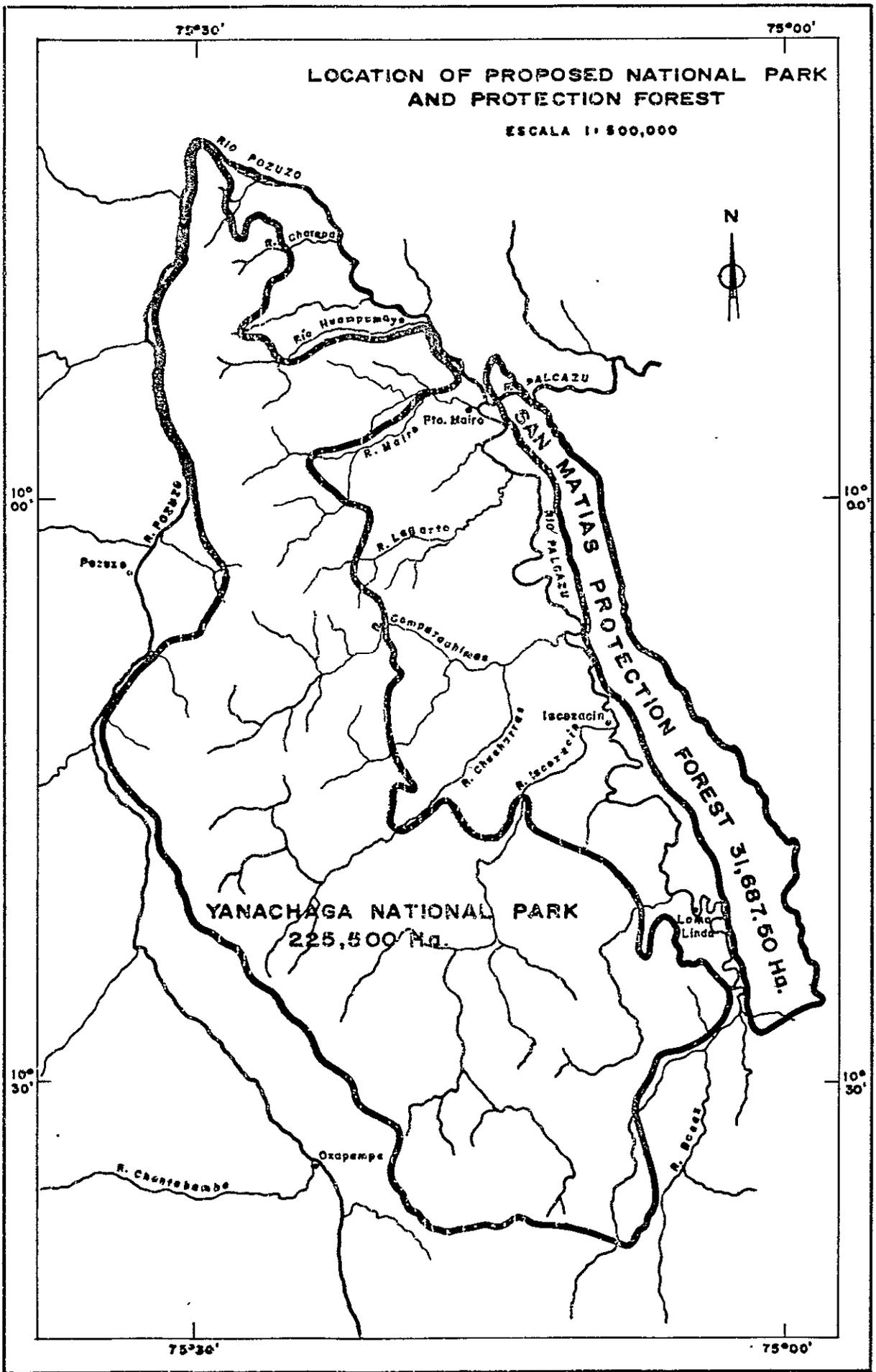
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MAPS

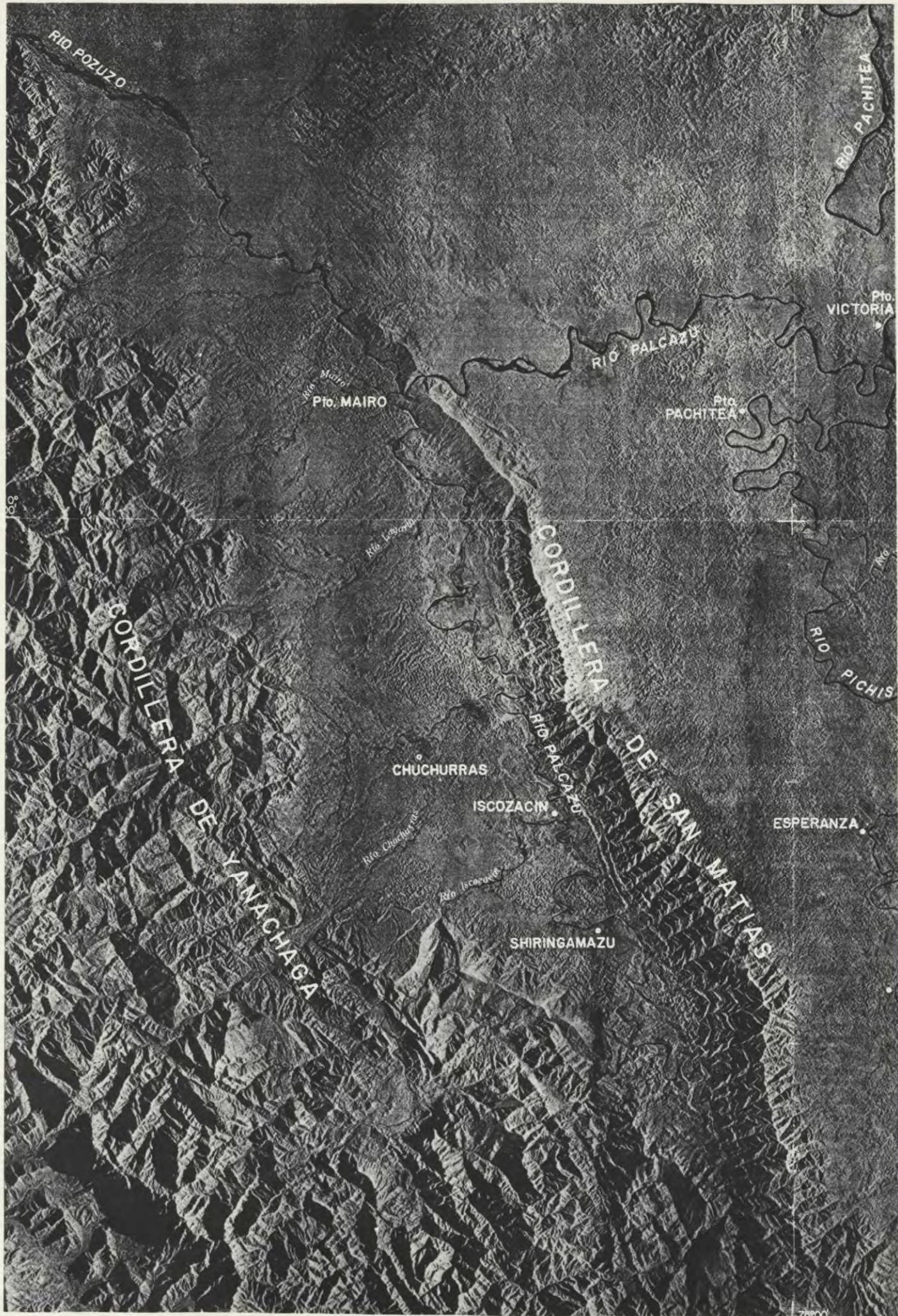
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- MAP OF MAJOR LAND USE CAPACITY
- LOCATION OF NATIVE COMMUNITIES



Palcazu Valley:
Location of Central Selva
Resources Management Project



X



75°30'

75°00'

ECOLOGICAL MAP (PALCAZU VALLEY)

By: RAFAEL A. BOLAÑOS
VICENTE WATSON

September 1981

9°50'

9°50'

10°00'

10°00'

10°10'

10°10'

10°20'

10°20'

10°30'

10°30'

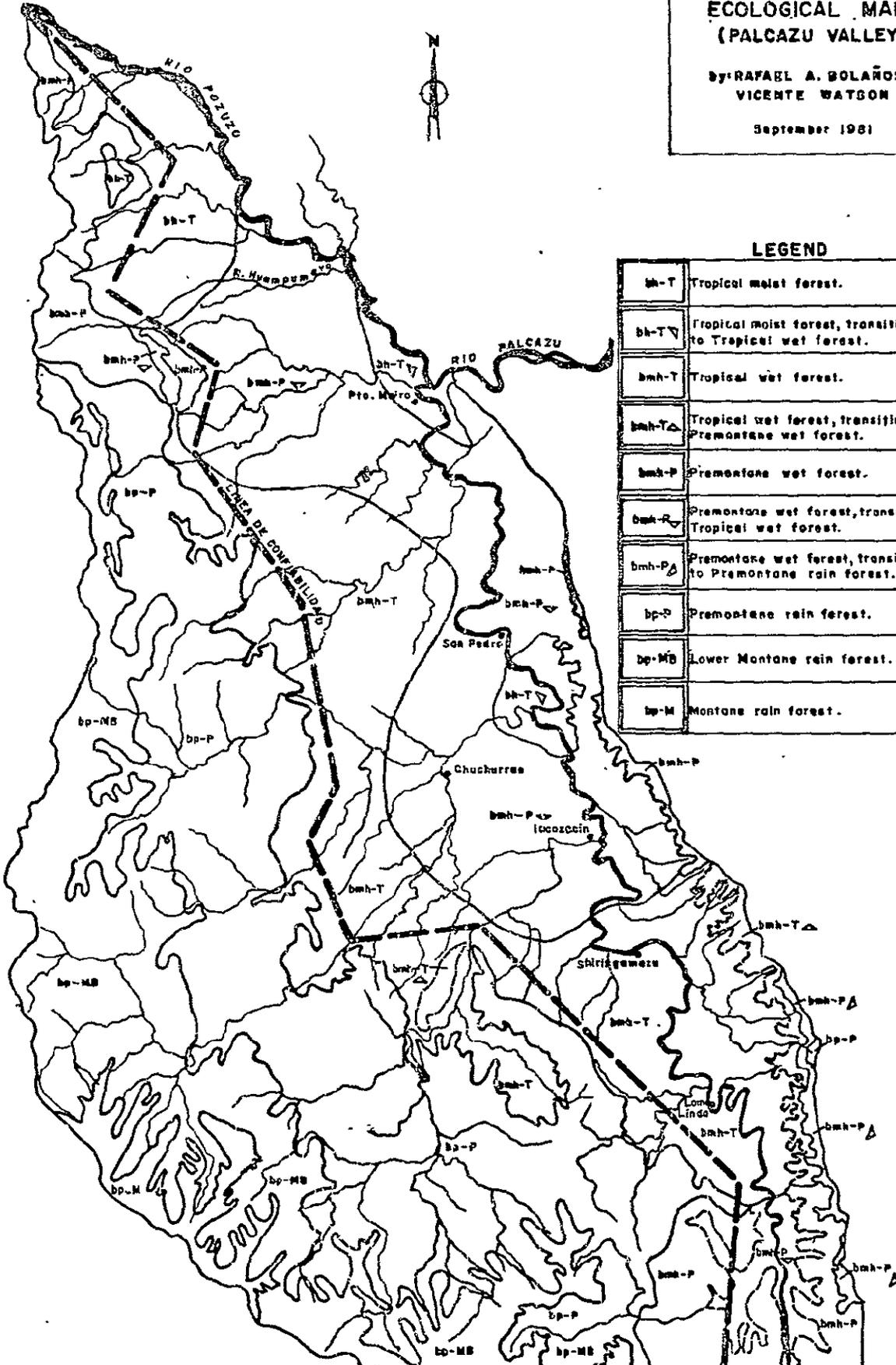
75°30'

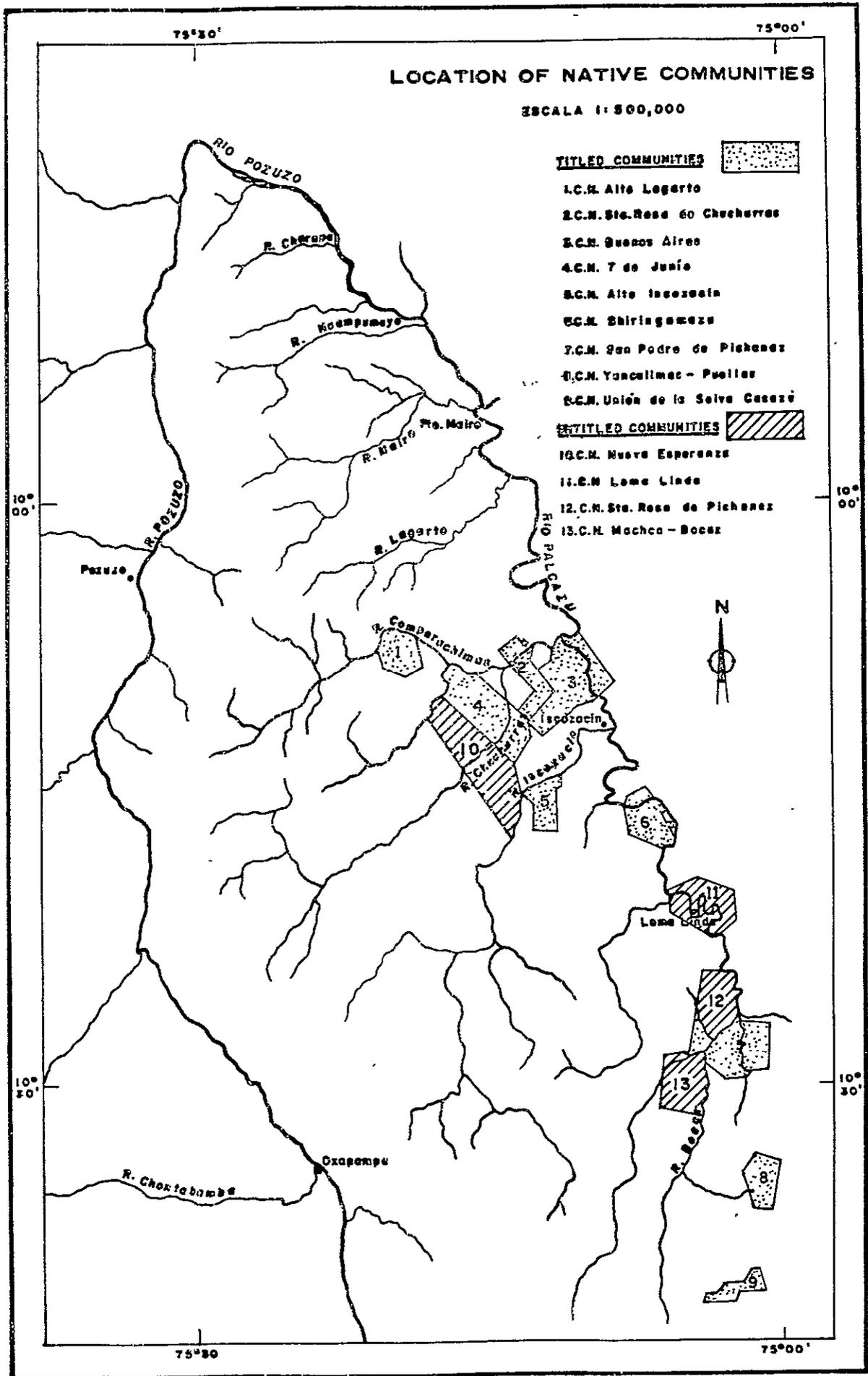
75°00'

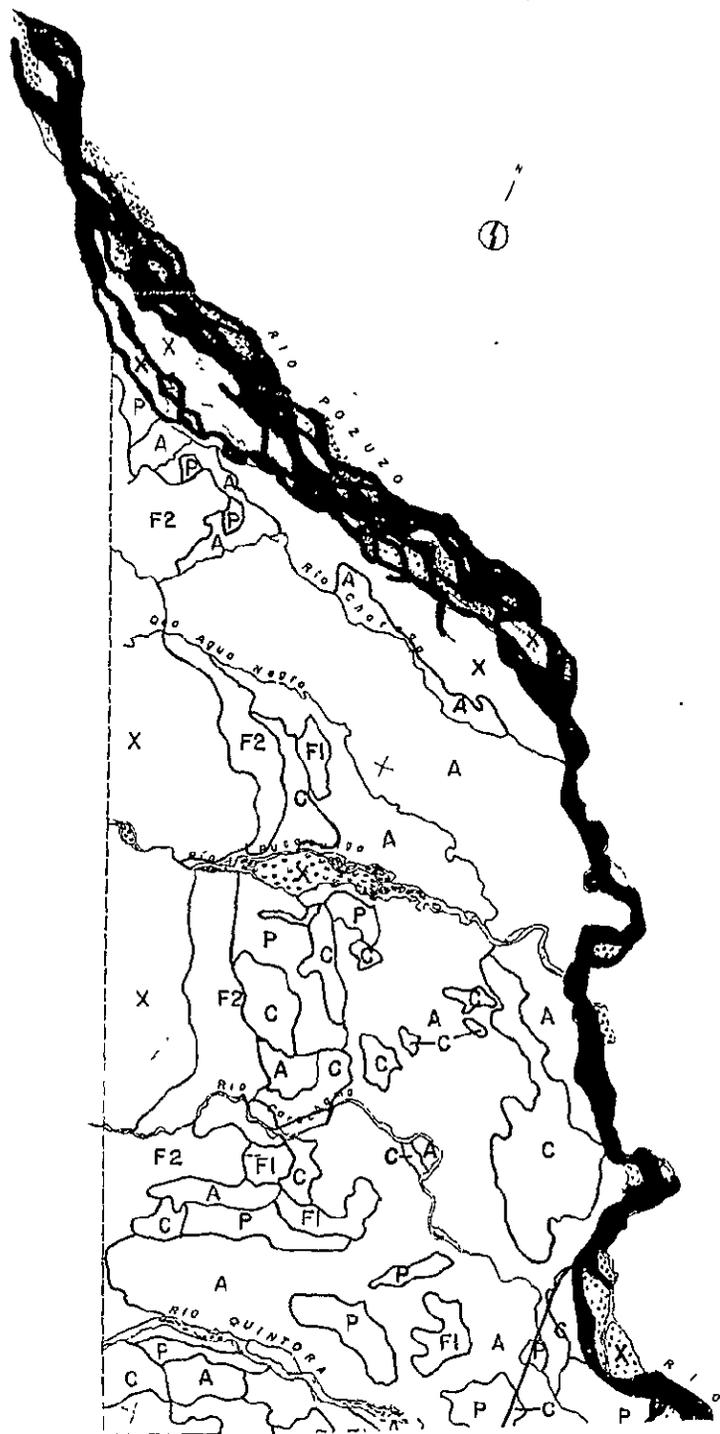


LEGEND

bh-T	Tropical moist forest.
bh-T ∇	Tropical moist forest, transition to Tropical wet forest.
bmh-T	Tropical wet forest.
bmh-T Δ	Tropical wet forest, transition to Premontane wet forest.
bmh-P	Premontane wet forest.
bmh-P ∇	Premontane wet forest, transition to Tropical wet forest.
bmh-P Δ	Premontane wet forest, transition to Premontane rain forest.
bp-P	Premontane rain forest.
bp-MB	Lower Montane rain forest.
bp-M	Montane rain forest.







MAP OF MAJOR LAND USE CAPACITY

by : J.A. Tosi C.
1:100,000

September 1981

HIGHEST USE CAPACITY

SYMBOL	DESCRIPTION
A	Clean Cultivation
P	Pasture
C	Permanent Crops
F1	Intensive Production Forest
F2	Restricted Production Forest
X	

75°
15'

9°
50'

AIX

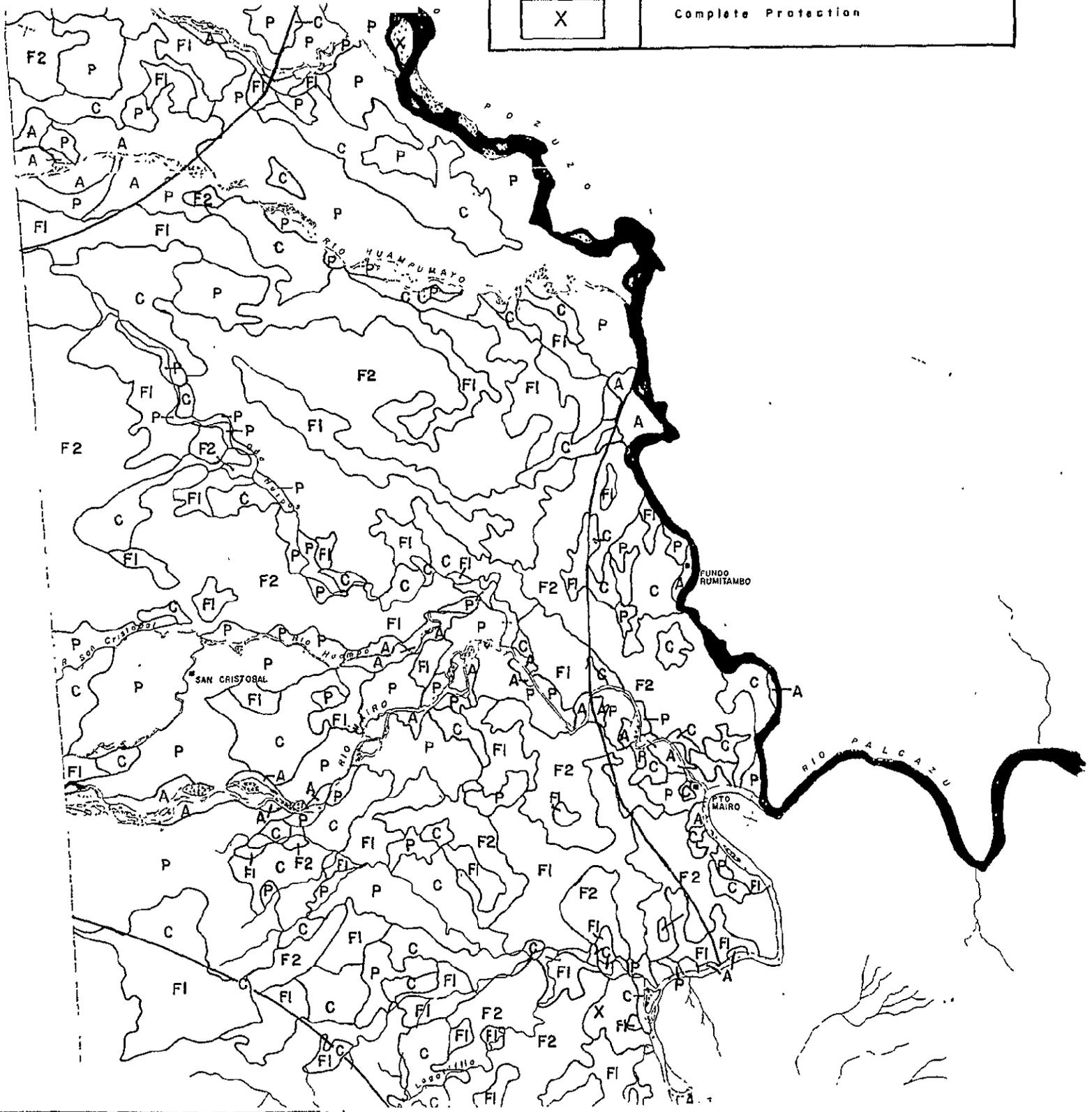
X

Complete Protection

75° 25'

90° 50'

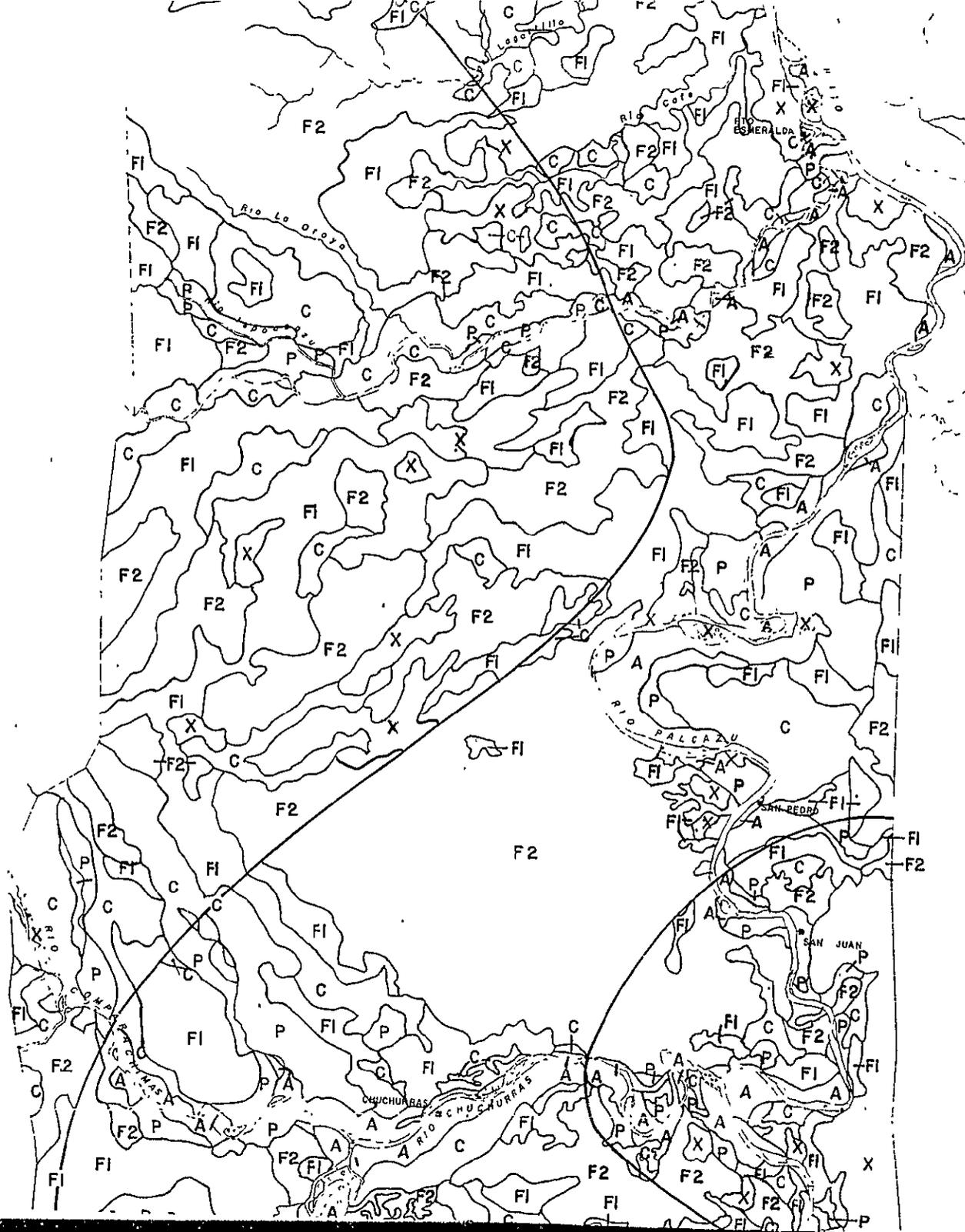
10° 00'

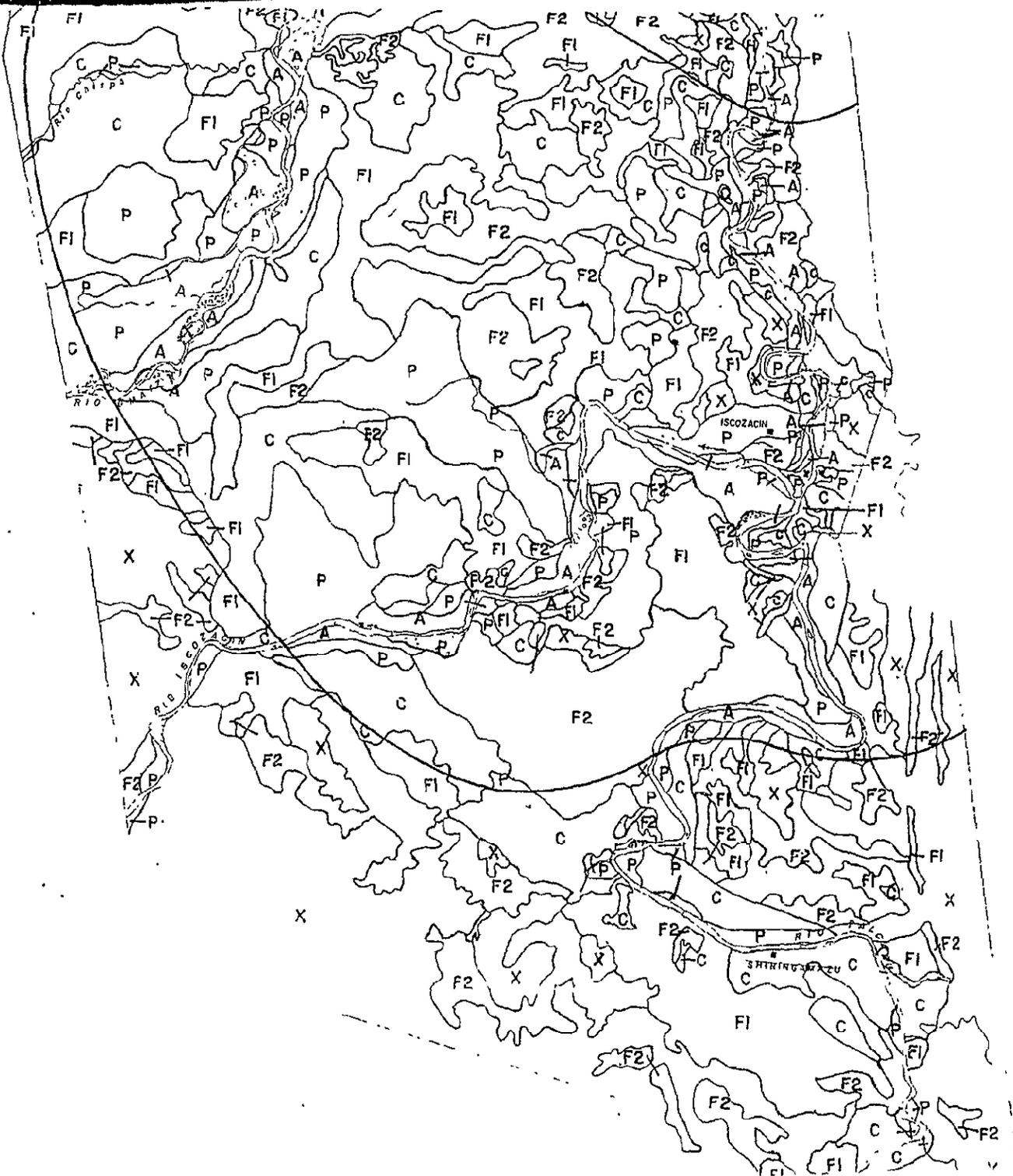


X

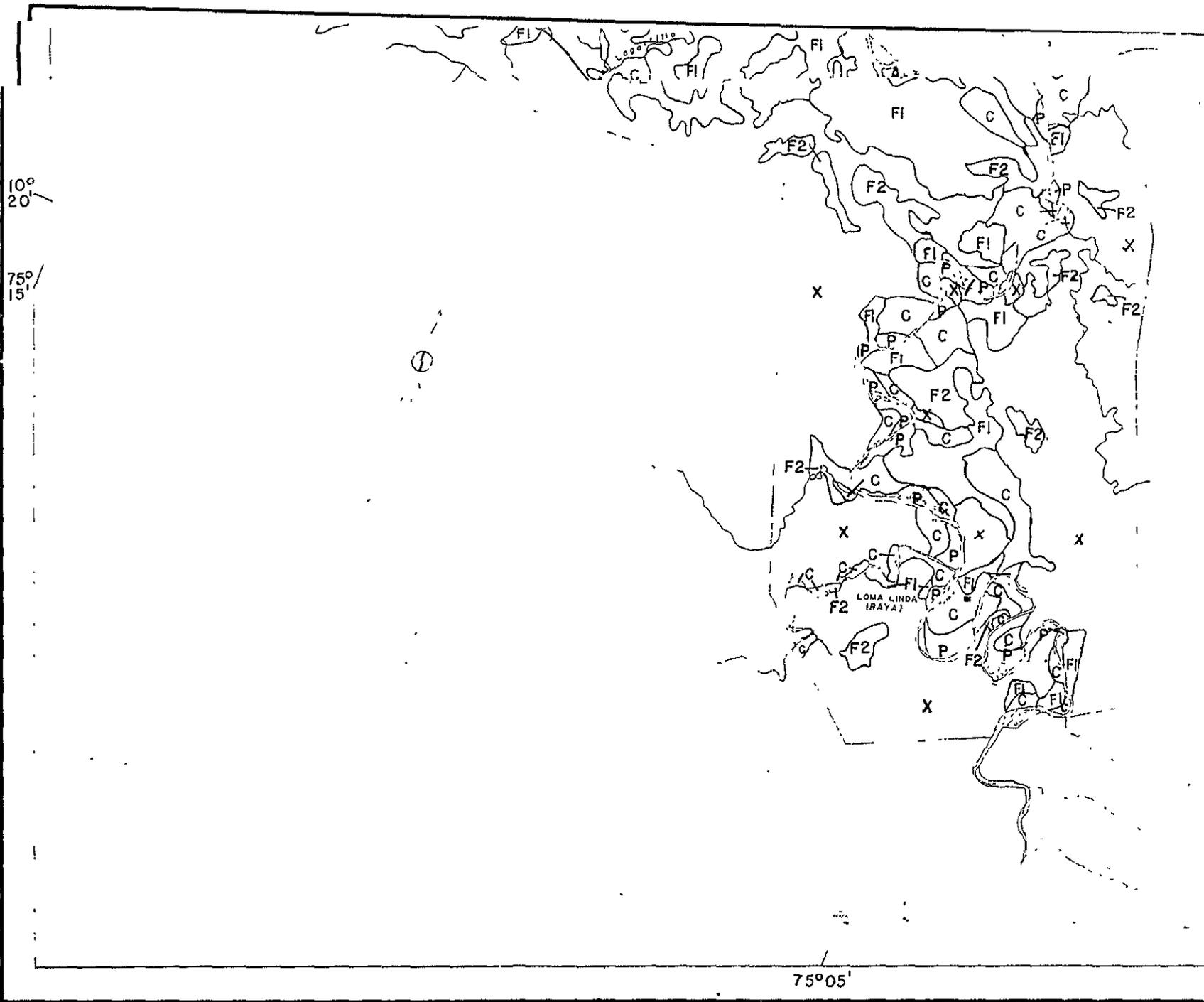
XVI

10°
10'





75° 05'
10° 10'



VIII

1. INTRODUCTION

1.1. Purpose of the Central Selva Resources Management Project

The immediate objective of the project is to maximize the sustained productivity of the Palcazu watershed and increase the incomes of native communities and colonos in the area through effective management of natural resources. Emphasis is upon upper watershed protection and introduction and improvement of agricultural and forestry practices appropriate to the Ceja de Selva ecosystem. Intimately related to this objective is the mitigation of negative effects of highway construction on the environment and well-being of the population. A broader goal of the project is to utilize the Palcazu experience in integrated resource development as a model for a national program focused on the Ceja de Selva.

1.2. Function of the Synthesis

The synthesis provides an integrative link between the Environmental Assessment and Project Paper. Drawing upon the wealth of data generated during the EA, the team has formulated a series of recommended development activities for consideration by the USAID Mission in preparing the Project Paper. It is our professional judgment that these activities are environmentally and socially sound and will lead to the best rate of return on investment. The modest direct return on pioneer investment in the Palcazu will reap additional benefits as the experience gained is extended to other areas of the Ceja de Selva.

1.3. Proposed Activities

1.3.1. Regional Development Strategy

A philosophy and structure for environmental management will be established to guide research and extension activities. Components will include staff training, baseline data collection and management and a plan for evaluation (Section 2).

1.3.2. The land capability study will be used to zone the area according to agricultural, forest and protection land use potential. In turn this zoning will guide titling of private and communal lands, delimiting of forest concessions and establishment of watershed protection areas (Section 3).

1.3.3. Upper Watershed Protection

Precipitous slopes and high rainfall (in excess of 4,000 m.m.) indicate that the upper watersheds best serve to stabilize regional water flows, reduce downstream sedimentation and to protect unique ecosystems of the Ceja de Selva. A national park and watershed reserves will be proposed to serve this function (Section 4).

1.3.4. Forest Management

The forest management program will have the dual objective of obtaining sustained yield from the natural forest and assuring that the local population, native and colono, derive maximum economic benefit from forest exploitation and wood processing (Section 5).

1.3.5. Agricultural Research and Extension

A small farm system approach integrating ecological and economic considerations in farm management will be used. Existing agricultural activities will be improved and new practices introduced via adaptive

research and on-farm demonstration backed by an extension and credit infrastructure (Section 6 and 7)

1.3.6. Native community assistance

Within the overall framework of regional development, programs will be implemented, in coordination with community organizations, to meet the unique needs of the Amuesha community. These include enlargement and titling of community holdings, land use planning and management program for community lands, and specific activities aimed at improving the sustained yield productivity of both agricultural and production forestry lands, and at improving access to markets for products. (Section 8).

1.3.7. Highway construction

The alternative of building a spur road from the Carretera Marginal into the lower Palcazu Valley is strongly favored by the design team. This alternative would achieve substantially all of the development benefits envisioned from the activities mentioned above while minimizing the most serious threats to the upper watershed functions, limiting disruption of the integrity of native communities and avoiding the high construction and maintenance costs associated with a highway through the upper watershed (treated separately by USAID).

1.4. Inherent Limits to Ceja de Selva Development

The factors which limit the net production of Amazonian forest areas, i.e. Yurimaguas and Pucallpa, are weed and pest competition, nutrient leaching or immobilization, high soil acidity, and erosion by heavy downpours. All of these limiting factors are relatively more serious in the Ceja de Selva where rainfall can be more than double that in low-land Amazonia. The situation in the Palcazu Valley is relatively

more serious because of the soils derived from nutrient poor parent material and the steep slopes, both on the mountains and associated with the highly dissected terraces occupying much of the valley floor. These limitations must temper our expectations from development investments. However, people now living in the valleys of the Ceja de Selva have legitimate aspirations for improving their well-being. In addition, landless poor and speculators alike will exploit land in these areas as access is provided. Humane considerations justify development assistance in the Ceja.

In addition, the Ceja is admirably suited for such functions as watershed protection and hydroelectric power generation if properly managed.

1.5. Hazards

Should USAID fund highway construction in the Palcazu Valley without unequivocal guarantee that land titles will be established and respected, forest concessions regulated and that the policing of protective areas will be institutionalized, then the following effects can be expected:

- Watershed protection functions of the area will be seriously impaired and the viability of the proposed Yanachaga National Park will be jeopardized.
- Sustained production potential of the natural forest resource will be irreversibly degraded.
- Erosion and sedimentation will occur with resultant permanent degradation of the soils resource, loss of downstream fisheries, reduced river navigability and increased flooding.
- The cultural integrity and land base of native communities will be threatened by uncontrolled colonization and timber concessionaires.

- Opening of the valley will result not in development, but rather the spreading of rural poverty.

2. REGIONAL DEVELOPMENT STRATEGY

2.1. The Environmental Management Approach

Environmental management implies the optimization of the sustained contribution of all components of the human environment to the development process. This includes the output of food and fiber from the agricultural component, the contribution of goods and services from natural systems such as forest products, wildlife, fish and watershed protection, and the research, extension, processing and marketing functions of the population centers. Optimization requires interdisciplinary effort on the part of the ecologist, forester, agricultural scientists, social scientists and economist with a structure for evaluation and control. Environmental management in the Palcazu Valley implies a systematic process of integrating activities within the region reaching the individual farm family and coordination of interactions with the national economy and administrative structure.

2.2. Agricultural Development Strategy

The agricultural technology to be introduced in the Palcazu Valley recognizes:

- The inherent ecological limitations of the area (See Section 1.4)
- The cultural diversity of the area and the very low capacity of the majority of the population to utilize sophisticated technology
- The disperse settlement pattern, poor road network within the valley, and great distance to sources of inputs.
- Non-existent service in infrastructure

Considering the limitations outlined above, the strategy for agricultural development will emphasize modest increase in production based on relatively low cost, simple inputs such as low levels of fertilization, improved varieties of existing crops, use of locally produced feeds for increased animal production, consistent animal health care and culling of unproductive animals. Relatively high capital inputs will be reserved for readily transferable technologies which are independent of environmental constraints such as centralized processing of fruits for juice, palmito, and feeds such as yuca and pejubaye fruit.

2.3. Management Structure

The Pichis-Palcazu Special Project Office, PEPP, is the point of contact and coordination between extra-regional interests such as AID, Ministries, other projects, etc. and the implementation of development activities in the Palcazu Valley. The PEPP Director will be responsible for the integration of the major project activities in watershed and park management, forest management, agriculture and Native Communities. The PEPP Director will be responsible for establishing a formal structure for communication between the project and the native and colono communities in the valley. The Director of Native Communities Coordination will be responsible for assuring that appropriate consideration is given to the Amuesha community in the evolution and implementation of activities.

2.4. Training

2.4.1. Orientation - Ceja de Selva Development

Training will involve full immersion in an intensive three week workshop. The first objective is to create an awareness of project goals

and proposed activities. The second objective is to integrate these goals and activities within the overall environmental management approach which combines land capability, ecological and agricultural feasibility, social equitability and economic viability. Ample opportunity will be provided for interaction among Special Project staff, outside experts, and USAID staff, resulting in modification and refinement of the project. Although the Palcazu will be the focus of the training workshop, the approach to management will be broadly applicable to the Peruvian Ceja de Selva.

2.4.2. Periodic seminar/field courses

Six to nine months after project initiation and periodically thereafter to coincide with visits of project evaluation teams, a combination/service/field course will be conducted. The objectives of the seminar/field course will be:

- To reinforce initial training in environmental management.
- To facilitate involvement and interaction among project staff, institutional participants with Ceja responsibilities, USAID staff and technical assistance consultants.
- Provide feedback to project decision makers on project progress and recommendations for modification in the form of a group field course report.

2.5. Regional Model

A regional model is a simplification of reality which aids in focusing attention on aspects of the area of concern in management. The Palcazu model will be a combination of diagrams, tables and descriptive material designed to help understand what is there (volume of timber, numbers of people, etc.); inputs (rainfall, immigration, etc.); interactions or

processes (erosion, crop production, timber growth); etc. and outputs (meat, lumber, sediment, etc.). Development involves the manipulation or management of the dynamics of the regional system to achieve pre-conceived social, economic and material goals.

2.5.1. Data base for planning

Quantification of a regional model will require considerable information in support of the project activities, including:

- Geology (location of lime); Geomorphology (earth movement, erosion, and sedimentation); Soils (location and characterization)
- Climate (rainfall intensity), hydrology (flow peaks and minima)
- National system inventory (timber, fauna, functions)
- Settlement patterns, land use, agricultural production, carrying capacity
- Studies of management in similar areas

2.5.2. Data Management

Collection of information is of little value unless a structure exists to facilitate its use. To this end the project will:

- Establish field and central office libraries for the maintenance, augmentation and dissemination of information.
- Establish editorial/printing facilities publishing information developed as part of research, extension and training activities.
- Develop a systematic process for updating and display of field data such as permanent forest inventory data, wood production, population, land titles, land use change, etc.

2.6. Project Evaluation

A project evaluation team with broad experience in tropical development will be established to assist PEP, U.S. AID and the higher level institution responsible for Ceja de Selva development in orienting the project. Timing of evaluation should be flexible but should be done every six months during the first two years of the project and annually thereafter. Team presence will be coordinated with training courses and seminars (Section 2.4.2. above). Responsibilities of this team would include:

- Review of the evolution of the project in the context of the stated goals and conditions.
- Advise the project staff and U.S. AID on adjustment in both objectives and activities in order to more effectively achieve overall goals.
- Evaluate the process and results of research, training and extension and make recommendations for incorporating new ideas and adjustments in the activities.
- Participate actively in workshops and seminars to maximize feedback and idea exchange.

2.7. Budget

Model-data collection and management	130,000
Publications	40,000
Training	
Initial workshop	25,000
Periodic seminars/field courses	105,000
Evaluation	<u>70,000</u>
TOTAL	270,000

2.8. Personnel

Regional development specialist	6 P/m
Systems ecologist-agriculture orientation	6 P/m
Social scientist	4 P/m
Tropical soil management expert	4 P/m
Small farm systems expert-agronomist	3 P/m
Small farm system expert-economics	3 P/m
Training and group dynamic expert	1 P/m

3. LAND CAPABILITY AND USE

The basis for environmental management in the project is a land capability classification incorporating ecological parameters (Holdridge Life Zone System), soil characteristics and topography (See Tosi appendix).

3.1. Zoning according to capability

3.1.1. Protection

Lands zoned for protection are considered to have no sustained use potential for agriculture, forestry or settlement. The value of these lands derives from their functions in maintaining water quality, regulating water flows to downstream areas, as areas for hunting and extraction of products such as medicines, and as reserves or parks for research or recreation. The management and use of protection areas are treated in Section 4.

3.1.2. Forestry

Section 5 treats forest management. Forest exploitation is normally followed by low productivity agriculture and grazing with resultant land degradation. To curtail this process, a system of

sustained yield forestry has been designed for implementation by small scale farmers and communities. Maintenance of land in this zoning category will require a major program in extension forestry, public education, use of credit restrictions to prevent use of such funds for clearing forest lands, and establishing processing facilities sized to accomodate only the sustained production of the forest. A program to improve and intensify agriculture on appropriate lands is designed to take pressure off forest and protection lands (Section 6).

3.1.3. Agriculture

Sections 6 and 7 (annual crops, pasture and permanent crops) deal with agricultural development activities. The application of land capability zoning on agricultural lands will be accomplished through farm planning projects, extension education and credit restrictions.

3.2. Titling of Land - Agricultural Ownership and Forest Concessions

3.2.1. Land Distribution and Current Residents

The land parcels titled to or occupied by the current residents will be located, and by the same process, the unoccupied areas of the valley will be determined. The land capability system will be used to determine the economic viability of each parcel. Those residents whose parcels are judged adequate will receive title; those whose parcels are judged inadequate will have their parcels enlarged and titled; or receive priority for relocation to unoccupied parts of the valley. Those currently living within the boundaries of the proposed Yanachaga National Park will be relocated to unoccupied parts of the valley.

3.2.2. Agricultural Land

The land capability system will be used as the basis for establishing land titles in areas not yet in private or communal holdings. Each parcel distributed will include an appropriate proportion of land in one or more use classes to assure the opportunity to produce food and income for the support of a family.

3.2.3. Forest Concessions

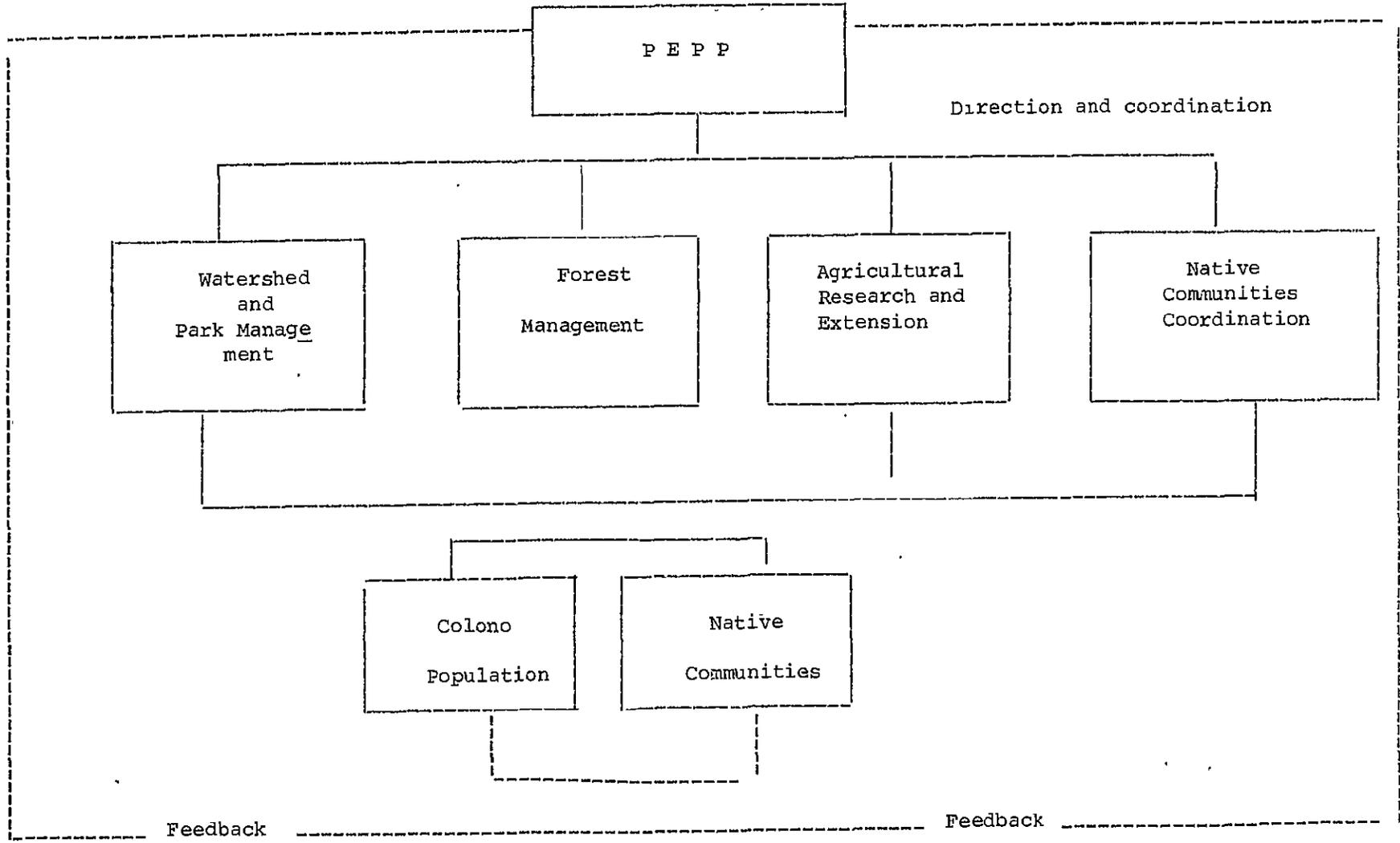
The land capability classification will be used to locate areas appropriate for family and communal forest concessions in support of forest management activities developed in Section 5.

3.3. Budget

Classification of lands not covered by the OMER and AID studies	20,000
Detailed classification of areas for titling	<u>30,000</u>
TOTAL	\$ 50,000

3.4. Personnel

Forester with experience in land capability classification	3 P/m
Geomorphologist	2 P/m
Agronomist/soil scientist	2 P/m
Social scientist	3 P/m



4. PROJECT COMPONENT - PROTECTION OF THE UPPER WATERSHED OF THE PALCAZU
PROJECT AREA

4.1. Background

The need to protect the high watershed and part of the medium watershed of the Palcazu valley has been pointed out since 1974 (Brack, 1974, Smith 1977) and has recently been reiterated (Dourojeanni 1981). These authors coincided in establishing one conservation unit (very probably a national park) at the Yanachaga range and a protection forest (or hydrologic reserve) at the San Matias and San Carlos ranges as a basis to assure the success of a human settlement in the lower part of the watershed.

These suggestions were reviewed and refined within the scope of the present study (Brack 1981, Dourojeanni 1981 b, Zadroga, 1981) and the need to implement them within the scope of the Palcazu valley development was reiterated.

The establishment of conservation units (parks, reserves and national sanctuaries) in Peru is a phenomena of only the last two decades. However, within this short period of time, 18 conservation units have been created which cover representative sample areas constituting 3.3% of the national territory. Such units are expected to cover up to 7.3% of the territory before the end of the century. This system already includes some of the protected areas which have been considered of great value in Latin America and even in the world (Manu, Paracas, Pampa Galeras, Macchu Pichu, Huascarán). As pointed out by Dourojeanni and Ponce (1978) the establishment of these units has been successful in actual practice.

4.2. Objectives

Objectives of this project can be classified in two groups: general and specific:

4.2.1. General Objectives

- Preserve a unique sample of the High Jungle of Peru with its exceptional genetic resources as well as its scenic beauty.
- Preserve the ecological functions, especially the hydrological, of the upper watershed of the Palcazu; and
- Contribute to the social and economic development of the Palcazu valley through the production of water and of other renewable natural resources, as well as development of the touristic potential of the area.

4.2.2. Specific Objectives

- Prepare the final study for the establishment of the Yanachaga proposed National Park and the San Matias and San Carlos protection forests, as well as any others required. (According to Peruvian forestry legislation for the establishment of national parks and other conservation units, and protection forests, specific studies and a precise demarcation of boundaries are required).
- To carry out a detailed scientific inventory of the natural resources contained in the proposed areas, with emphasis on the ecosystems, the flora and fauna, and the hydrology.
- Prepare the management master plan for the proposed National Park of Yanachaga and for the protection forest including:

- 1) Background (location, boundaries, park purpose, management objectives and visitors policy)
 - 2) Resources (geology and relief, climate, hydrology, flora, fauna and human settlement)
 - 3) Management (access, internal roads, access control plan, intensive and extensive management areas, intensive use areas, moderate use areas, light and controlled use areas and construction controls)
 - 4) Administration (logistics, personnel, infrastructure and control)
 - 5) Zoning (natural environment zones, special preservation zones, wildlife zones, recreation zones, service zones)
 - 6) Interpretation and research program
 - 7) Establish a park headquarters in Villa Rica or Oxapampa with a station in Iscozacin
 - 8) Integration of the park in the region.
- Develop and conduct a training program at professional and technical levels, (management technicians, guides and forestry rangers).
 - Preparation of a feasibility study for the regional touristic development in order to determine the most appropriate investments up to 1990.
 - Initial support for the implementation of the corresponding management plans.

4.3. Justifications

Over 70% of the Palcazu watershed corresponds to lands with major soil use strictly for protection. There are really three ranges (Yanachaga, San Carlos and San Matias), two of them reach maximum elevations of 3000 to 4000 m.a.s.l., and have very steep slopes and rainfall in excess of 4000 m. annually (Tosi, 1981). These ranges have no possible sustained use for agriculture or forestry.

If colonists move into these areas, which is starting to happen, they could only live under marginal subsistence conditions. However, the most serious part of the problem, would be the vegetation destruction caused by the colonists which would have irreversible effects on downstream areas, threatening the success of the proposed agricultural development and forestry activities planned there. Within this context, the proposed project is justified for the above mentioned social, economic, scientific, and aesthetic reasons.

4.3.1. Economic and Social justification

Indirect

- The national park and the proposed protection forests will assure the regular supply and the quality of water for the development of the hydroelectric and potable water development already proposed and necessary for the Palcazu, Oxapampa and Pozuzo valleys.
- These protected areas will also limit the costly effects of higher flood peaks which result in property damage and erosion.
- Upper watershed protection will reduce erosion and downstream sedimentation with resultant maintenance of river navigability and the quality of fisheries.

- The National Park represents a significant potential for public and scientific tourism development due to its scenic beauty and ecological diversity. As the closest jungle area to Lima reached by a good road, the park has the potential to attract significant tourism..

If the proposed development program is executed, before 1990, about 20,000 Peruvian visitors per year, plus about 2,000 foreign tourists will be expected in this valley. Tourism, as it is well known, has a strong multiplying effect in the economy.
- Tourism employment generation (hotel, tourist guides, tourist agencies, restaurants, camping equipment, inputs and food, gas stations and service shops) and employment opportunities at the national park and at the protection forests (professionals, technicians and qualified workers and others) would be available directly for the inhabitants of the valley, especially native Amuesha, given their knowledge and skills.
- Rational use of the fauna (sport hunting, commercial hunting and rational use of non-forestry products (medicinal and ornamental plants fruit, barks, latex, seeds, etc.) from the lands of the protection forests in coordination with forestry management and management of the low valley fauna.

4.3.2. Scientific and Aesthetic Justifications

- The Yanachaga range and the neighboring areas correspond to the Pleistocene refugium and to the evolution center (endemism) of Chanchamayo (Lamas, 1979, Brack, 1981) and as such is an exceptional sample that must be preserved, moreover since it is still not represented in the National System of Conservation

Units of Peru (Dourojeanni and Rios, 1981).

- Numerous species of animals and plants in danger of extinction exist within the boundaries of the Yanachaga, San Carlos and San Matias ranges, and these must be protected.
- The degree of devastation of these forests is so great in the Central Jungle of Peru (UNA 1979, Dourojeanni 1981) that if representative samples such as the Yanachaga are not protected, it could be assumed that Peru could lose as much as 50% of its genetic resources before the end of the century (Dourojeanni, 1980).
- Numerous species are still unknown to science.
- The scenic value of the Palcazu Valley depends on the vistas offered by forests, mountain ranges, clear water streams, and waterfalls. Its partial destruction would destroy its aesthetic value and thus its touristic and recreational potential.

4.4. Personnel

See Table on following page.

PERSONNEL

LONG TERM USAID CONSULTANTS

(60 man/months)

- 1 Ecologist or specialist in national parks (Chief of Mission)

LONG TERM PERUVIAN CONSULTANTS

- 2 Engineers or biologists
- 30 Officers and forestry policemen

USAID CONSULTANTS

(60 man/months)

- 1 Specialist in watershed management
- 1 Specialist in Tourism Botantics, Zoology Mission

PERUVIAN CONSULTANTS

- 1 Forestry or Agric. Engineer
- 2 Specialists in Tourism University teams

It is expected that all experts and consultants will have a full command of the Spanish language. This is not indispensable for the members of scientific missions.

COLLABORATORS:

U.S.:

1. Leadership:
2. Collaboration:

Would be in charge of USAID

The following institutional support can be foreseen:

- a. Development of National Park:

U.S. National Park Service

- b. Scientific Inventory:

Smithsonian Institution
N.Y. Zoological Society
N.Y. Botanic Garden
Various Universities

- c. Protection Forests

U.S. Forest Service
U.S. Soil Conservation Service

COLLABORATORS: (Contin.)

PERUVIAN:

1. Leadership: Would be in charge of the Executive Commission of the Pichis Palcazu Special Project (PEPP).
2. Participation: General Forestry Direction of Fauna and National Institute of Forestry and Fauna.
3. Collaboration: The following institutional support can be expected:
 - a. Development of National Park
 - b. Scientific Inventory
National University of San Marcos
National History Museum/Javier Prado
 - c. Protection Forests
National Agrarian University
 - d. Tourism:
State Secretariat of Tourism
National Agrarian University

4.5. USAID Budget

Personnel	US\$	768,000
- Experts (60 m/m)	480,000	
- Consultants (25 m/m)	192,000	
- Missions (12 m/m)	96,000	
Fellowships (100 m/m)		140,000
Goods and services		400,000
Equipment		300,000
TOTAL:	US\$	1,608,000

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5. PROJECT COMPONENT - NATURAL FOREST MANAGEMENT

5.1. Background

About 44,000 hectares of land within the Palcazu watershed have the capacity to sustain production forestry. 20,000 hectares have low soil erosion hazard and are suitable for high level production. The remaining 24,000 hectares present significant hazard of erosion so a lower level of productivity can be expected from them.

Most of the forests in the Palcazu are highly diverse; although average volume of standing timber is 90 to 100 m³/ha, an average of only about 30 m³/ha has commercial value under current marketing conditions.

Land classified for production forestry is not suitable for more intensive uses. Nonetheless, there is a strong tendency to deforest production lands, burn most of the timber, and convert the land to pasture. The resulting pastures yield poorly. The land they occupy erodes and second growth forests which succeed the pastures are poor.

5.2. Objectives

The natural forest management project component has three objectives:

5.2.1. To design a system of natural forest management that is simple, that works, and that pays.

5.2.2. To promote sustained yield management of natural forests on lands whose major land use capacity is production forest.

5.2.3. To provide regular, sustained income to families and native communities from the continuous harvest, transport and processing of products from natural forests.

5.2.4. To increase utilization of natural forest trees.

5.2.5. To maintain or improve the percentage of high value trees in managed natural forests.

5.2.6. To prevent conversion of land whose major land use capacity is production forest to unsuitable land uses.

5.2.7. To avoid degradation of natural forests by inappropriate harvesting methods.

5.3. Management of Natural Forests by Systematic Clearcutting

Elements of the management of natural forests by systematic clearcutting are:

5.3.1. Identify natural forests suitable for management in blocks of convenient size for administration of the project.

5.3.2. Obtain more detailed information on total timber volume and volume of commercial timber in each management block.

5.3.3. Determine optimum rotation age for natural forest management. This should be around 25 to 35 years.

5.3.4. Determine optimum size of management units for family management and native community management. Estimates of size for family units range from 30 to 250 or more hectares.

5.3.5. Establish a system of annual harvest by clearcutting in which the size, shape, location and timing of the clearcut are designed to optimize natural regeneration of desirable heliophytic species in the clearcuts.

5.3.6. The system will emphasize:

- Labor intensive harvesting methods using family or native community labor.
- Harvesting methods using draft animals or very light machinery so as to minimize soil damage and erosion.
- Extraction of the maximum amount of merchantable material from each clearcut.

5.3.7. The system will avoid:

- Selection cutting of the forest outside of areas designated for annual clearcutting.
- Grazing of the clearcuts or converting them to pasture.
- Agricultural use of the clearcuts except, possibly, for subsistence purposes in a manner which does not impede or interfere with natural regeneration of the forest.
- Burning, unless experimentation shows that burning improves regeneration and growth of new forest.
- Plantations and enrichment plantings, though it may include weeding or regenerated stands.

5.3.8. Locate manufacturing plants of lumber and parquet, and perhaps furniture and other products, close to the management blocks and process timber from the management units at these plants.

5.3.9. Provide families and native communities with title to management units or with long term rights to harvest them. The object of this is to create a long term property right in which the

owner's long term property and economic interests coincide with ecologically sound forest management.

5.3.10. Assure that families and native communities share ownership of the manufacturing plants and of the system for transporting logs and wood products.

5.4. Management of Rubber and "Tornillo" on White Sand Soils

Management of rubber and "tornillo" on white sand soils consists of the following elements:

5.4.1. Identify natural forests on white sand soils with a high concentration of rubber and "tornillo", (Cedrelinga catenaeformis)

5.4.2. Design techniques for increasing predominance of rubber and tornillo trees by such methods as removing weed trees and encouraging natural generation.

5.4.3 Design selection harvest techniques to optimize yield of rubber and tornillo while maintaining their abundance in the natural stand.

5.4.4. Manage forests on white sands to increase harvest of other desirable trees in addition to rubber and tornillo.

5.4.5. Determine appropriate sizes for management units; design system of allocating management units to families and native communities.

5.4.6. Provide technical and financial assistance to families

and native communities to manage the units.

5.5. Project Sequence

5.5.1. Steps to be completed prior to starting Project in the field

- 1) Complete land titling and platting of Palcazu under contract between PEPP and Ministry of Agriculture.
- 2) Complete protection of protection forest under National Park project.
- 3) Complete classification and zoning of forest lands under land capability and zoning project.
- 4) Develop detailed management plan describing the elements listed in titles 5.3 and 5.4 above with as much precision as possible.
- 5) Begin training AID and PEPP technicians in natural forest management, dendrology, and other subjects necessary to carry out detailed management plans.
- 6) Plan wood products manufacturing complex and transportation system, determine type and cost of most appropriate equipment.

5.5.2. Steps for Development of Project in the Field

- 1) Identify project sites; define boundaries of management blocks
- 2) Refine management plan for management blocks and prepare specific management plans for management units
- 3) Continue to train field technicians in application of the management plans
- 4) Select site or sites for wood products manufacturing complex; begin site preparation and construction of complex

- 5) Assign management units to owners, setting terms of title, arranging financial assistance for start up and operating, and explaining management plans
- 6) Assist owners of management units in executing management plans and in marketing products
- 7) Purchase vehicles to transport raw materials to manufacturing complex and products to markets
- 8) Bring wood products manufacturing complex into production
- 9) Continue education and training of technicians and owners to improve the project

5.5.3. Steps which could be provided from ancilliary projects

- 1) Establish permanent inventory system for managed and unmanaged natural forests
- 2) Improve dendrology of Palcazu forests
- 3) Research the general subject of improved forest management and harvesting
- 4) Research the general subject of improved forest product utilization with specific attention to the possibility of producing from the Palcazu such products as pulp and paper, chipboard, plywood, charcoal and others

5.6. Rough Approximation of Costs

1)	Refine project design: *	\$150,000
2)	Initial education of technical personnel:	100,000
3)	Continuing training of technical personnel and owners of management units:	250,000
4)	Financial assistance to owners of management units for start-up costs, tools, draft animals, machinery, etc.	1,500,000
5)	Purchase transportation equipment	500,000
6)	Purchase and set up wood products manufacturing complex:	1,000,000

5.7. Rough Approximation of Benefits

Systematic clearcutting should give yields in the initial years of management of roughly 30 m³/ha. If utilization improves as the project progresses, yields should increase.

The size of a management unit should be large enough to provide an adequate income to the owner. In a study provided to PEPP, the Ministry of Agriculture proposed a unit size of 400 ha. This was based on extraction

* PEPP has detailed economic analysis of small forest tract management developed for the Von Humboldt National Forest

** Family and native community owners of management units would be sold:
- Title to land or concession with payment schedule
- Tools, machinery, draft animals, with payment schedule
- Share in transportation system with payment schedule
- Share in processing system with payment schedule .
Payments could be deferred several years until units are well established. Income should start with harvest in first year.

potential of 15 m³/ha of wood with a gross value of about \$45/m³.

Under the proposed natural forest management system extraction potential should increase to 30 m³/ha. Extraction and management costs should be low. Value per cubic meter will be decreased by inclusion of lower value woods but increased by greater elaboration at the forest site and short hauls to the processing center.

If value per cubic meter of wood delivered at roadside were \$40/m³, gross income would be \$1200/ha/year. Subtraction of costs of harvest, which cannot be estimated accurately at this stage of project design, gives net income. If net income were as high as \$400/ha/year and an income of \$2000 were considered adequate then 5 ha/year would be harvested and the size of a management unit would be 150 hectares.

The owners of management units would receive the value of their shares in the transportation and processing systems.

The sponsors of the project should receive the net receipts from marketing finished products, plus payments and interest on various types of credit to unit owners, minus dividends to unit owners.

The object of selling shares in transportation and processing systems to owners of management units is to give them an economic and property interest in improved forest utilization and marketing of forest products.

5.8. Personnel

Refinement of Project design and initial education of technical personnel will involve a small group, perhaps 3 to 6 people, who are well acquainted with natural forest management in the wet tropics.

Initial education would probably be directed at somewhere between 6 and 12 technologists who will get the project started on the ground.

One result of the refinement of project design should be a more exact list of personnel for technical management, ownership of management units, transportation operations and operation of the manufacturing plant.

6. PROJECT COMPONENT - AGRICULTURAL DEVELOPMENT FOR THE PALCAZU

6.1. Background

Given the ecological constraints of the Palcazu, the choice of agricultural development strategies is limited. It is more beneficial to valley residents to increase their level of income by improving the existing tropical agriculture than it is to modify the environmental to accommodate monocultural or temperate zone production systems. To accomplish this an adaptive on-farm research program should be established to assist in the technology transfer between experiment station research and local residents. In particular on-farm experience will help in determining viable cropping and livestock production systems that are best adapted to the high selva. The purpose should be to improve existing crop/livestock systems taking into consideration the farmer's ability to absorb new technologies and incorporate appropriate management practices into a stable sustained-yield agriculture. The scope needs to cover not only on-farm research but also extension, training, as well as marketing and agro-industrial processing of locally produced products.

6.2. Project Sub-Component - Agro-Industrial and Agricultural Production Credit for Colonists and Native Communities

6.2.1. Objective

To provide stimulus for improving the level of agricultural

production as well as encouraging processing, industrialization, and marketing of locally produced agricultural products.

6.2.2. Elements

- Conduct feasibility studies on the potential for processing of locally produced agricultural products. Study should be based on:
 - a. The range of potential crops permitted by land capability and the total area suitable for each crop.
 - b. The cultural and technological capability of potential growers to produce and transport the quantity and quality of different crops suitable for processing.
 - c. An assessment of the long term market potential for ecologically and culturally suitable processed crops including local use of processed feed.
- Provide financial assistance for the purchase of tree crop seedlings, fertilizers, pesticides and other inputs for the successful establishment of permanent crops such as pejobaye, pineapple, cacao.

6.3. Project Sub-Component - Agricultural Research, Extension, Training

6.3.1. Elements

- Develop technical packages of agronomic information applicable to the Palcazu and similar areas of the high selva.
- Improve the delivery of the technical package and farmer assistance.

- Strengthen the capacity of regional training centers (UNAS) in order to provide the human resources necessary for the research and extension activities. Coordinate research and extension activities with Ministry of Agriculture, INIPA, La Molina, Yurimaguas Tropical Soils Experiment Station (N. Carolina State University), REDINAA as well as on going selva agricultural development projects (i.e. Upper Huallaga Agricultural Development).
- Provide a research base for the agricultural extensionists so that they can achieve the production potential of both the farmers and the land.

6.4. Organization

6.4.1. Evaluate the productive potential and appropriate cropping systems considering the social and ecological constraints of the region. Need to find out what can be grown, where, how much, and if it is feasible from both a social and practical standpoint.

6.4.2. A second level of research will be required. *Figure out* to *how* to produce, evaluate the market situation, and suggest feasible methods of organization (cooperative, private, mixed). *The hell*

6.4.3. Technical assistance should include help in evaluating the social and ecological feasibility of producing and processing locally produced crops as well as developing the marketing potential and administrative structure of any agro-industrial facility.

6.5. Staff

Social Scientist - part of the PEPP on-going development program

Agronomist - Familiar with fruit and industrial crops

Agro-industrial specialist whose functions could include:

- work closely with the social scientist and tropical crop specialist to determine the range of potential crops for processing and the market potential of each.
- work with the project staff to assess the options available for financing processing equipment, for share, communal or private ownership, and for establishing the extension infrastructure to guarantee the efficient utilization of a processing plant.
- disseminate information to producers regarding processor requirements and prices and likewise disseminate local supply conditions, outlook information to processors.

6.6. Approximation of Costs

US\$

Project design	50,000
Personnel	
1 Agronomist	
1 Social Scientist	
1 professional - agro	
3 extensionists	200,000
Training materials	25,000
Financial assistance for agro-industrial projects	500,000
Marketing Feasibility	225,000
Extension Program	500,000
Research (Linked with Alto Huallaga)	500,000
TOTAL:	2,000,000

7. PROJECT COMPONENT - LIVESTOCK AND SMALL ANIMAL IMPROVEMENT

7.1. Background

In terms of livestock production in the Palcazu valley, there are three types of relevant land use: pasture lands, croplands producing animal feeds and croplands producing by-products that may be used for animal feed. The alluvial soils, the best land for tilled crops, is currently underutilized in extensive livestock production and shifting agriculture. From the standpoint of natural resource management, this land should be more intensively cultivated for crop production with by-products and crops used as animal feed. However, considering that much of this land is already owned by livestock producers, it might also be used for intensive pasture or rotation of annual crops and pasture. Given the constraints of land capability and the fact that an estimated 15,000 has. of pasture is supporting approximately 13,000 head of livestock, it becomes obvious that there is little opportunity for expanding livestock production. Rather, the focus of this project will be to improve existing pasture, levels of herd management and incorporate small animal production units for native communities as well as colonists.

7.2. Objectives

7.2.1. Generate technical recommendations for a stepwise transition from current extensive to intensive cattle production.

7.2.2. Establish an effective livestock extension service to provide technical service to livestock farmers.

7.2.3. Create small animal production units on appropriate lands utilizing non-conventional locally available feeds, crop residues and by-products.

7.3. Project Subcomponent - Research, Training and Extension Unit in Livestock Production and Pasture Management

7.3.1. Elements

- Detailed inventory of livestock production units including quantification of pastures and livestock, evaluation of levels of management and interest in improvement. The results of this inventory would serve to identify priorities and sites for on-farm investigation.
- Improved record keeping, more consistent health care and stock culling based on simple production indicators.
- Pastures should be fenced into subsections so that the various age groups can be managed appropriately and rotation grazing practiced.
- Improve pastures with potential for response from improved grass/legume species or fertilization. These areas would be used by animals needing the highest level of nutrition.
- Develop pasture renovation and intensive use systems for existing pastures through the use of forage legumes, improved grass species, fertilizers, green manures, crop rotations and management techniques.
- Test recommendations for achieving heavier weights at slaughter and improved reproductive efficiency through more careful management and better nutrition. Research and extension should emphasize increasing the value and returns per animal, options which are more readily available to the Amuesha and colonists with few animals.

- Monitor the impact of grazing management, stocking rate and age of pasture on completeness of ground cover, water runoff, erosion, as well as pasture species composition and nutritive value.
- Implement a breeding program so that mating to improved bulls and subsequent calving occurs during a period of approximately 90 days.
- Identify existing livestock producers that have the best genetic stock so that they can be a source of improved bulls for sale to surrounding farmers.
- Establish a credit or cost-sharing fund for native communities and colonists interested in corral construction, fencing, pasture renovation or other improvement projects.

7.3.2. Training Procedures

- Consultants can be provided by IVITA Pucallpa staff on a long term basis.
- The training team could also be part of the INIPA system
- Linkages such as contractual agreements with current research, extension, or development programs in similar areas is important (i.e. Alto Huallaga Agricultural Development Project).

7.3.3. Organization and Location

- The major area of emphasis will be pasture renovation and the development of methodologies to improve livestock production on existing farms, indicating on-farm rather than experiment station research.

- The decision on need and allocation of an experimental station devoted to tropical pasture management should await the final plans of the Pichis-Pachitea livestock project. The planning and construction of a research station with a cattle herd would take 4 - 5 years.
- Laboratory facilities and technicians of INIPA in Tulumayo or IVITA in Lima and Pucallpa could be utilized rather than setting up expensive facilities in the Palcazu. Facilities at the PEPP demonstration currently being developed in Iscozacín should include provisions for the pasture and livestock research/extension team in terms of office and storage space.

7.3.4. Equipment

The equipment and budget requirements will include tractor rental, hired labor, fertilizer and fencing. Cost sharing plans may be worked out with collaborating farmers.

7.3.5. Staff

Agronomist - works with soil fertility management, soil compaction, pasture species composition, pasture renovation and maintenance.

Animal Scientist - works with grazing and herd management, stock selection and breeding programs, and installation of low cost fencing.

Veterinary * - works with herd health and nutrition

Economist * - works with analysis of profitability of technical recommendations, farm business management and record keeping.

* Available from Ministry of Agriculture. All personnel will work also with the small animal improvement project.

Forester - works at implementing an agro-silva-pastoral system practical for the conditions of the Palcazu. This is only a half-time job. The remaining time can be used to advise the small animal development project.

Livestock extension agents - Five extensionists that also work as research assistants.

7.3.6. Constraints and Hazards

- Offering large amounts of credit to existing Palcazu livestock producers before technical recommendations have been developed would only lead to increased deforestation, environmental degradation, and expansion of cattle production onto unsuitable lands.
- The on-farm research will probably funnel extra benefits to large farmers creating greater inequality of wealth within the area. However, if livestock production is to be improved in the area, it will occur first on large farms which are in need of technical recommendations.
- The conversion of pasture lands on inappropriate sites to other uses will depend on the intensified use of the more suitable pasture lands and the accompanying level of profitability.
- Cattle herds are dispersed over wide areas and are generally managed as separate units. Location of demonstration or adaptive farm research must be situated so that the greatest number of producers can benefit.

7.3.7. Characteristics of a Typical Beef Enterprise in Palcazu
Conditions

- On improved system of management utilizing pasture rotations
- Area of permanent pasture - 50 hectares
- Average carrying capacity of pasture - 1 - 1.5 animal units per hectare per year
- Breeding herd - 20 cows and 1 bull
- Growth rates - .4/kg /day or 180 kg carcass in 3 years
- Expected annual slaughter
 - 15% extraction
 - 5 cull cows weighing 350 kgs.
 - 11 slaughter steers and heifers at 350 kg
 - dressing percent of 50%
 - live weight 5600 kg
 - carcass weight 2800 kg
- Production per hectare per year - 56 kg (low, uneconomical production if pastures were not already established)
- A 45% increase in production (31 kg/hectare/year are current production figures)

7.4. Project Sub-Component - Research, Training and Extension Unit in Feed Processing and Ration Formulation for Monogasters

7.4.1. Elements

- Identify potential sources of energy and protein in annual and permanent crops traditionally used by natives and colonists as well as in surrounding successional or virgin forests.

Test the chemical composition and possible toxic substances in these sources.

- Test and develop small scale appropriate on-farm technology for drying or processing carbohydrate sources such as yuca, plantain, taro, sweet potatoes and protein sources such as pejibaya, kudzu sweet potato foliage and cow peas. Technology for collection and harvest may also be necessary.
- Design cropping systems that include permanent plantings of feed source crops that would improve the production levels of free roaming swine, goats or sheep and provide year round feed supply.
- Formulate rations for swine and poultry maximizing utilization of local products both processed and fresh, and assess the economic feasibility of supplementing locally scarce protein with fish meal from the coast.
- Design production system for swine, poultry and other animals based on improved nutrition and animal health that are economically profitable and achieve greater total production than present systems.
- Establish demonstration units of economically feasible feed formulation operations for native communities and colonists and implement extension activities to promote use of the rations in increasing small animal production.
- If rations are successfully developed, provide improved breeding stock.

7.4.2. Organization

- Evaluate the profitability and productivity of small animal production systems.
- Evaluate the feasibility of small scale feed processing units in the Palcazu valley including crop production and transport, unit financing operation and maintenance, product distribution and overall economics.
- Quantify the surplus of actual annual and permanent crops that might serve as monogastric feed and evaluate the possibilities for intensification and extension of their production within land use guidelines.
- Design and evaluate permanent cropping systems (i.e. pejibaye, plantains) that provide protein or carbohydrate sources without processing.
- Develop feed processing units for testing on demonstration farms for swine as well as poultry.
- If local rations can be economically formulated and produced in sufficient quantities, a pig unit should be established on the demonstration farm utilizing local stock and then converted to improved stock as experience in feed processing and small animal management becomes more reliable.

7.4.3. Training

- In-country training can be provided by IVITA on a long term basis.

- Linkages with ongoing research, extension programs such as the Upper Huallaga Agricultural Development project and the agricultural Research Network for the Amazon (REDINAA) would be very beneficial. Additional experience of CIAT should be evaluated.

7.4.4. Staff

Agricultural Engineer - Evaluate and select appropriate technology suited to local needs, construct processing plant.

Animal Scientist- Responsible for ration formulation and development of small animal production systems. Same individual as livestock improvement project.

Agronomist - Develop cropping systems that provide feed sources for swine poultry. Same individual as livestock improvement project.

Forester - responsible for developing agro/forestry systems that can be utilized by small animals. This position is shared half time with livestock improvement project.

Veterinarian - same individual as livestock improvement project.

Available from Ministry of Agriculture.

Economist - same individual as livestock improvement project.

Available from Ministry of Agriculture.

7.4.5. Location

- Initial work on feed processing should be carried out on the pilot farm with emphasis shifting to demonstration centers and private farmers as technology is proven and crop supplies become available.

- The swine demonstration units should be strategically located in native communities and with area colonists so that the results of the various energy feed sources (plantain, yuca, pejibayá, by-products, etc.) become available to all interested farmers.

7.4.6. Limitations

- At present small animals and poultry compete with humans for corn, yuca, plantains in the native communities. Swine and poultry can be promoted to increase protein supply in the Amuesha community only if feed supplies are increased.
- With the proposed road construction, imported feeds may be cheaper. If so, the research unit could shift their emphasis toward animal health and nutrition.
- Vitamin and mineral supplements will have to be purchased outside of the area.
- Basic research in the processing and use of non-traditional sources of protein and energy is lacking. Universidad de la Selva, INIPA, or La Molina would be appropriate centers for research development as well as REDINAA.

7.4.7. Characteristics of a Typical Pig Unit

- Production will be based on free-roaming pigs utilizing protein and energy sources such as corn, plantain, yuca, peji-baya, dried leaf protein, etc. , where at least 2 or 3 pigs will be reared for home consumption.
- A minimum of physical facilities might include holding pens for farrowing or vaccinating.

- Sows per unit - 6
- Litters per sow per year - 2
- Pigs weaned per litter - 6 per litter or 12 per sow per year.
- Age weaned - 8 weeks
- Market age - 7 to 9 months if sold for slaughter
- 4 to 5 months if sold for breeding purposes
- Slaughter weight - 50 - 60 kg.
- Total annual production:
 - 3 cull sows at 85 kg live weight (255)
 - 72 barrows and gilts at 55 kg live weight (3960)
 - 60% dressing
 - Carcass weight - 2529 kg

ANIMAL SALES AND OPERATING COSTS FOR A SIX SOW PIG UNIT

<u>INCOME</u>						
	Live Weight	Price Soles/kg	Year 1		Year 2	
			Head	Soles	Head	Soles
Butchers	55	600	36	712,800	72	1,425,600
Culls	85	600	--	-----	3	91,800
TOTAL INCOME			36	712,800	75	1,517,400

<u>EXPENSES</u>		
Feed a/ 30% purchased, 70% farm produced	362,700	697,500
Veterinary supplies (S/.4500/Sow/yr)	27,000	27,000
Labor - Family Supplied	0	0
Miscellaneous (10%)	38,970	72,450
TOTAL EXPENSES		796,950
Return in labor investment b/	284,130	720,450

a/ Assuming that all feed concentrates are purchased (27,900 Soles per pig), the operation is uneconomical. In reality only a small quantity of mineral supplement will be purchased.

b/ This return must be added to additional farm income generated from annual or permanent crops (See Pool Appendix, 1981)

Note: The livestock improvement and small animal projects have been based on recommendations prepared by Staver (1981) and considerable modifications of an evaluation prepared for the Alto Huallaga (Sprague and Gray, 1981).

7.4.8. Benefits and Rational for a Family Pig Production Unit

- A fairly rapid return on investment
- A large investment is not required for the establishment of an economical unit.
- Higher production levels are likely to be achieved when numbers and risks are reduced.
- Disease risks are minimized with smaller numbers.
- Supplemental feed demands are not so great and consequently easier to supply.
- By-products are more likely to be available to provide a larger proportion of the required feedstuffs.

7.4.9. Approximation of Costs for Five Year Program

Project Design	US\$	50,000
Personnel (5.5 Professionals, 5 extensionists)		500,000
Education and training of technical personnel and technical assistance		100,000
Equipment, hired labor, veterinary supplies, tractor rental, fertilizers, equipment for processing locally available feeds		400,000
Financial assistance to livestock producers to cover pasture improvement and renovation, fencing, improved breeding		750,000
Financial assistance for on-farm research and demonstration		<u>200,000</u>
TOTAL:	US\$	<u>2,000,000</u> =====

8. PROJECT COMPONENT - AMUESHA NATIVE COMMUNITIES LAND BASE CONSOLIDATION AND MANAGEMENT PROGRAM

8.1. Background

The Amuesha are an indigenous group which has inhabited the central Selva of Peru for several milenia. They maintain a distinct language and culture from both the Andean and coastal peoples who have moved into that area during the past century. Today the 5000 Amuesha are organized into 29 Native Communities (NNCC) which were legally established in 1974 by the Law of Native Communities and Agricultural Development of the Selva (DL 20653, changed in 1978 to D.L. 21175). Fourteen of these 29 NNCC are located in the Upper Palcazu drainage area. In 1976, the Amuesha population of this area was about 2500; current estimates place the population at 3000 (537 families) for an annual population growth of about 4.5%. Part of that high growth rate is due to immigration of Amuesha from the land poor communities in the Villa Rica - Oxapampa area.

The Amuesha have been interacting with the market economy for over a century. In addition to subsistence agriculture, they are currently engaged in commercial agriculture (corn, rice, achiote, bananas), cattle raising (2500 head of cattle), lumbering, and wage labor. They have been experimenting with communal and cooperative forms of production and marketing for 15 years. A valley wide community organization, AGROYANESHA, is currently promoting agricultural development and training in the Palcazu NNCC and establishing a community marketing network. However the great majority of Amuesha remain extremely poor. This is so because the conditions under which they participate in the market economy are extremely unfavorable, and because their resource base is inadequate. (See Miller and Martínez, 1981).

Projects aimed at this population must be specially designed with a maximum input from the communities in order to take into account their social and cultural situation. However, past experience has demonstrated that, for a variety of reasons, state services do not reach the NNCC. Because the Amuesha are the least powerful social group in the valley, it is imperative that some monitoring mechanism be established to guarantee that past experience is not repeated.

8.2. Objectives

- Safeguard against the negative effects on the native population of the Palcazu penetration road and spontaneous colonization.
- Guarantee to the NNCC an adequate land base which satisfies the needs of an expanding population.
- Improve the levels of nutrition and preventive health care delivery systems in the NNCC in order to reduce the effects of incoming diseases.
- Guarantee that the native population participate equitably with other local residents in the benefits which result from the Pichis Palcazu Special Project.
- Improve productivity on a sustained yield basis within the NNCC through the implementation of land use planning and management.
- Improve such conditions as productivity, access to markets, to capital inputs, and to credit, economic organization so as to allow the native population to participate in the market economy on a more competitive basis.

8.3. Project Sub-Component - Increase and Consolidate Land and Natural Resource Base of Palcazu NNCC

8.3.1. Background

The best estimates demonstrate that a minimum of 10 unit equivalents of agricultural land are needed to support one family (1 hectare A Land = 3 hectares C Land = 5 hectares P Land). For production forestry, estimates range from 120 has. to 400 has. per family. Although over 28,000 has. have already been titled to the NNCC in the project area, only 20% of that area is appropriate for agriculture. Land and resources are not equitably distributed among the NNCC. The 5 NNCC on the valley floor have better quality lands with as much as 10 unit-equivalents per family of agricultural land and 77 has. per family of production forestry land. However, the 9 NNCC in the mountainous headwaters are located on the poorest soils, with the highest rainfall and most deeply dissected terrain; here there is as little as 2 unit equivalents per family of agricultural land and 3.5 has. per family of production forest land. Of the 9 NNCC studied in detail, 6 had more than 60% of their agricultural lands under cultivation; 2 have already passed that limit and are actively converting forest and protection land to pasture. Five of the 14 NNCC have no land titles to the territories they occupy.

8.3.2. Objectives

- Guarantee a recommended minimum of 10 units equivalents/family of agricultural land (A, C, B) 70 has/family of production forest land (class F), and 50 has/family of protection land (class X), based on minimum area needed to support a family within the market economy. (See

Appendix) . On this basis a total of 3014 unit equivalents of agricultural land, 26,804 has. production forest land, and 7239 has. protection land is required to provide the recommended minimum land/family ratio for the 537 Amuesha families. (See Smith Appendix)

- Provide title to the five NNCC currently without them before the road construction advances.
- Consolidate the NNCC land holdings into a continuous territory by titling the small intervening areas, thus creating a unit which would promote economic integration, facilitate land use planning and management, and be more easily protected from invasion by new settlers.
- Encourage the resettlement of native families from areas with predominantly poor quality soils to areas on the valley floor with better quality soils, thus:
 - reducing the pressure on the proposed Yanachaga National park;
 - increasing the likelihood of a successful economic development of the NNCC

8.3.3. Activities

Untitled communities: demarcate and title lands for the five untitled NNCC according to recommendations in the Smith Appendix. Where possible boundaries should touch with boundaries of neighboring NNCC .

Titled Communities: where lands are still available, demarcate and title new lands for the titled NNCC in areas contiguous to current land holdings to bring their total holdings up to the recommended level (See Smith Appendix),

New Concessions: because of the limited availability of productive lands in the Upper Palcazu, grants of unsettled lands, titled under Art. D.L. 21175, should be established in the middle Palcazu to bring up the total land holdings to the recommended minimum. Amuesha from land-poor NNCC should be encouraged to resettle on these lands.

- demarcate an area of agricultural lands in the Codo del Pozuzo region (Class A,C, P)
- demarcate an area of production forest land in one of the main blocks of forest (Rio Chuchurras to Rio Lagarto; Rio Lagarto to Rio Mairo)
- demarcate areas in the lower Palcazu (Enock, Flor de un Día) for both agriculture and forestry Activities.

8.4. Project Sub-Component - Land Use Planning and Management Program

8.4.1. Background

Because their land base will soon be fixed in size, the economic success and to a large degree, the cultural survival of the Amuesha ethnic group depends on the sustained yield productivity of their consolidated land base. This will require careful planning and management of the use of that land. The following recommendations are made:

- the community assemblies, the recognized authorities, and the existing organization AGROYANESHA must participate fully in the planning and implementation of their own plan;
- for such a program to be successful in any NC, the Amuesha public must be convinced through education and promotion that they will benefit from the program;
- the program should be implemented by a team of Amuesha trained and aided by personnel of the Special Project;
- in order to avoid the common pattern of government paternalism, and to encourage the Amuesha to assume an active role in this program, a contractual agreement should be established between USAID, PEPP, Ministry of Agriculture, and AGROYANESHA stating the rights and obligations of each part.
- the program should be aimed in the following directions:
 - to improve yields of subsistence agriculture;
 - to improve management of wildlife and fisheries;
 - to promote small animal production;
 - to encourage shift to permanent cover and tree crops;

- to intensify cattle production;
- to manage the community forest lands for domestic needs, for sustained yield commercial lumbering, and for the collection of natural rubber, gums and fruits.

8.4.2. Objectives

- Increase the capacity for long term sustained-yield production on NNCC lands;
- improve the levels of nutrition;
- raise the cash income of the native population;
- generate employment opportunities within the NNCC

8.4.3. Activities

1) Research and Design

- establish an office with the local Special Project Office for coordinating activities planned for the NNCC. 1 anthropologist and 1 economist.
- establish a sub-program within the framework of a valley wide program for research and design of land use and management. 1 anthropologist, 1 economist, 1 agronomist, 1 cattle specialist, 1 forestry management specialist, 1 soils specialist
- demarcate lands within NNCC according to land use capability

2) Education and Promotion

- establish and implement educational and promotional programs for NNCC

3) Agricultural Research and Extension

- establish sub-program for NNCC within the framework of valley wide research and extension program. 1 Tropical crops specialist, 1 Small Animal Production Specialist, 1 Cattle Specialist
- establish a small training and demonstration center for the NNCC with the following objectives:
 - . to train Amuesha extensionists
 - . to experiment with permanent and tree crops
 - . to test intensive cattle raising methods
 - . to experiment with appropriate technology
 - . to coordinate extension services for NNCC
- Recommended site: NC 7 de Junio
- Budget items:
 - . classroom building (2 classrooms, 1 office)
 - . sleeping and eating facilities (25 persons)
 - . basic research and demonstration infrastructure
 - . training programs and materials

4) Industrialization of Agricultural Production

- research and planning for the installation of processing facilities (achiote, oil palm, fruit, yuca, coconut, etc.)
- promotion and implementation

5) Forestry Research and Extension

- establish sub-programs for the NNCC within the framework of a valley wide forestry research and extension program. 1 Silviculturalist, 1 Expert in Forest Management

and 1 Expert in Forest Harvesting.

- establish a small training and demonstration center for the NNCC with the following objectives:
 - . to train Amuesha forestry technicians
 - . to provide center for coordinating and implementing the forestry management techniques;
 - . to experiment with appropriate technology

Recommended site: new area of production forest land (see section 3.3)

Budget items:

- . classroom building (2 classrooms, 1 office)
- . sleeping and eating facilities (25 persons)
- . basic research and demonstration infrastructure
- . training programs and materials

6) Industrialization of Forest Production

- research, design, and installation of community owned lumber mill and related wood product mills (broomhandles, soda cases, furniture, etc.)

Recommended site: at forestry training and demonstration site

- training of native personnel for operation and administration of lumber and wood products mills

7) Management of Natural Rubber Stands

- provide technical support to begin managed exploitation of community owned natural rubber stands

8) Credit/Financial assistance

- provide financial assistance to individual producers

and to community enterprises for the following activities:

- . intensification of cattle production;
- . shift to permanent cover and/or tree crops
- . initiate rubber management and production
- . encourage natural forest management programs
- . purchase and installation of agricultural processing facilities
- . purchase and installation of lumber and associated mills

9) Technical training

- provide fellowship funds for technical and professional training of Amuesha outside project area in the following fields: agronomy, pasture and herd management; forest management; silviculture; business administration; marketing

10) Marketing

- collaborate with AGROYANESHA through research and design in the establishment of a Community Marketing Service for agricultural and forestry produce. 1 Economist, 1 Anthropologist, 1 Agronomist, 1 Forester

8.5. Project Sub-Component - Health Care System

8.5.1. Background

Health care delivery systems in the NNCC are very poorly developed. Health promoters are poorly trained, have no effective back-up system, and work in very inadequate conditions. The spontaneous colonization of the valley poses a real threat to the native populations through the introduction of new epidemic diseases.

8.5.2. Activities

- broad immunization program for all local residents and for new settlers
- provide further training to the local health promoters with emphasis on preventive medicine;
- train women nurses and midwives to assist in prenatal care, obstetric and gynecological services, now absent in the valley;
- financial assistance for infrastructural improvements of the community and other local health posts; creation of new posts.
- financial assistance for the construction and staffing of the central health facility at Iscozacán.

8.6. Project Sub-Component - Evaluation of Program Advances

In order to monitor program advances and problems, financial support should be provided for a periodic evaluation by specialists in the appropriate fields who are not associated directly with the project execution.

8.7. Budget

Sub-Component - Land Base Consolidation	100,000
Sub-Component - Land Use Planning and Management	
Research & Design (2 persons)	(20,000)
Education and Promotion of Management Program	5,000
Agriculture Research and Extension	
Infrastructure	25,000
Training 5/yr.	25,000
Special programs	15,000
Industrialization	
Research and planning	5,000
Forestry Research and Extension	
Infrastructure	25,000
Training program 5/yr	25,000
Equipment	(25,000)
Industrialization	
Research and planning	5,000
Rubber	
Technical support	5,000
Credit	
Agricultural programs	(100,000)
Forestry Management	(150,000)
Ag-Indust.	(100,000)
Forest. Indust.	(200,000)
Technical Training	50,000
Marketing research and design	5,000

Sub-Component - Health Care

Immunization	10,000
Training	25,000
Health post improvements	50,000
Central Health Facility - Staffing 20,000/yr	100,000

Sub-Component - Evaluation

Full time on NNCC Project

- 1 Anthropologist - coordinator
- 1 Economist
- 1 Forest manager
- 1 Tropical Agronomist
- 1 Cattle Specialist

Part time-shared with other Programs

- 1 Soils specialist
- 1 Small Animal Specialist
- 1 Silviculturalist
- 1 Forest Harvest Specialist

ANNEX A
ENVIRONMENTAL ASSESSMENT

CENTRAL SELVA RESOURCES MANAGEMENT PROJECT
USAID PROJECT No. 527-0240

Dennis McCaffreary
Lima, Perú
October, 1981

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1. SUMMARY

1.1. Major Conclusions

1.1.1. Environment

The Palcazu watershed lies about 274 miles northeast of Lima. It has a total area of approximately 190,000 hectares. The watershed is presently nearly roadless but a road is planned to penetrate it, south to north, from its headwaters to its mouth. The first eight kilometers of this road are under construction.

The watershed is characterized by rough terrain, numerous large and small streams, and very little flat land. Climate is warm and wet, becoming cooler and wetter with increasing elevation. Annual rainfall exceeds 3000 mm. throughout the watershed and most places receive 4,000 mm. or more of rain per year.

Flora and fauna exhibit great diversity. Most of the watershed is forested but quite a bit of clearing has occurred in the valley floor. A few species of animals are rare and some are threatened by hunting. Fish are abundant in the rivers and are an important food source.

1.1.2. Land Use Capability

The major land use capability of the more rugged land in the watershed, which comprises over half its area, is protection forest. This land is so steep, receives so much rain, and has such thin, erodable soil that clearing or logging will seriously damage it.

About 44,000 hectares at lower elevations in the valley are suitable for forest production but are too poor and fragile to support grazing or any kind of agriculture. Of these, 24,000 have limited productive capacity because slope and erodable soil restrict harvesting methods.

Only 34,000 hectares in the valley have the capacity to support some form of agriculture. 14,000 hectares can support permanent

crops, the least restricted use, 13,000 can support pasture, and 7,000 can support the most restricted use which is clean cultivation.

1.1.3. Productivity

Soils in the Palcazu Valley are highly acidic and infertile. The poor soils, together with high rainfall, limit productivity of row crops and pasture even on lands which are classified as having the capacity for those uses. The productivity of lands for forest and permanent crops is not quite so limited by these factors but it is still low.

1.1.4. Capacity for Development

Capacity for development is limited by low productivity and the small amount of land available for agriculture and other productive uses. Nonetheless, there are opportunities for development. These consist of encouraging use of land in accordance with its best capability and improving productivity on lands that are well used.

1.1.5. Capacity for Colonization

There are somewhere between 4,500 and 15,000 people in the Palcazu Valley now, almost all of whom make their living from the land. A more precise figure for population should be available soon when the results of the 1981 national census are known.

The size of land holdings and the quality of those lands is difficult to determine now. However, a land titling and platting program is underway so that fairly soon maps showing ownership should be available.

After the tools are available to know who owns what kind of land, two things can be determined: whether current residents need more good quality land to sustain a decent standard of living and whether there

is any room for new settlers on land which has the capacity to support them.

Present data indicate that some of the Amuesha communities are land poor whereas others have sufficient lands.

1.1.6. Alternatives for Development

Development of the Palcazu centers around whether there will be a road in the valley, where the road will be, and what kinds of development programs will accompany the road.

If development is not directed toward good land use for sustained yield it will almost certainly lead to improper land use, degradation of the environment, reduced land productivity, and social misery.

Four of the alternatives discussed in the environmental analysis advocate a detailed natural resources development project. They differ in that two refer to two different road locations, one includes financing a road and one explores development without a road.

1.1.7. Preferred Alternative for Development

The project paper synthesis recommends a development plan based on a road into the valley from its mouth rather than from its headwaters as currently planned.

A six-part development project would accompany development. Zoning land use to match land capability is a central feature of the development project. The project would establish a national park and forest protection system for the valley uplands. A natural forest management plan is proposed for forest production lands and crop and livestock improvement programs are proposed for permanent crop, pasture and clean cultivation lands. A regionally oriented management element would guide the

project. Another part of the program would key development to the special circumstances of Amuesha native communities in the Palcazu.

1.1.8. Environmental Effects of No Development Project

If a road is built into the Palcazu Valley, especially a road coming from the south through its headwaters, it will bring rapid changes for land use in the valley. Unless deflected, there will probably be massive deforestation, partly to obtain timber, but mostly to clear land for crops and pasture.

Deforestation will occur on lands which do not have the capability to support non-forest uses. These lands will then erode, causing their own impoverishment, as well as silting of streams, disruption of stream flows, and depletion of fisheries. Loss of flora, wood products, wildlife habitat, and wildlife are other effects of deforestation.

Similar degradation will occur on lands which could be used for production forestry or permanent crops but on which pasture or agriculture are attempted.

1.1.9. Environmental Effects of a Development Project

The preferred project is designed to avoid all the environmental ill effects that could accompany spontaneous development following a road. It would curb deforestation except on lands which are suited to clearing. Those lands and forest production lands would be managed for sustained yield. From these measures flow protection of soil, water, flora, and wildlife, conservation of timber resources, and maintenance of land productivity.

1.2. Areas of Controversy

1.2.1. Road Location

The road on which the preferred alternative is based would come from the marginal highway between the Pucallpa Road and Puerto Bermúdez and enter the Palcazu Valley at its mouth. It would then divide to give access to lands northward and southward in the valley.

The road proposed by the Peruvian government to penetrate the valley enters at its headwaters and proceeds about two-thirds of the way down the valley. It is presently under construction.

Penetration of the valley from the mouth rather than the headwaters has environmental advantages of avoiding fragile lands and giving access to the best lands. It is a longer route to Lima, however, than the road from the headwaters.

1.2.2. Land Capability

The land capability statements presented in this environmental analysis differ from statements on land capability from various sources in Perú. In general, earlier estimates have shown much larger potential for agriculture and pasture than those set out in the environmental analysis.

The statements in this analysis are supported by soil and climatic data for the Palcazu. They set a realistic basis on which to discuss such things as size of economic land management units and carrying capacity of the Palcazu.

1.2.3. Colonization

At one time, it was predicted that the Palcazu had a large capacity to absorb new population. The data in the environmental

analysis show that the population which the land base can support is not large, although a precise figure on population capacity is not given.

When the exact existing population of the Palcazu is known and titled lands are mapped, vacant good land can be identified. Controversy over use of this land will surround competing needs of native communities with insufficient good lands, other current residents of the valley with not enough land, and the desire to settle new people in the valley.

1.3. Issues to Be Resolved

1.3.1. Road Financing

The Project Identification Document that gave rise to this environmental analysis anticipated financing a road. That road was projected to enter the Palcazu Valley from its headwaters in the south and penetrate all but the northern third of the valley.

Only one of the alternatives discussed in the environmental analysis includes financing road construction or maintenance. The preferred alternative does not include it. That is because the road in it self has only minor environmental effects.

Nonetheless, U.S. AID is faced with deciding whether to finance a road in the Palcazu or not.

1.3.2. Road Location

The preferred alternative recommends serving the Palcazu with a road in a markedly different location from the road presently planned. A decision needs to be made on where a road will eventually be built.

1.3.3. Type of Development Project

U.S. AID needs to determine if it wishes to finance a development project in the Palcazu and what the thrust and scope of that project will be.

The preferred alternative sets out a development project that should both conserve natural resources and enhance their productivity. The project could be expanded to include road construction. It consists of several separate elements so it could be contracted as well. However, the elements dealing directly with land use are all integrated so that no one element would be as successful singly as it would linked to the others.

The other alternatives set out in the analysis should also be considered and a decision made.

2. INTRODUCTION

2.1 Background

Construction of a highway, known as the marginal highway, along the eastern base of the Andes has been a long-standing goal of the Peruvian Nation. One of the purposes of the highway is to open up the selva of the Amazon lowland and the upper selva of the eastern slopes of the Andes. When completed the highway will extend from the Ecuadorean border to the border with Bolivia.

One loop of the marginal highway is intended to penetrate the Palcazu valley in the eastern parts of the Departments of Pasco and Huanuco. The main stem of the marginal highway is planned to extend through the Pichis valley just east of the Palcazu. The two roads are to diverge in the upper Palcazu watershed and reunite near where the Pichis and Palcazu Rivers join to form the Pachitea. The highway then is to continue northward until it meets the Pucallpa-Tingo Maria highway at a point near San Alejandro.

This road network is currently under construction at four points:

- Southward from San Alejandro up the Pachitea River ;
- Eastward toward the Pichis Valley from the end of the road east of Villa Rica;
- Southward in the Pichis Valley from Puerto Bermúdez toward the road coming from Villa Rica;
- Northward into the Palcazu Valley from the junction with the road heading to the Pichis.

By the end of 1981 the road to Puerto Bermúdez should be completed and about eight kilometers of the road into the Palcazu should be built.

Simultaneously with building these roads, the Peruvian Government wishes to develop the valleys which they penetrate. Toward this end Perú has established the Pichis-Palcazu Special Project known, by its acronym in Spanish, as PEPP.

PEPP's initial funding comes from a grant from U.S. AID agreed to in September of 1930. One of the objects of the grant agreement is to design a project for development of the Palcazu Valley.

An early step in reaching this object was preparation, in March of 1981, of a Project Identification Document, PID, by the US AID Mission in Perú. The PID identified a project entitled Central Selva Resource Management and called for environmental analysis of the proposed project. Social analysis of the project area accompanied the PID as did a scope of work statement for environmental analysis.

In July of 1981, U.S. AID entered into a contract with JRB Associates of MC Lean, Virginia to prepare a multifaceted study of the project. The study consists of:

1. A report on prior experience with colonization of tropical lands.
2. An ecological baseline analysis and natural resources inventory of the Palcazu Valley;
3. A determination of land and natural resource capability and suitability for development in the project area;
4. An environmental assessment of the project;
5. Project design assistance to the AID Mission in Lima.

The team fielded by JRB Associates, after discussion with AID and PEPP, is proposing a group of projects which anticipate environmental impacts and which are designed to be environmentally sound. The proposed projects also take social impacts into account.

2.2. Methodology

Work on the five-part study commissioned by AID was done between early July and mid-October of 1981. Teams of experts developed the baseline inventory first, followed by the land capability and suitability analysis, and ending with several synthesis reports. The subject matter overlapped and so did the timing of the work so that there was much cross-contact and exchange of information among members of the teams.

In general, each team member performed his part of the project by a combination of field inspection, interviews, and review of data and documents. A report was prepared by each team member.

2.3. Format

This environmental analysis is an annex to the Project Paper Synthesis for the Central Selva Resources Management Project. It, in turn, draws its facts from the series of background reports comprising the baseline analysis and natural resources inventory of the Palcazu Valley and also the determination of the land and natural resource capability and suitability of the valley for development.

The background reports are set out as appendices to the project paper synthesis. Two other annexes accompany the project paper synthesis. One is a social analysis of the proposed projects and the other is a study of the history of land colonization in Peru.

2.4. Purpose

The purpose of this environmental analysis is to analyze from an environmental point of view, the projects described in the Project Paper Synthesis for the U.S.AID Central Selva Resources Management Project in Perú, Project No. 527-0240.

The projects have been designed to be environmentally and socially sound in the Palcazu Valley. The central feature of the environmental analysis, then, is to describe how project design meets environmental constraints and opportunities for development in the Palcazu. The analysis also discusses alternatives to the project including predictions of the environmental effect of not having the project.

2.5 Need

The underlying need for environmental analysis of the Palcazu Valley stems from these facts:

1. The valley has a fragile environment characterized by:
 - rough terrain
 - rainy climate
 - poor soils
 - threatened wildlife
 - limited capacity for development activities.
2. The valley is populated by several thousand people who tend to occupy the most productive lands and who engage in activities which cause some pressure on the environment.

3. The population of the valley is increasing by internal growth and by gradual immigration of new settlers, causing greater pressure on the environment.
4. The Peruvian Government intends to penetrate the valley, which is currently nearly roadless, with a road running the length of the valley. Construction and presence of the road itself affects the environment.
5. The road is almost certain to bring new settlers. These people, finding the best land already occupied, will be tempted to settle on poor lands where risk of environmental damage is high.
6. Presence of the road will probably also encourage current residents of the valley to expand land uses onto lands with high risk of environmental damage.

2.6. Collaboration

The teams who prepared the background papers worked closely with PEPP, the AID Mission in Lima, and numerous Peruvian agencies and institutions. PEPP and the AID Mission have been consulted regularly concerning this environmental analysis. As information for the analysis has accumulated it has been provided to the mission and to PEPP. PEPP and the AID Mission have been extremely helpful in exchanging ideas and information, thereby greatly assisting this analysis.

3. ALTERNATIVES

3.1. Synopsis of Alternatives

The alternatives for a natural resources management project in the Palcazu Valley center around whether there will be a road in the valley, where the road will be, and who will fund the road.

3.1.1. Upper Valley Road

Initially, it was assumed that there would be a road in the Palcazu Valley which followed current plans for that road. PEPP plans propose a road beginning near the headwaters of the Palcazu River at the south end of the watershed. The proposed road follows the river closely until it reaches the valley floor where it diverges from the river. Then the road continues down the valley parallel to the river, but several kilometers west of it, passing through a little of the better land in the valley. It ends near the Pozuzo River northwest of Puerto Mairo. A number of branch roads are planned to gain broader access in the valley. Neither the road nor its branches, however, will reach the area of the elbow of the Pozuzo River which is where the land with the highest capacity for agriculture and grazing is located.

3.1.2. Lower Valley Road

Building a road in the lower Palcazu Valley should be considered in preference to building the road proposed for the upper valley. A road into the Palcazu could begin at the marginal highway near where the Palcazu Rivers joins the Pichis. It could ascend the Palcazu into the Palcazu valley near Puerto Mairo and then divide into two branches. One branch could go northwest to the good land in the elbow of the Pozuzo River. The other could go southward, perhaps following the course of the road planned by PEPP, through the lands drained by the Lagarto, Chuchurras,

and Iscozacin Rivers. Such a road would be approximately 100 Km. long divided into three segments as follows:

30 Km. - Marginal highway to Puerto Mairo

30 Km. - Puerto Mairo to elbow of the Pozuzo

30 Km. - Puerto Mairo to Iscozacin River

This alternative road would have the following advantages over the road as currently planned:

- It would avoid the rough terrain and high rainfall of the southern end of the Palcazu watershed.
- It should reduce construction and maintenance costs.
- It makes the lands in the southern end of the watershed whose principal use is protection forest, less accessible so that intrusion into them for logging and settling is less likely.
- It would give direct access to the best lands.
- It could be built in stages with some lands opened up first and others later.
- It could be linked to river transportation on the lower Palcazu rather than relying exclusively on highway transportation.
- It would reach native communities by a spur road rather than a through road so that disruption of the communities would be lessened.
- The road presently under construction in the upper watershed could still provide access to a proposed Yanachaga National Park.

The segment of the Marginal highway from the Pucallpa road to the Palcazu river and thence up the Pichis River to Puerto Bermúdez is not yet

completed. It is under construction, however, as is the section of the Marginal highway from Puerto Bermúdez to Villa Rica. Plans are to complete this entire segment of the marginal highway in the near future. It should be completed soon enough to give timely access to the lower Palcazu. Moreover, a short delay in access to the lower valley would provide valuable time to implant management plans for the valley.

3.1.3. Road Funding

The PID which preceded project design included a proposal to fund construction and maintenance of the road entering the Palcazu from the upper end of the watershed. The proposed projects, however, exclude funding any roads. Funding roads in the Palcazu is expensive and does not appear to confer sizeable environmental benefits. Major effects on the environment in the Palcazu will not come from road building but from human activities that will occur after roads are built.

3.1.4. Presentation of Alternatives

Several possible combinations of projects with and without the road are set out below. Their order of presentation begins with the combination most closely resembling the present day situation in the Palcazu. It is followed by a combination which typifies what happens when roads are built into new lands in the upper selva without planning for the development which will follow. This alternative assumes that a road will be built according to present plans to penetrate the watershed from the upper end.

Thereafter, two alternatives are presented whose central feature is to anticipate and mitigate undesirable environmental effects of building a road in the Palcazu. The first, and preferred, alternative centers around a road into the lower valley with no through road from the upper watershed.

The second alternative assumes that the road proposed by PEPP will be built as planned.

Finally, there is an alternative which includes road financing and one which discusses a project in the absence of a road.

3.2. Alternative A: Do not Construct Any Roads; Do Not Have A Natural Resources Project.

If no road were built into the Palcazu, migration into the valley and expansion of forest clearing would probably continue at a gradual rate. Cattle raising would probably continue to be the major economic activity along with subsistence agriculture and some harvesting of forest products.

Without any incentives to do otherwise, land use would probably follow the pattern of forest clearing, burning, cropping, pasture, poor second growth forest. These activities would occur on lands across the whole range of land use capability from those which could support intensive agriculture to those which should not be deforested.

The population would probably continue to hunt and fish for most of its protein. Education, health, and sanitation would probably not improve much.

Environmental effects of this alternative would be:

- Loss of forest products.
- Erosion and impoverishment of fragile lands.
- Increased threat to vulnerable species.
- Increased irregularity of stream flows.
- Increased silting of streams.
- Competition for land and resources among native communities, other established residents and new settlers.

- o Long term depletion of fish and game.
- o Long term reduction of land use capability.

These environmental effects would spread fairly slowly. Less accessible parts of the valley, which tend to have the most restricted land use capability, would probably remain unsettled for a while.

This alternative is not likely to occur because Perú plans to build a road into the valley. It is already under construction and will probably be completed either with international financing or national financing. Even if the road were not completed, migration into the valley would probably accelerate, thereby - accelerating adverse effects on the environment.

3.3. Alternative B: Construct A Road; Do Not Have A Natural Resources Project.

This is the worst alternative.

Construction of a road, especially one entering the watershed at its headwaters, will invite a rapid influx of new settlers. It will also provoke rapid and massive deforestation. One object of deforestation will be extraction of timber. This will not be complete deforestation because it will seek only the more valuable commercial woods. However, because logging opens penetration roads, it will lead to rapid conversion of logged lands to pasture and agriculture. Another object of deforestation, which will probably be quite widespread, is direct conversion of forest to pasture with little or no utilization of timber.

Massive conversion of forest to pasture can be expected from both current residents and newcomers because cattle raising will continue

to be the major economic enterprise in the Palcazu. Its attractiveness will increase with a road that should make transportation more available at lower cost.

People will seek out good land; but good land is limited in the Palcazu so poor land will be used as well. When poor land can no longer produce it will be abandoned to low-grade, secondary forest. More land, probably poor, will be cleared and pasture again attempted but not sustained.

Over the course of time, virtually the entire watershed will be cut over. This will include much of the land in the San Matias and Yanachaga ranges whose only capability for sustained use is protection forest and whose function as protection land is essential to maintain the productivity of the watershed.

The environmental effects of this alternative are extreme. They include:

- Massive loss of forest products.
- Degradation of large amounts of land by putting it to uses beyond its capacity.
- Massive erosion and soil impoverishment.
- Serious reduction of wildlife and wildlife habitat.
- Serious threat to fisheries from silting of streams, disruption of stream flow regimen, and fishing pressure.
- Stream degradation by silting, increased flooding, and bank erosion.
- Severe competition for land and resources among native communities, established residents and newcomers.

- o Unattractive social environment characterized by poverty, disease and malnutrition.

Although a penetration road into the Palcazu will probably be completed soon, this alternative ought not to occur. The Pichis-Palcazu Special Project is expressly designed to accomplish sustained, sound development. But if the special project is successful it will be a marked exception to the experience in other parts of the upper selva where roads have been followed by devastation and very low land use productivity over the long run.

The special project probably won't be entirely successful but it probably won't be a complete failure either. Its chances of success would seem to be enhanced by a natural resources management project funded by U.S. AID.

3.4. Alternative C: Construct Road in Lower Valley; Have A Natural Resources Project.

This is the preferred alternative.

It contemplates stopping construction on the present penetration road when the first eight kilometers are completed and then building a different road in the north end of the valley. The new road is described in Section 3.1.2. above.

This alternative anticipates and mitigates adverse environmental consequences of building a road into the Palcazu. Its principal objectives are:

- o Protect lands whose major land use capacity is protection.
- o Encourage use of land for its major land use capacity and discourage other uses.

- o Control erosion and protect streams.
- o Improve utilization of forests for sustained yield.
- o Improve agriculture and livestock production on suitable lands.
- o Protect fish and wildlife and their habitats.
- o Enhance scientific and recreational use of the watershed
- o Insure access to adequate natural resources for native communities and other present residents of the valley.
- o Avoid road construction in rugged protection lands in the headwaters of the watershed.
- o Assure road access to the most productive lands in the valley.
- o Minimize disruption of native communities by reaching them with spur roads rather than through roads.

These objectives are met by the elements proposed in the Project Paper Synthesis as follows:

1. Establishment of a management program for the upper selva aplicable to the Palcazu;
2. Zoning the Palcazu according to land use capability;
3. Creation of a national park in the Yanachaga range and protection of highlands outside the park;
4. Financing a project in natural forest management for sustained yield at high levels of utilization;
5. Developing a crop and livestock improvement program adapted to major land use capability;
6. Assisting native communities in good land use, production and marketing.

Although this alternative differs from the specific plan for road construction in the Palcazu which is currently under way, it does generally mesh well with the overall road network planned for the upper selva.

Its advantages over the proposed road under construction are set out above in Section 3.1.2. These advantages should encourage acceptance of this alternative.

3.5. Alternative D: Construct Road in Upper Valley: Have a Natural Resources Project.

This alternative contains most of the environmental benefits of the preferred project. However, penetrating the valley with a road from its headwaters, as called for in current plans, has these drawbacks:

- More road construction in steep, wet lands whose best use is protection forest.
- Failure to reach the most productive lands in the northernmost part of the valley.
- Greater exposure of fragile protection lands to incursion.
- Disruption of native communities by a through road.

This alternative is not as good as the preferred alternative from an environmental point of view. It may be less desirable than the preferred alternative from the points of view of engineering and economics as well. It should be carefully compared with the preferred alternative and plans for the road from the headwaters of the watershed should be with drawn if the preferred alternative is shown to be superior.

3.6. Alternative E: Finance The Road; Have A Natural Resource Project.

This alternative would consist of a natural resources management project containing all the elements of the proposed project with all the environmental benefits that project entails. In addition, it would include financing construction and maintenance of a road, preferably in the lower end of the valley.

Building a road in the Palcazu will involve some disruption of the environment. That disruption consists of removal of trees, cutting slopes and filling hollows, and diverting streams. Commercial trees which are removed can be sold; no harm is done to vegetation or wildlife overall. Some damage is done to streams by filling and diverting channels and by introducing eroded material from road cuts and the road surface. This damage can be minimized by careful construction and good road maintenance.

Control over construction and maintenance would follow from assuming financing of the road. The benefits in improved environmental protection are small, however, for the size of the cost of financing.

Financing the road could also result in control over location of the road. Environmentally fragile areas could be skirted and the road routed through areas of least environmental hazard. Again the environmental benefit is small for the cost expended.

Whether this alternative occurs seems to depend more on economic considerations than environmental ones.

3.7. Alternative F: Discontinue Construction of the Road; Have a Natural Resource Project.

This alternative contemplates halting road construction into the valley after the eight kilometers of road now under construction are completed

and not building any other roads in the valley. A natural resource project would then be carried out in the roadless valley.

Such a project could readily incorporate the national park element of the proposed project. The other elements would have to be modified, however.

Absence of a road would mean continued difficulty in transportation of products which would continue to be, as now, by air and river. An inexpensive and simple cattle improvement project might be possible. So might a project to improve tornillo and rubber production using the river for transportation. Some work might also be done with high value crops that could pay the cost of air or river freight. In general, though, forest management and crop and livestock improvement programs would be less sweeping and affect fewer people.

Zoning the land in the Palcazu according to land use capability would still be a good idea as would formulation of an overall management plan. Difficulty in getting around the valley might impede putting the plan into effect.

This alternative is not likely to occur because a road will probably be completed in the Palcazu fairly soon.

3.8. Comparison of Alternatives.

Figure 1

COMPARISON OF COMPONENTS OF ALTERNATIVES							
Alternative	Natural Resources Project	No Natural Resources Project	Road from lower Valley	Road from upper Valley	No Road	Road Financed	Road Not Financed
A		X			X		
B		X		X		Z	Z
C	X		X			Z	X
D	X			X		Z	X
E	X		Z	Z		X	
F	X				X		

X = the component is expressly included in the alternative.

Z = the component could be included in the alternative.

Figure 2

COMPARISON OF ENVIRONMENTAL BENEFITS OF ALTERNATIVES						
ENVIRONMENTAL BENEFIT ¹	A	B	C	D	E	F
Acquisition of data for environmental management			X	X	X	X
Training personnel in environmental management			X	X	X	X
Zoning land by land use capability			X	X	X	X
Protection of protection forest lands			X	X	X	X
Protection of Flora and Fauna			X	X	X	X
Natural forest management on forest production lands			X	X	X	Z
Appropriate cultivation of permanent crop lands			X	X	X	Z
Livestock management on pasture lands			X	X	X	X
Appropriate cultivation of clean cultivation lands			X	X	X	Z
Avoidance of road construction in fragile lands	X		X		X	X
Direct access to most productive lands			X		X	
No disruption of native communities by through road	X		X		X	X
Possibility of linkage between road and river transport			X		X	
Controlled environmental impact of road construction					X	
Road maintenance to reduce environmental impact					X	

X = the benefit is conferred by the alternative

Z = the benefit is partially conferred by the alternative

¹/ Most of these might be termed primary environmental benefits expressed in terms of land use. From them flow secondary benefits such as erosion control and maintenance of soil fertility and tertiary benefits that include improved forest utilization, flood avoidance and similar benefits.

4. AFFECTED ENVIRONMENT

4.1. Location and Boundaries.

The Palcazu watershed is located about 275 kilometers north-east of Lima in the eastern part of the Departments of Pasco and Huánuco. It is bounded on the east by the San Matias range, on the south by the San Carlos range, on the southwest and west by the Yanachaga range and on the north by the Pozuzo River.

Just east of its juncture with the Pozuzo River, the Palcazu passes through a gap in the San Matias range. This analysis covers the Palcazu watershed to this point. The Palcazu continues eastward to join the Pichis River near Puerto Victoria forming the Pachitea River. That portion of the Palcazu, however, is physically and environmentally more closely associated with the Pichis and Pachitea valleys than with the Palcazu Valley west of the San Matías range. Furthermore, the road currently planned for the Palcazu Valley is going to end west of the San Matias near Puerto Mairo. Future plans do envision connection of the Palcazu and Pichis roads along the lower Palcazu.

4.2. Physical Features

4.2.1. Mountains. The San Matias range is an abrupt, steep range that rises from the eastern edge of the Palcazu River to altitudes of more than 1100 m. It has virtually no foot hills or side ridges and the ridge crest is at an average distance of only 4 or 5 km. from the river channel.

The Yanachaga range, on the other hand, is much higher than the San Matías, reaching altitudes of more than 3,000 m. The range has extensive side ridges and foothills spreading into the Palcazu

Valley. The crest of the Yanachaga range, due west of Iscozacín in the widest part of the Palcazu watershed, is nearly 40 Km. west of the rivers.

4.2.2. Rivers. The principal river in the valley is the Palcazu itself which begins at the juncture of the Bocaz and Pichanaz Rivers in the southeast part of the watershed. The Palcazu then flows slightly west of north to join the Pozuzo which originates on the west side of the Yanachaga range. The distance from the point of beginning to the confluence with the Pozuzo is a little over 60 Km. in a straight line. Elevation of the Palcazu is about 400 m.a.s.l. at its beginning, dropping to 270 m. at the confluence with the Pozuzo.

The Palcazu is fed from the east by small streams at close intervals coming off the San Matías range. Its major tributaries come from the west. Chief among these are the Chuchurras and Iscozacín which are navigable for small craft. The Palcazu is navigable for small craft up to Loma Linda. Larger craft can reach Puerto Mairo. The northern part of the valley is narrow so that tributaries entering the Pozuzo are smaller than those further south.

4.2.3. Terrain. There is not much flat land in the Palcazu Valley. Most of what flat land there is forms terraces along the larger streams and rivers; some of this land is flooded periodically. Between the river and the main ridges and foot hills of the Yanachaga range the land is broken. Although the hills are not all tall, even short slopes are often very steep and the land is cut frequently with small streams. The San Matías range and main foot hills and ridges of the Yanachaga consist of long, steep slopes as do the high hills in the Valley floor.

4.2.4. Soils. Soils throughout the Palcazu tend to be highly acid and infertile with high concentrations of aluminum. Some of the alluvial soils are slightly more fertile than the upland soils. The soils on slopes tend to be thin and highly erodable.

4.3. Climate

The climate of the Palcazu Valley is warm and wet, becoming cooler and even wetter at higher elevations. Temperature is fairly constant throughout the year so that diurnal variations are greater than seasonal variations. Average daily high and low temperature are approximately 31 and 21°C, respectively, in Puerto Bermúdez in the Pichis Valley. Similar ranges may be assumed for the low elevations in the Palcazu Valley.

Rainfall, which averages from a little under 3,000 to about 4,500 m.m. per year in the valley floor, varies seasonally. Wet months are October to May; June through September are drier.

There is only one meteorological station in the watershed, on the Bocaz River in the southern part of the watershed, elevation 1,050 m. It reports an average annual rainfall of 3,380 m.m. over a period of seven years.

4.4. Life Zones

Life zones, the expression of the relationship of rainfall, biotemperature, and evapotranspiration to plant and animal life, have been described and mapped for the watershed. In the absence of temperature and rainfall data, the life zones were determined by field inspection of vegetation and soil.

The life zones reflect the wet climate of the watershed. All of the life zones except for one are classified as wet forest or rain forest. The one exception, Tropical moist forest, including Tropical moist forest in transition to Tropical wet forest, covers about 15 per cent of the valley floor.

The wettest life zones occur in the southern and western part of the watershed. The Yanachaga side of the watershed is wetter than the San Matías side. The wetness of the region is an overriding ecological characteristic which over the course of time has influenced soils, land forms and biota and which restricts land use.

4.5. Biota

4.5.1. Wildlife

The Palcazu watershed comprizes two zoogeographic provinces, the Amazonic in the lowlands and the Yungas at medium and high elevations thus it has an exceptionally large number of species of animals. The high diversity of species is accentuated by the fact that the Palcazu is probably part of a pleistocene refugium in which many endemic species have evolved.

The animals of the Amazonic province include a goodly number of large species whereas the animals of the Yungas province tend to be smaller. The Yungas is particularly rich in birds.

There are several rare species in each province and also a few which are being hunted to the point of threatened extermination. River turtles, several species of monkeys, and the spectacled bear are among the threatened species. Some species which are not threatened generally are becoming scarce locally because of heavy hunting.

4.5.2. Fisheries.

The Palcazu River system has ample population of a large number of species of fish. Some of the species are sedentary but many are migratory, moving up and down the river seasonally.

The fisheries are well fished by the local population and probably are a more important source of protein for many people than is game or domestic meat. At present the fisheries are not being overexploited. Virtually all of the current exploitation is for subsistence in the Palcazu, but downriver on the Pachitea some of the stocks are harvested commercially.

Although fisheries in the Palcazu do not appear to have commercial potential for the national market, they should continue to be an important social source of food on a sustained yield basis.

4.5.3. Flora

The vegetation in the Palcazu exhibits a wide variety of form and high diversity of species. Forest is the natural vegetation of the entire watershed. In the lowlands it tends to be tall forest, whereas at upper elevations cloud forest predominates. On the highest slopes of the Yanachaga diminutive trees form elfin forest. There are some rare species of plants and a number of endemic species.

Besides the major forest types which tend to reflect climate, there are some formations that reflect edaphic conditions. Examples are swamps of aguaje palm and the association on white sand soils typified by tornillo and rubber trees.

4.6 Land Capability

4.6.1. Protection Forest Land

Because of its rugged terrain, fragile soils, and high rainfall, most of the land in the Palcazu watershed is best suited for use as protection forest. This is true of virtually all of the San Matías range and all of the main ridges and foothills of the San Carlos and Yanachaya ranges. Much of the high hill areas in the valley floor should also be retained in protection forest.

Although protection forest land will not support either harvesting of forest products or cultivation of any kind, it has economic uses. These include recreation, watershed protection, and shelter for wildlife.

4.6.2. Production Forest Land

Nearly half of the land at low elevations in the Palcazu watershed is suitable for production forestry, that is the extraction of forest products while generally retaining forest cover on the land. This land is not suitable for any form of cultivation, however, and it should not be cleared.

More than half of the forest production land is so steep and wet that extreme caution should be used in timber extraction to avoid erosion. The rest of the land is less susceptible to erosion and a wider variety of harvest methods are appropriate.

4.6.3. Permanent Crop Land

Land use for permanent crops is use in which a continuous cover of perennial plants is maintained and harvested with infrequent cultivation. Examples are tree crops, such as fruits and nuts, and other long lived plants like plantains.

Land may be used for permanent crops if it is too easily erodable or too infertile to support pasture or clean cultivation and yet not so delicate as to prohibit deforestation.

4.6.4. Pasture Land

In the wet climate of the Palcazu, pasture is a more restricted land use than permanent cropping. Cattle compact soil and their trails invite erosion. Their production by grazing is only appropriate on gentle terrain with fairly fertile soil. Even though land may be physically capable of supporting pasture, the wet climate affects nutrition and quality of the pasture adversely.

4.6.5. Land Suitable for Clean Cultivation

Clean cultivation, the production of crops such as corn or beans on bare soil with frequent cultivation, is too demanding a use for most of the Palcazu valley. Less than ten per cent of the land in the valley floor has good enough soil and gentle enough terrain for clean cultivation. Again the wet climate limits crop suitability and production levels.

4.7 Social Setting

An annex to the PID for the Central Selva Resources Management Project by Miller and Martínez describes the social setting of the Palcazu Valley. The Palcazu population consists of three groups - Amuesha native communities, people of European origin who have gradually settled the area over several generations, and recent colonists from other parts of Perú.

The circumstances of the Amuesha are described in detail by Richard C. Smith in an Appendix. In general the rest of the population is poor although some of the large, established ranchers are reasonably

well off economically. Education, health, and sanitation facilities are inadequate for all social strata.

Most of the population engages in some subsistence farming, hunting and fishing, and cattle raising. Cattle is the principal product of the valley. A little commercial logging for outside markets also occurs.

Estimates of current population of the valley vary from PEPP's estimate of 4,500 to 15,000 estimated by Miller and Martínez in their annex to the PID. A more exact figure on population should be available when the results of the national census of July 12, 1981 are known.

4.8 Current Land Use

The most common type of land use in the Palcazu consists of deforestation in which little or no timber is harvested, followed by a cycle or two of crops, and then conversion to pasture. On many holdings, conversion to pasture often occurs directly after deforestation. Sometimes crops are not followed by pasture but by second-growth forest known as "purma." Some pasture is also overgrown and becomes "purma."

Much of the better land in the valley, especially between Loma Linda and Puerto Mairo has already been cleared. It is used for pasture even if it is suitable for clean cultivation, probably because there are no markets for agricultural products and also because cattle raising is the preferred activity of the landholders.

Much land which is not suitable for pasture, but which could be used for permanent crops or forestry, is also in pasture. This land often shows signs of erosion and its productivity for grazing tends to be low. Long term use of the land for pasture degrades it, reducing its suitability for permanent crops or forestry.

5. ENVIRONMENTAL CONSEQUENCES

5.1. Environmental Impacts of the Alternatives

All of the alternatives described earlier entail some form of development of the Palcazu Valley. Development is almost certain to occur and it is almost certain to center around the presence of a new road in the valley. Unguided development of the valley will bring serious environmental impacts. Guided development can mitigate those impacts and enhance environmental and social benefits. Therefore, environmental impacts and mitigation of the alternatives will be discussed in terms of constraints and opportunities of the Palcazu environment for development.

5.2. Environmental Constraints on Development of the Palcazu Valley

5.2.1. Limited Land Use Capability

The Palcazu watershed contains roughly 190,000 hectares of land. About 95,000 hectares in the valley floor have been studied and classified according to land use capability. The lands in the San Matias, San Carlos and Yanachaga ranges have not been classified. However, these lands are so rugged and have such wet climate that virtually all of them can only serve as protection forest. Small amounts of land with forestry or agricultural potential probably occur in parts of the Iscozacín, Chuchurras and Lagarto watersheds which were not classified. But these lands would probably make only a small addition to valley lands with some development potential for forestry or agriculture.

FIGURE 3

LAND CAPABILITY OF 95,000 HECTARES IN PALCAZU VALLEY FLOOR 1/

<u>CAPABILITY CLASS</u>	<u>AREA IN HECTARES</u>	<u>PERCENTAGE AREA</u>
Clean cultivation	7,200	7.6%
Pasture	12,671	13.3
Permanent Crops	13,653	14.4
<hr/>		
All agriculture	33,554	35.2
<hr/>		
High production forestry	19,150	20.3
Low production forestry	24,646	25.9
<hr/>		
All production forestry	43,796	46.2
<hr/>		
Protection Forest	14,841	15.6
<hr/>		
Riverbed	2,839	3.0
<hr/>		
TOTAL:	95,000	100.0
<hr/> <hr/>		

1/ Taken from Appendix by Joseph A. Tosi, Jr.

5.2.2. Low Productivity

The land available for agriculture, livestock or forestry cannot be expected to give very high yields. Pool estimated that land classified for clean cultivation can yield \$278 per hectare per year from a ten hectare parcel planted to a variety of crops using traditional technology. For permanent cropland, Pool estimates an initial annual income of \$2,165 from 30 to 35 hectares planted to a variety of crops. Income would increase

in later years as more area came under cultivation and pig production peaked.

Grazing of cattle by current methods in the Palcazu yields 31 kg/ha/year according to Staver for a value of approximately \$50 per hectare per year.

Hartshorn estimates standing volume of commercial timber to average 25 to 35 m³/ha. Forest lands of this capacity would yield one m³/ha/year if managed on a 30 year rotation.

These low productivity levels are attributable to the basically infertile soil of the Palcazu. Crop and livestock productivity are further depressed by the excessively wet climate.

5.2.3. Low Adaptability of Other Production Systems

Most production systems for agriculture, livestock production, and forestry in the tropics have been designed for drier climates and more fertile soils. Sometimes they use temperate zone plant materials and usually they apply temperate zone technology regarding fertilizers, mechanization and so on.

There are some instances of good success in such high technology systems. An example from Peru is occurring at Yurimaguas in the Central Huallaga Valley where North Carolina State University has an agricultural program.

Yurimaguas is very different from the Palcazu however. It is a good deal drier with fertile soils that are not too acidic. Moreover, the fertile soils occur on large expanses of fairly level land. None of these conditions are present in the Palcazu so it probably will not be possible to repeat the Yurimaguas success story there.

5.2.4. Low Carrying Capacity

The three factors noted above combine to make the carrying capacity of the Palcazu very low. The poor, dissected, heterogenous land of the Palcazu must be worked in fairly large parcels to yield even modest incomes to those who work it. Several of the background reports taken together can give a rough idea of how large a farm, ranch, or forest tract would have to be to support a family.

The small total amount of useful land in the Palcazu will not support too many families and there is a sizeable population in the valley now although estimates of its number vary widely.

Fairly soon data from the 1981 census should be available for the valley. Also a land titling and platting project contracted for by PEPP from the Ministry of Agriculture should be completed soon. This information should show how many people are in the valley and where they are. Comparison of these data with land capability data will give a better approximation of carrying capacity and whether and how the valley can hold increased population.

5.2.5. High Environmental Vulnerability

Improper land use, primarily deforestation of protection forest lands, improper harvesting of forest production lands, and attempting pasture on lands which do not have the capacity to sustain them, will cause severe environmental damage in the Palcazu.

In the wet climate, forests must be maintained on protection lands or those lands will erode. This will decrease their capacity to support useful vegetation and will cause excessive silting of streams plus greater irregularity in stream flows. This, in turn, damages fisheries, agricultural lands and human settlements.

Other inappropriate land uses have the same general effects as deforestation of protection lands. Deforestation also involves waste of forest resources, impoverishment of vegetation, and loss of wildlife habitat.

5.3. Environmental Opportunities for Development in the Palcazu Valley

All of the environmental constraints in the Palcazu are counterbalanced by a group of environmentally sound development opportunities. These opportunities are based on land use in accordance with land use capacity. They are embodied in the project elements proposed in the Project Paper Synthesis for the Palcazu Natural Resources Management Project.

5.3.1. Regional Development Strategy

This project element is aimed at the entire upper selva. Much of it is intended to be directly useful in the Palcazu however. Principal aspects of this element that will protect the environment are increased data on the environment and environmental education of technicians and land owners in the valley.

5.3.2. Land Capability Zoning

Application of land use capability to actual land use by zoning means to insure that land is not put to uses that it cannot sustain. If it works, it will prevent deforestation of protection lands, improper harvesting of forest production lands and establishment of pasture on unsuitable lands. If these land uses are avoided, all their secondary adverse environmental effects such as erosion are also avoided.

5.3.3. Upper Watershed Protection

Upper watershed protection will consist of establishing a Yanachaga National Park and protected lands in the San Matias range. This should

prevent deforestation of upper slopes and the consequent ill effects there and downslope . It will also be a refuge for flora and fauna enhanced by a lowland corridor for protection of lowland species. Its environmental benefits are complemented by social and economic benefits of tourism, recreation, and scientific study.

5.3.4. Forest Management and Agricultural Research and Extension

These project elements aim to enhance productivity on lands which are being used in accordance with their best use capacity. The specific objective is to conform use to capacity and then to increase productivity by management. This should be the best way to sustain productivity in the valley with minimal environmental damage. In fact, it is probably the only way to sustain productivity.

5.3.5. Other Project Elements

The project Paper Synthesis relates two other project elements: native communities assistance and highway construction.

Native Communities assistance would mould land use in accordance with land capability to the special circumstances of Amuesha native communities.

Highway construction, emphasizing a road in the lower rather than the upper valley, is treated at length in section 3 above on alternatives.

5.4. Unavoidable Adverse Impacts

The entire thrust of the project described in the Project Paper Synthesis is to avoid adverse environmental impacts of building a road into the Palcazu without taking measures to prevent environmental damage.

5.5. Relationship Between Short-Term Uses and Long-term Productivity

By tying land use to land capability and then enhancing productivity, the project expects that short-term uses will maintain and enhance long-term productivity of Palcazu lands.

5.6. Irreversible or Irretrievable Commitments of Resources

The resources proposed for use in the project are the land of the Palcazu valley and its soil and vegetation. When land is used within its capacity, that use can be sustained on it. Such land can also be converted to less demanding uses. But when land use that exceeds land capability is attempted, land capability is depleted, often irreversibly. Because the project proposes to use land in accordance with its capability it does not have irreversible or irretrievable commitments of resources.

5.7. Direct and Indirect Effects

Direct effects of the proposed project in natural resource management should be environmentally sound land use that can be sustained by the capability of the land. Indirect effects are preservation of flora and fauna, control of erosion, maintenance of good hydrologic balance, and maintenance of land productivity.

5.8. Conflicts Between the Proposed Action and Land Use Plans, Policies and Controls

The proposed action described in the Project Paper Synthesis does not conflict with land use plans, policies and controls. It meshes with them very well. Peruvian law requires that land use harmonize with land

capability. It calls for protection of forests and wildlife, integrity of native communities, and soil conservation. All these goals of the law are also goals of the proposed action.

5.9. Energy Requirements and Conservation

The project elements in the proposed action are specifically designed to be labor intensive. They do not recommend introduction of high levels of new technology so their energy requirements are fairly low. This low level of energy input is the principal energy conservation aspect of the program. If the proposed action succeeds in imposing good watershed management on the Palcazu it will simultaneously succeed in conserving its potential for hydroelectric power generation.

5.10. Natural Resource Requirements and Conservation

The natural resource requirements of the proposed action are virtually all of the lands of the Palcazu. The object of the action is to manage those resources expressly for their conservation.

5.11. Urban Quality

The proposed action affects only rural environments; urban quality is not affected.

5.12. Historic and Cultural Resources

The subject of historic and cultural resources is treated in the social analysis that accompanied the PID and in the papers by Richard C. Smith annexed and appended to the Project Paper Synthesis.

5.13. Mitigation Measures

Mitigation measures are discussed above in sections 5 - 1 and 5 - 3.

ANNEX B

PALCAZU SOCIAL ANALYSIS

CENTRAL SELVA NATURAL RESOURCES MANAGEMENT PROJECT
USAID PROJECT No. 527-0240

Richard Chase Smith
Lima, Perú
October, 1981

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1. INTRODUCTION

A study of the social soundness of the Central Selva Resources Management project was done in February 1981, prior to the preparation of the Project Paper (Miller, Martinez, 1981). Further analysis of the human ecology of the Palcazu drainage basin was undertaken as part of the environmental assessment and project development work carried out between July and October 1981 (Smith Appendix). These studies have identified three different human groups already in the valley:

- 1) the native Amuesha Indians
- 2) the descendants of German Swiss and Austrian colonists who arrived in Peru 50 to 100 years ago
- 3) mestizo settlers from the coast, the highlands of Huancayo, Pasco and Junin, and from the lower jungle of Loreto who have filtered into the Project area during the past 30 years.

As is generally true of rural Peru, there is no systematic collection or storage of data about the population of the area, their economic activities, income, origins, social networks, and land base. Partial censuses together with the best estimates put the current population of the Valley at 10 to 15,000, of which 3 thousand are Native Amuesha. The majority of the population combine subsistence agriculture with small scale cattle raising. There is a small group, mainly those of European descent, who combine cattle ranching on a middle to large scale with commercial activities.

The Amuesha land is held under Community land title. The colonists have either individually titled parcels or demonstrate individual possession of the land simply by "squatting" on it.

2. MAJOR SOCIAL PROBLEMS OF THE AREA

Miller and Martínez have identified the following major social problems of the area:

1. There exists an extremely exploitable and hierarchical social structure in the area which allows most benefits to accrue only to local and outside elites.
2. The native communities and the small colonist farmers are ignorant of and relatively powerless in enforcing their existing rights.
3. The valley lacks alternatives in marketing its production resulting in monopoly benefits accruing to a few, as well as raising costs of production beyond viability.
4. Land distribution in the valley is neither equitable nor secure giving rise to competition and conflict over this resource.
5. Educational and especially health care systems are very inadequate both in terms of human resources and infrastructure.

The more recent social studies have further identified the following social problems:

1. There is a general labor problem in the valley, which ranges from scarcity of labor, complaints of abuses, low wages, and the use of the debt-peonage system and the importation of Campa laborers from the Pichis Valley.
2. Much of the native population is located in the areas of poorer soils, higher rainfall, and steepest gradients. As communications are improved through the area, generating a greater need for cash income, pressure is put on the land to produce beyond its capacity. This has initiated a process of pauperization of the population

and severe degradation of the land base.

The Miller and Martinez report concluded that the project may be socially feasible and beneficial to the target groups only if appropriate measures are taken to protect the relatively fragile ecological systems of the area and to institute special activities for aiding and developing the native communities.

3. BENEFITS and CONSTRAINTS OF ALTERNATIVE SCENARIOS

It is important to look at the benefits and constraints of different alternative approaches. These alternatives are considered:

1. A road is constructed from Pichanaz to Puerto Mairo; there is no natural resources management project.

2. There is the project as proposed:

Variant a - The road proceeds as planned

Variant b - The road is constructed from the northern end of the valley.

3.1. Alternative No. 1

From the view point of social feasibility, this alternative is the least acceptable. Because of the public attention focused on this area as a potential breadbasket which can absorb thousands of colonists, there is already tremendous pressure from lumber companies, colonization cooperatives, cattle ranching enterprises, and small farmers to move into the area. Should the road proceed with no program for control of the settlement process, or management and protection of the limited resources, the following consequences can be expected:

- competition and conflict between the new arrivals for available lands;

- invasions of the NNCC, and subsequent conflicts
- lowered productivity and greater poverty due to increased population pressure and deteriorated lands;
- severe health problems of an epidemic nature;

The following are the expected consequences of spontaneous lumbering activities in the absence of the project:

- competition and conflict between established residents, new colonists, and lumber companies for the timber resources;
- as the more powerful lumber companies are likely to win the competition, benefits from the timber resources will accrue largely to groups outside the area.

There is some doubt that the GOP will have either the resources or the will to control the spontaneous colonizations and lumbering of the area if project funds are not forthcoming.

3.2. Alternative No. 2

The proposed project is based on two premises, supported by the findings of the Environmental Assessment Team. They are:

- 1) The ecology of the Palcazu Valley is especially fragile and requires careful protection and management to ensure a satisfactory future productivity;
- 2) Because the valley's soils are generally poor, and because there is an existing population of 10 - 15,000; its carrying capacity is already saturated, precluding the desirability of any further colonization.

Therefore the proposed project, in spite of a penetration road, would ameliorate many of the constraints of Alternative No. 1 by:

- securing the current residents' possession of land;
- planning land use in strict accordance to capability in such a way as to increase the potential for sustained yield production, thereby increasing the economic security and well-being of the present population.
- providing an economically viable land base for existing settlers rather than colonizing currently unsettled lands;
- allocating and managing natural forest resources in such a way as to give maximum long term benefits to the local population;
- increasing the capacity of the local population to absorb appropriate technology, management techniques, new productive systems, and larger capital investments
- providing some special assistance to the NNCC.

A comparison of the social constraints and benefits of Variant A (road from south) and variant B (road from north) shows that variant B offers significantly greater chance for the successful implementation of the Project. Under variant A, there is the continued high probability that spontaneous colonization and lumbering will occur given the low rate of success of controlling this process in the past (See Bunin Annex). Given the fact that the variant A road passes through or very near 5 NNCC (3 of which are as yet untitled) in the initial 18 km section, it will be these 5 NNCC who will be most seriously affected by conflicts over land and timber resources. The construction of this branch road before the implementation of the proposed project or virtually before any protective measures or controlling factors are in place in the valley, reduces significantly the chances for consolidating the lands of the NNCC and the

small colonists of the Upper Palcazu, and of implementing land use planning and management techniques with these populations. The only foreseeable benefits of this variant will be to offer a shorter access route, sooner, to the current residents of the Upper Palcazu.

Variant B, on the other hand, has several advantages:

- By entering the valley from the end away from the direct access routes to the highlands and coast, it reduces the probabilities of any significant spontaneous colonization and lumbering
- For the same reason, it affords a "breathing spell" to begin the implementation of the Watershed Protection Program and to finish the land cadaster and titling project.
- Reduces the pressure on the NNCC in the Upper Palcazu Valley, while giving them time to implement land use planning and better management practices.

The obvious disadvantage to this variant is that it will increase the route length, and therefore the transport costs for the Upper Valley residents in comparison to Variant A. However, in comparison to current freight costs by airplane, even Variant B should be significantly lower.

4. SPECIAL PROBLEMS

A number of issues have been identified which will become important in the implementation of the proposed project.

- 1) The project can be successful only to the degree that the local residents understand its meaning for them, participate in the planning, and accept it as their own during the implementation. To date, the dialogue between project personnel and local residents has been minimum at best.

- 2) The dispersed settlement pattern of the colonists and the lack of social networks which link them together (with the exception of some European descendants), presents problems for implementing both extension and management programs. It may be advantageous to initiate work by organizing local cattlemen's clubs, or loggers luncheon associations, Swine Centers, associations which can provide the structures through which management, appropriate technology and education can be transmitted.
- 3) The capacity of most local residents to receive and effectively utilize large amounts of new technology, credit and information is limited. Short term successes are not to be expected.
- 4) Racial and cultural bias are factors which influence the outcome of many regional development projects in multi-racial or multi-ethnic societies. Such bias is deeply rooted in the project area. Evaluations should be aware of this problem when examining the allocation of project resources, the establishment of local project priorities, etc. The inclusion of a specific project aimed at the NNCC represents an attempt to correct for that situation.

The proposed project does not deal directly with either the problem of exploitable and hierarchical social structure, or (except to a small degree in the NNCC) with the monopolistic marketing practices. It can be expected that these structures will continue and that benefits generated by the project will continue to accrue to local and outside elites. For the maximum benefits of the Project to reach the small farmer and the NNCC, these social constraints must be addressed in the course of implementing the project. The related problem of labor needs to be studied more closely before recommendations can be made.

ANNEX C

COLONIZATION SYSTEMS ANALYSIS: REVIEW OF COLONIZATION PROJECTS IN THE
PERUVIAN SELVA

CENTRAL SELVA NATURAL RESOURCES MANAGEMENT PROJECT
USAID PROJECT No. 527-0240

Nina M. Bunin
Lima, Perú
October, 1981

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1. INTRODUCTION 1/

President Fernando Belaunde's dream of turning the Peruvian jungle into the nation's breadbasket has collided with the realities of development schemes in several colonization attempts over the past 20 years. Belaunde's clearly-stated national political goal to relocate people from the overcrowded areas west of the Andes was to generate benefits such as reduced rural migration to cities, reduced regional income disparities, increased rural employment and a higher level of regional purchasing power by regeneration of the stagnant agricultural sector, lower urban food prices and improved exchange.

These political promises, however, have yet to be developed into a coherent national politic that is implemented in a consistent manner. A review of both spontaneous and directed colonization schemes in the Peruvian selva shows that the government has fallen short of its implied national goal in terms of the number of people settled and the amount of land awarded; particularly when desertion and the amount of land actually now being worked is taken into account. In fact

Nowhere in the world is the tropical rain forest biome being managed intact on a sustainable basis, except by tribal people ... Furthermore, no one knows confidently whether, much less how, sustainability can be achieved at yields that significantly improve human well being... Calculated by orthodox analysis, no economically feasible type of development has yet been achieved which is compatible with conservation (sustainable exploitation for human benefit) of the tropical rainforest biome (Goodland, 1980).

1/ Much of the information contained in this report was provided by Dr. Héctor Martínez, Anthropologist, San Marcos University, Lima. His assistance in this effort is gratefully acknowledged.

TABLE I

COLONIZATION IN PERU: SUMMARY OF SALIENT FEATURES

PICHARI - RIO APURIMAC

Type of Colonization:	Directed
Year Initiated:	1961
Total Area:	49,856 Has.
Impetus:	Colonists coming from Department of Ayacucho
Officiating Agency:	Inst. de Reforma Agraria y Colonización - M. Agricultura
Ethnolinguistic Group:	Campa
Soils studies:	On 18,000 Has. (83% found suitable for agro-livestock)
Settlement: planned/actual 1976:	458 families/181 original families remaining
Crops: Planned/actual 1974:	7,590 Has./1,710 Has.
Livestock: Planned/actual 1974:	6,578 Has./1,500 Has.

GENARO HERRERA

Type of Colonization:	Directed
Year initiated:	1965
Impetus:	Development of Brazilian Amazon
Officiating Agency:	COTESU (Cooperación Técnica Suizo Peruana)
Awards Planned/actual 1974:	47,500 Has./6,842 Has.
Land in production 1974:	1,328 Has.
Individual family loans:	S/.659,000
Desertion rate:	26%
Funding:	63% Swiss (COTESU)/37% Peruvian Government

TINGO MARIA - TOCACHE - CAMPANILLA (ALTO HUALLAGA)

Type of Colonization:	Directed
Year initiated:	1962
Impetus:	Carretera Marginal
Officiating Agency:	Oficina Nacional de Reforma Agraria
1961 Natural Resources Study:	96,000 of 290,000 Has. studied found suitable for cultivation (10,500 already in cultivation)
1962 Established settlers:	4,800 colonists/170,000 Has.
Unauthorized occupations:1962-1966:	600 families
1966 established settlers:	5,400 colonists
1966 20-year plan to:	- Reorganize tenancy of 130,000 Has. - Bring 55,000 Has. into production
% of Awards actualized by 1967-70:	80% (122,685 Has.)
Awarded land in use in 1974:	22,351 Has. (18% of total awards)
Families in project area in 1981:	11,000 (Twice number originally planned)
Desertion rate:	30%

MARICHIN-RIO YAVARI

Type of colonization:	Directed
Year initiated:	1971
Impetus:	1970 Amazon river flooding and resulting livestock loss
Officiating Agency:	Ministry of Agriculture
Soil Capacity Studies:	None
Loans by Agric. Development Bank, Peru:	S/.161,300 in 1971, S/.435,000 in 1974
Plot Size:	100 Has. to each of 50 families
Situation in 1978/1980:	6/4 of original 50 families left

SAISPAMPA

Type of Colonization:	Directed; non-government
Year initiated:	1973
Impetus:	Limited capacity to absorb labor at SAIS Tupac Amaru
Officiating Agency:	SAIS
Technical/Economic Feasibility Study:	1976
Land in cattle in 1975:	3,200 Has. (doubled)
Size of 1976 workforce:	102 (only half from SAIS Tupac Amaru)
Funding Sources:	SAIS & German Technical Cooperation Program
Situation in 1980:	Initial Plan abandoned, timber imported, limited capacity to absorb highland SAIS members

TAMBOPATA

Type of Colonization:	Spontaneous, seasonal
Impetus:	1945 Altiplano drought, 1964/Highway 85 kms from Sandia, demographic expansion
Number seasonal inhabitants:	5,000 in 1958; 9,000 in 1979

2. SUMMARY OF DIRECTED AND SPONTANEOUS COLONIZATIONS

As a response to the chaotic, spontaneous occupation of the jungle, and in accord with national considerations of an economic and political nature, the Peruvian Government began, in the early 1960's to assume a more decisive role in directing the occupation of the selva region. Following is a chronological summary of six major colonization projects (five directed and one spontaneous), illuminating the most outstanding characteristics of each.

2.1. Pichari - Rio Apurimac

Beginning around 1960, the right margin of the Apurimac River (Province of La Convención, Department of Cuzco) was under consideration as a possible zone for the settlement of colonists coming from the Department of Ayacucho. In that year, an evaluation of resources was prepared (DGRA/AR, 1972) by the Land Tenure Program of the Interamerican Cooperative Service (SCIPA), and in 1961, the project was officially initiated with the construction of some facilities to address "the unpostponable urgency to satisfy the needs of a general population explosion" (Decreto Supremo No. 15).

The project covered an area of 49,856 Has. located between the confluence of the Mantaro and Apurimac Rivers on the North, and the Chumpiara River on the South (DGRA/AR, 1972). The project area was inhabited by numerous families of the Campa ethnolinguistic group in at least five settlements. In 1964, the Instituto de Reforma Agraria y Colonización assumed responsibility for the execution of the colonization program, declaring that all land not being worked would revert to the Government (Ministerio de Agricultura, 1972). Conflicts between colonists and Campas became prevalent, and still continue, despite the Ley de Comunidades Nativas, promulgated in 1974. In

1975, the VII Congress of the Apurimac River Campa Communities formally unified the several Campa settlement into one single community. An application submitted to the Ministry of Agriculture to demarcate a 30,000 Ha. area was never addressed, although the community was officially recorded in 1976. The Campas, pressed by the colonization movement, gradually retired to the Ene River. At present, only a few isolated families remain in the zone, on very poor and small parcels (SINAMOS, 1976).

Soils studies carried out on 18,000 of the 50,000 Has. reserved for the project indicated that 83% of the soils were suitable for livestock and agriculture. Land awards were made on the basis of these data, which were much lower than earlier political estimates (Belaunde, 1964), although a later ONERN study (1972) of 131,000 Has. of the right margin of the Ene and Apurimac Rivers indicated that 45% of the land was not appropriate for forestry, livestock or agricultural exploitation and should be protected as watershed reserve.

The project envisaged the settlement of 458 families on individual parcels of 15-30 Has. for agriculture or livestock respectively, however, by 1972, only 388 plots had been demarcated (DGRA/AR 1972). By 1974, 7,890 Has. had been awarded, half of the area originally intended for livestock/agriculture use and of this area, only 1,710 Has. (21%) was being exploited. In 1976, 360 plots were occupied; 186 of them by the original awardees and the remainder by new settlers. Boundary problems, disappearance of landmarks and plot invasions were frequent. The rate of desertion in this project has been one of the highest, reaching 48% (Martínez, 1980). Crop plans had envisaged 7,590 Has. of avocados, bananas, cashews, coffee, and cacao. However 1974 saw only 1,710 Has. in agriculture due to lack of

processing facilities (cashews) and markets (fruit).

Of the 6,578 Has. projected for livestock activities, 1,500 Has. were in pasture in 1974 (Martínez, 1976).

At present, there are few vestiges of the colonization project; its activities are now included within the context of those normally carried out by the Ministry of Agriculture. But the area has been converted to an important focal point for immigration with resulting serious problems of minifundia: ever smaller land subdivision and boundary disputes (Casaverde, 1980).

2.2. Genaro Herrera - Colonia Angamos

This colonization is located in the Department of Loreto, between the Ucayali River, 40 kms downriver from Requena, and the Yavari River on the border with Brazil. In 1964, as a result of a cooperative agreement between the Swiss and Peruvian Government, studies were carried out in the area by the Swiss Technical Cooperation Service (COTESU) and the former Servicio de Investigación y Promoción Agraria (SIPA), and a pilot plan for integrated development was established in 1965 (DGRA/AR, 1972).

Between 1965-69 the project examined the creation of a small settlement typical of the low jungle (with headquarters in Genaro Herrera). The stated goal was to promote the development of a market economy and thus raise the living conditions of the local riverine population. Hence the project as planned, did not include the settlement of any people foreign to the area, distinguishing it from other colonization projects in Peru. To accomplish this goal there was a need to focus the local economy around a profitable activity (livestock was chosen) which would be of interest to regional and national markets.

However, there was no incentive for the riverine population to develop the local economy to include livestock, since they could obtain most

of their protein through fishing and hunting; activities which demanded less work. And the high costs implicit in this type of production, the risks, and the long period between initiation and profit, constituted obstacles to accomplishing project goals.

Around 1970, the fast and powerful economic development of the Brazilian Amazon region fomented a renewed interest in development of the Amazon frontier region bordering Brazil. The project was thus redefined within this context. The construction of a road was proposed to join the small town of Genaro Herrera (Ucayali River) with the Angamos Colony (Yavari River). At the same time, the project goals were changed and re-defined to:

- incorporate new areas into agricultural and livestock production to relieve national import quotas.
- create an economically and demographically permanent frontier by converting the riverine inhabitants from hunting and fishing to farming.

The plan was to re-settle the riverine population from the low Ucayali River into interfluvial highlands, converting them to farming. The government, in coordination with COTESU undertook all phases of the colonization, from the selection of colonists to the construction of infrastructure.

In 1974, four years after its initiation, the project had awarded 6,842 of the envisioned 47,500 Has., only 1,328 Has. were under production, and the desertion rate was estimated at 26% (Martínez, 1976). Each family had been loaned 659,000 Soles for livestock by the agricultural bank, to be repaid over a 15-year period. Three years later, the project was terminated as a consequence of :

- o the low aptitude of the highlands for agriculture and livestock demanding greater investment of work than the alluvial lands where the colonists had originally settled
- o the lack of technical knowledge by riverine dwellers about livestock and an attack of anaplasmosis (Rivas, 1976)
- o cultural factors whereby the riverine dwellers preferred game protein to livestock
- o individual parcelling which imposed the negative aspects of "campesino" status (CENCIRA, 1976).

In 1978, another model project was initiated in which cattle and a sum of money was given to each of seven colonist families. Income was to be derived from calves and from the sale of wood extracted from the plots themselves and from areas assigned for forest exploitation. In 1981, nine new families were added to this group. The current project also includes experimental pasture, forestry studies and experiments, and socio-economic studies to facilitate the transfer of information to the riverine groups.

The current project is being conducted by Peruvian nationals from the Ministry of Agriculture. Previous income disparities between Peruvian and Swiss technicians had caused high staff turnover.

Studies carried out between 1965 and 1980 total 20,080,389 Swiss Francs, 63% of this amount coming from COTESU and 37% provided by the Peruvian government (Martínez, 1981).

2.3. Tingo María - Tocache - Campanilla (Alto Huallaga)

The project area is 400 kms northeast of Lima, stretching along the Huallaga River in the Department of Huánuco and San Martín. Spontaneous settlement started in the early 1930's, but the first real impetus for development was the Huánuco-Pucallpa highway, constructed around 1940. A 1938 law reserved for colonization a strip on either side of the highway (800,000 Has.) and the equivalent of \$400,000 was allocated to support settlement. From 1939 to 1945, 65,000 Has. were distributed (325 lots of 15 Has. each, 383 of 30-100 Has., and 35 of 100-300 Has.) resulting in about 700 settlers with 2,900 Has. under cultivation (Nelson, 1973).

From 1946 to 1954 the basis of the Tingo María 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.

A 1949 Italian company's land-development scheme planned for 80 Italian immigrant families on a concession of 48,000 Has. A total of 40 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 Has.

The next organized settlement was an attempt to set a precedent for the transfer of people from the 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 40 colonists remained in 1968 and repayment of the loan obligations has been on the order of 10%.

The official Tingo María - Tocache project originated with a Ministry of Planning and Public Works reconnaissance study of natural resources on 290,000 Has. in 1961-62 (SCIF, 1962) 1/ . On the basis of this study, the Agrarian Reform Office (ONRA) began in 1966 to implement a twenty-year plan (ONRA, 1965) to reorganize tenancy on 30,000 Has., bring 55,000 Has. of additional land into production and grant 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 4-year budget was \$30 million, and 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.

In the interim before major public investments were made (1962-1965), the situation in the region changed markedly. News of the proposed colonization, of provision for granting titles, credit and technical assistance gave impetus to a movement of spontaneous colonists, particularly from neighboring areas. Between 1962 and 1966, about 600 families occupied lands in the project area without any official action. The official number of previously established settlers was raised to 5,400 in 1966, the result of migration and a more thorough survey. The final new-colonist target was scaled down, but it was not until 1967 that ONRA put an end to unauthorized settlement of lands (Nelson, 1973). Thus it appears that the major factor

1/ It was found that available timber amounted to 2,400 million board feet in standing trees, of which 50% could be exploited economically. Sustained yield management of these forests would yield 40 million board feet of sawn lumber annually. Some 96,000 Has. were established as suitable for agriculture; of these, 10,500 Has. were in cultivation supporting a rural population of 19,000.

It was estimated that there were about 4,800 colonists in the project area, claiming a total of 170,000 Has. The study also indicated that full development of the area over twenty years (1962-1981) would result in a rural population of 118,000 -- including population growth of more than 10,000 immigrant families.

in development in these early years was the impact of roads and rising expectation.

The project planned 130,000 Has. for possible livestock and agricultural use by approximately 5,000 families, the land to be awarded 1967-70. More than 80% of the awards were made, covering an area of 122,685 Has., but with a subsequent desertion rate of 30% (Martinez, 1976). Plots were awarded with preference to already-settled owners and with a long-term payment plan.

Initially the colonization plan envisioned the exploitation of rubber, oil palm, citrus and cattle (CENCIRA, 1974a). However, rubber did not grow in the areas selected. High installation costs made this crop non-competitive with natural rubber production. Oil palm experiments failed because phytosanitary problems prevented normal growth of plants, and the cause could not be found. Citrus crops did not succeed due to the costly investment, long maturity period, and insecure commercialization. In 1973, 15,210 head of cattle were recorded and loans for livestock represented 59% of the amount drawn to that date from IDB (Dávila, 1975).

By 1974, of the 122,685 Has. already awarded, only 22,351 Has. (18% of the total)were in use. This area was dedicated to pasture crops, corn, banana, rice, oil palm and yuca (CENCIRA, 1974a); an apparent switch from the proposed crops to a subsistence agriculture based mainly on products already adapted to the zone and about which the colonists already had an adequate understanding.

The early evaluation of forestry resources had estimated that 16 sawmills could function in the area with an annual production of up to 3 million board feet each (SCIF, 1962). However, 1973 showed 28 sawmills in the zone, rapidly demolishing forestry reserves. Indeed, imported wood was used for the construction of one of the principal centers for the

colonization (Martinez, 1946).

In the last five years, large groups of colonists have once again been settling the area "spontaneously" attracted by the coca "boom". In early 1981, it was estimated that the area of the old project contained 11,000 families; more than twice the number envisaged originally. These families are occupying in part, lands that the old colonists had subdivided, or they are invading unoccupied land (Almenara, 1981).

2.4. Marichín - Rio Yavari

This low jungle project is located near Caballococha (capital of the Ramón Castilla district), nine hours downriver from Iquitos. Flooding of the Amazon River in 1970 caused the loss of about 40% of the livestock in the zone (deaths and forced sales due to lack of pasture) in addition to the destruction of banana and yuca farms. The Ministry of Agriculture decided to re-settle the damaged families on previously uninhabited non-flooding, higher lands (Maldonado, 1974).

With no previous soils capacity studies, the first 50 plots (100 Has. each) were outlined in 1971. At the same time a program for individual loans from the Agricultural Development Bank of Peru was prepared, granting S/.161,300 to each family for a house, 10 Has. of pasture and 10 cows. The loans were increased to 435,000 soles in 1974 to allow for increased herds (Maldonado, 1974).

The project had not planned any activities in addition to livestock, however the colonists established small farms for food production and as a source of income. Existing wood that was not used for housing and fence construction was burned.

As a basis for the colony, cattle-raising faced a series of problems from the beginning: procurement of cattle from distant places (Yurimaguas), travel stress, poor and insufficient pastures, and inefficient handling practices (most of the colonists had no knowledge of cattle raising). In addition the colonists lacked sufficient subsistence means and were forced to leave their farms to fish or obtain temporary jobs (Martinez, 1974a).

In 1978, six of the fifty original colonists remained, two more had deserted by 1980, and the bank could not recover its capital. Among the factors explaining the massive desertion were: individual loans that disregarded subsistence funds for colonists until they reached the productive phase of the project, the orientation of the loans exclusively towards livestock disregarding forestry exploitation which could have provided significant initial income, delays in the livestock procurement program and quality of same, high interest rates (17%) for an activity that would not mature for a long term, and the relatively isolated location lacking an infrastructure of basic services such as education (Martínez, 1980).

2.5. Saispampa

This colonization differs from those previously described in that it was directed by an enterprise which resulted from the 1969 agrarian reform, Sociedad Agrícola de Interés Social (SAIS) Tupac Amaru, located in the Andean section of the Department of Junín. This enterprise consists of 3,000 families whose primary activity is sheeprearing. As a result, their ability to absorb labor has been very limited and (Gamarra, 1976) they looked to colonization of the Amazon for the surplus population. Granted a 25,000 Ha. concession in 1973 and a livestock farm located near Pucallpa,

capital of Department of Ucayali, they set out to maximize work opportunities, augment economic stability by diversification, and produce sufficient surplus to better the socio-economic conditions.

To achieve these goals, a technical-economic feasibility study was carried out in 1976. It planned for the multiple and integrated use of natural resources, the application of different systems of suitable land use, and investment priorities in lines of production that would rapidly recoup costs, addressing both distant markets and costly transport (Campos et.al, 1976a).

Cattle activity developed rapidly, doubling by 1976 and using about 3,200 Has. of cultivated pastures. Crops were planted (yuca, rice and corn) in association with pastures. Timber was being exploited with two forestry tractors, motor-saws and transportation equipment, in addition to a sawmill purchased in 1974 (on-site commercialization). However, the manual workforce employed in 1976 was very small (scarcely 102 workers) and less than half were from the company itself.

Funds were largely from SAIS itself, with much of the machinery, technicians and equipment supplied by the German Technical Cooperation Program. This colonization has shown some self-financing capacity through the sale of sawed timber and food-stuffs-- the livestock contribution has been minor (Pucallpa conversations, 1980).

By 1980, the initial plan had been abandoned. Residents were importing timber from other places, and agricultural and livestock activities were distinct and no longer integrated. Capacity to absorb members from the highlands was very limited, basically due to a lack of adequate services (housing, schools, and medical care). Social problems are also evident

from the translocation.

2.6. Tambopata

This is one of the high jungle valleys of the province of Sandia, Department of Puno. Occupation has been gradual since the pre-Spanish period (Collins, 1981) with short bursts related to the search for gold. Settlement by Aymaras from the districts of Conima and Moho began in 1945 when a strong drought was suffered by the high (3,800 m) altiplanic region of the department, coinciding with demographic expansion. In 1964, the highway 85 kms from Sandia was finished allowing commercial amplification of previous coffee, fruit and subsistence foodstuffs. The establishment of public and private agencies for social, credit and technical assistance was then possible (Martínez, 1969).

A 1958 census showed 5,000 inhabitants (Aymaras, Quechuas, and mestizos). Twenty years later, the pattern of seasonal migration had not been broken; despite the existence of the highway, migration reached 9,000 people in 1979 (Aramburu, 1970 and Collins, 1981).

The colonists have not really settled the area in spite of the time elapsed and benefits obtained in the valley are transferred to the altiplano to improve housing, procure cattle and educate their children (Painter, 1978).

TABLE 2

BASIC INFORMATION ON DIRECTED COLONIZATION PROJECTS

COLONIZATION	REGION	DISTANCE FROM (KM)	YEAR ESTABLISHED	EXTENSION (Has.)	FAMILIES SETTLED	EXPENDITURES AS OF 1974 (1,000 S/.)
1. Pichari	High Jungle	Ayacucho: 200	1961	18,710	500	100
2. Tingo Maria -T-C	High Jungle	Lima: 400	1966	140,000	5,250	2,104
3. Genaro Herrera	Low Jungle	Iquitos: 300	1965	47,500	400	11 S.Frc.
4. Marichin-Rio Yavari	Low Jungle	Iquitos: 500	1971	10,000	100	22
5. Saispampa	Low Jungle	Lima: 840	1972	26,000	1,500	15
6. Tambopata *	High Jungle	Puno: 340				
TOTAL				242,210	7,750	2,252**

* Spontaneous colonization

** Does not include 11 million Swiss Francs used at Genaro Herrera

3. FACTORS AFFECTING THE PLANNING, IMPLEMENTATION, AND EVALUATION OF COLONIZATION PROJECTS

Colonization projects in the tropical wet forests, should be analyzed in three phases: planning, implementation and evaluation. Factors that determine success or failure of each phase are identical, although some are more critical in one or another of the phases. These factors are examined below with specific illustrative examples drawn from the colonization project summaries.

An examination of spontaneous and directed colonization projects in Peru highlights a series of defects and omissions that explain their failure and underscores the need for consideration in future project planning.

3.1. Lack of Project - Specific Goals and Objectives

Stated objectives for most of the previous projects have shown themselves to be primarily national rhetoric, with no possibilities for quantification of goals, measurement of progress, or final evaluation. For example, the primary objective noted for the Genaro Herrera and Marichín colonization projects was: "to lay the foundations for frontier nationalism, through definite possession of the areas" (Maldonado, 1974). In addition to being non-quantifiable, this objective did not correspond to project-specific reality -- these projects were essentially for resettlement of local populations. The objective "to transform agriculture from subsistence to market" (Gonzalez, 1970; CENCIRA, 1975) at Tingo Maria was another example of a broad national goal applied to a local project without further, site-specific definition.

A lack of clearly-stated goals and objectives for each project means, in effect, there can be no schedule for the realization of goals over time, divided into manageable tasks to be carried out in a logical sequence. And lacking this, there can be no real determination of progress, or evaluation of difficulties encountered.

For example, the goal to settle 5250 families within a four-year period at Tingo María was not broken into annual increments; the same for goals such as putting 60,000 hectares of land under production or establishing a livestock project of 16,000 head of cattle. When later, the Ministry of Agriculture began to delineate over periods of time, there was often no realistic possibility of accomplishing the goals due to technical deficiencies or lack of equipment and materials. Tying goals to a time frame early on forces a realistic appraisal of forthcoming capital and technical assistance.

More often, as clearly seen in the case of Genero Herrera, projects were planned and developed in steps with successive objectives rather than a sustained objective (Mision Internacional de Evaluación, 1977). Additionally, project designs have almost never included periodical evaluations. In practice, evaluations have been performed as a reaction to crisis situations, and the results may or may not have been included in subsequent phases of project planning.

3.2. Targeting Studies

Because the flow of international monies poses the constant danger of overstudying an area, the critical decision-making factors become phasing and targeting of studies in both depth and breadth; from reconnaissance

surveys down to soils capability interpretations. Planning must be based on sound understanding of the ecology, the economy and the sociology if projects are to succeed.

3.2.1. Natural Resources Capacity Studies

Selection of a project site based only on general reconnaissance surveys may be premature. At Tingo María, the original survey indicated a potential for 10,000 new colonists. It was not until the project got underway that it was discovered that "if tenancy and production were rationalized for the existing 28,000 settlers on the 400,000 Has. suitable for agriculture, there would be little or no land available for new settlers" (Nelson, 1973).

Neither can one make land-use decisions for a target project area solely on the basis of existing information from nearby or ecologically-similar areas. This is becoming particularly apparent in the case of tropical wet/moist forests (see discussion of Yurimaguas data in Tosi appendix). On the other hand, selection of a project site for natural resources evaluation should be based on some amount of comparative data, and not merely a political reaction to already-occurring, spontaneous migration.

An understanding of the capacity of the soils to withstand particular types of development is the foundation upon which project planning for sustained yields must be based. Examples of a lack of ecological understanding abound. At Genaro Herrera, it was necessary to resettle colonists on new plots because the ones to which they had originally been assigned were flood-prone most of the year (Rivas, 1976). Contractors

using heavy machinery to clearcut in the Upper Huallaga, not guided by any plan to address the basic ecology of the area, pushed humus aside with tractors and ignored the need for drainage canals to prevent erosion. The resulting degradation had the Ministry of Agriculture itself calling for the use of "manual" labor for agriculture and nothing other than "traditional technology" for deforestation (Ministerio de Agricultura, 1976).

In order to achieve sustained yield over the long term, reconnaissance-based site selection must be followed by in-depth studies of land use capability in a successively phased approach.

3.2.2. Target Social Groups

While extensive sociological study may be unnecessary, a basic understanding of the people already located in the target area and of the incoming populations is essential. First, groups who have been living in the area for two or more generations (i.e. Germans and Amuesha in Palcazu) are often the logical source of information about best use of the resources since their trials and errors over time are likely to have yielded a sustained-use methodology. Secondly, an understanding of the cultures of both the incoming and existing populations will be indispensable to the success of any basic services or extension program designed to facilitate change. Thus, for example, Andinos coming to live in the selva can become seriously ill if not advised about changes they must make in dress, food preparation, and sanitation. Last, but certainly not least, a framework of cultural understanding is important to planning so as to minimize the conflicts and tension inevitable between two or more cultures. For example, differing ideas of land

ownership (communal vs. individual) leading to "invasion" of parcels can be a primary cause for conflict and later desertion. These kinds of tensions prevent any social coherence, particularly problematic when communal work is necessary or in the context of cooperative production associations as evidenced at Tingo María (CENCIRA, 1973).

3.2.3. Economic Studies

Under current market signals -- such as the prices of beef, land and labor, etc..... the Amazon forest can quickly yield immense profits when converted to pasture for the production of cattle... But these profits, though enormous, are ephemeral. The over-grazed pastures are allowed to deteriorate in a few years in the absence of expensive chemical inputs, so that conversion of further forest becomes more profitable than rehabilitation of existing pasture (Hecht, in prep.).

This expenditure of capital resources rather than of interest derived from forest capital, probably creates the lowest level of employment and does this at about the highest cost per job created (US\$63,000 according to Skillings and Tcheyan, in press) of all types of development project (Goodland, 1980).

Planning for the integration of regional subsistence economies into the national market economy demands a thorough and complete analysis of the supply and demand of labor, capital, and production, marketing networks (including the matter of intermediaries); product processing and transport. Thus for example, at Pichari, the establishment of 650 Has. of avocado and banana had no basis in the demand potential from the nearby Ayacucho market. High transport costs to more distant markets resulted in the substitution of coffee for these crops by the settlers themselves (Martínez, 1976). Cashews at Pichari failed as an economically viable crop because of the lack of processing facilities to convert them to a marketable item. The same also occurred with the

oil palm plantations at Tingo María. Also at Tingo María, a lack of understanding about the chain of commercial intermediaries led one production cooperative to plant corn based on the price current at the time in Lima. As a result, production costs could not be recovered and the crop was abandoned in the following agricultural campaign (CENCIRA, 1973).

3.3. Project Design

To date, colonization projects in Peru have not benefitted from complete and thorough project design with implementation timetable, cost projections, etc.

3.3.1. Schedule of Land Tenure for Existing Populations and for Settlement of New Populations

The attempt to transform spontaneous colonization into a somewhat more ordered process, is futile without a strictly-enforced schedule for cadastre and titling of existing populations. This not only serves to protect those already within the zone from becoming the new landless migrants, but serves also as a base for estimating the amount of land available to new colonists. Following titling for the resident population (which, in all logic, should precede any road penetration), a schedule of awards and concessions can be drawn up based on land use capability studies.

For example, in the Pichari project area, settlements of Campa Indians had been established long before the project was originated. As all the Indian lands were untitled, they were included in the area designated for colonization. While some opted to receive land parcels of a size

designated by the Instituto de Reforma Agraria, others, after a period of conflict, abandoned their "properties". At Tingo María, frequent overlapping of parcels occurred when new settlers conflicted with the extant colonists who had received a plot designated on a map.

A land tenure schedule also allows for some retrospective evaluation of the colonization process. When previous projects have been evaluated, settlers dating from before project initiation have often been listed as colonists, thereby overestimating the process of occupation of new land.

3.3.2. Management Plan for Existing Natural Resources

The important implications in the failure to plan for the management of existing natural resources are:

- 1) The immediate loss of potential to generate short-range income (i.e. timber harvesting) upon which residents can depend while investing in future development
- 2) the degradation of the resource base and subsequent loss of potential future yield for any type of development

An outstanding flaw in almost all directed colonization projects studied is that in general, ecosystem fragility has not been taken into account, and no plans were outlined for the management of existing resources; i.e. soils, forests, watershed, etc. Indeed, tree cover has generally been considered nothing more than an obstacle to agriculture, to be cut down, with resulting soil degradation and frequently a return to shifting agriculture or crops such as coca.

At Pichari, Tingo María, and Marichin, the Agencia de Reforma Agraria considered only the development of agro-livestock activities. At both Tingo María and Pichari, the use of existing resources was insignificant. Camps constructed of imported wood (from Norway and Canada at Tingo María from Chile at Pichari) are a clear demonstration of lack of production planning in the use of existing resources (Martínez, 1976).

3.3.3. Schedule for Development of Infrastructure

The scheduling of infrastructure construction must be done with particular care since colonization without the necessary roads, housing, schools, sanitary headquarters, etc., create very precarious conditions that frequently lead to failure and desertion.

On the other hand, it becomes ever more difficult to control spontaneous colonization once the road goes into place. Thus, the infrastructure construction schedule must be closely tied to that of technical assistance, development loans and financing, and land titling/awards. Once planned, close and careful control must be maintained by the Special Projects Office with authority over infrastructure contractors to avoid duplicating the situation in Tingo María where 545 kms of road projected for the period 1967-68 were not initiated until 1969 (and only then by using International Development Bank funds originally allocated for colonist loans) and in 1974, were still 90% incomplete (Peñaherrera, 1974).

3.3.4. Credit and Production Schedule for Agriculture, Livestock, and Forestry

Credit operations in colonization projects have experienced serious difficulties almost without exception. The purpose of a credit

program in directed settlements is to assure compliance with an established production schedule. Overly optimistic production plans and institutional pressure to comply with credit disbursement rates have resulted in loans to colonists who were technically unprepared. Further, constantly changing production plans and the resulting high level of uncertainty has made agricultural banks wary of non-recuperation risks. Consequently, experimentation with production plans was largely at the expense of the colonist. For example, at Pichari and Tingo María, agriculturally-oriented colonization projects such as the crop projections were not matched to a detailed development program. In the first case, the production from the cashew plantations was not linked to a processing plant. As a result, the plantations were abandoned and the total investment lost (Inspectoría General, 1975). At both Tingo María and Marichín, a lack of coordination between the establishment of continuous and appropriate pastures and the acquisition of improved breeds of cattle meant that cattle often arrived before adequate pastures were mature (Rivas, 1976).

The demand for credit has usually been accelerated by emphasis in the early years on the establishment of permanent plantations, to the exclusion of annual crops that spread the risk, provide immediate income to meet living expenses, and provide incentive to reinvest in accelerated land clearing. At Tingo María, for example, the ratio of credit for long range production plantations and cattle to annual cropping was 16:1 (Nelson, 1973).

On the other hand, agricultural bank reluctance to consider colonists as clients is not surprising. However, institutional aspects that complicate the flow of capital to new land development are apparent from the cases studied-- most notable the extreme delays in granting titles.

In a number of instances, the credit agencies have failed to establish any effective relationship between lending and extension; institutional barriers having prevented the vesting of responsibility for both activities in the same organization. To ensure credit recuperation, the banks must not only have a detailed disbursement program, but must tie their plan carefully to a parallel plan for research and extension support and must ensure the wherewithal to carry out the plan. Thus, for example, receipt of disbursement is thwarted by the limited capacity of branch bank offices to carry out field inspections or by long, loan-approval processes which undercut the critical timing requirements of agricultural and livestock production.

3.3.5. Technical Assistance

Research and extension in support of credit and programs such as the promotion of cooperatives, are crucial, and extremely difficult to integrate with other planning activities. Experimental work, demonstration plots, or pilot farms are complementary to resource surveys and to a degree may be considered as alternatives. The gap between theory and practice in tropical agriculture and forestry (especially for small producers) is well known. The fundamental questions are:

- How transferable is experience from one tropical area to another; or from the experiment station to the farm; e.g. Pichis-Palcazu-Yurimaguas soil chemistry comparisons show striking differences in soil composition and critical elements. (See Tosi Appendix, 1981)
- What sort of extension/structural changes/economic incentives are necessary to overcome any economic and social barriers

to technical transfer; since structural and social factors can overshadow technical considerations in the production response of a project.

Standard problems in the provision of extension services which must be addressed include:

- low ratio of extension agents to farmers (1 to 128 in Alto Huallaga) or farmers who cannot be reached due to infrastructure or dispersement problems.
- inexperienced young extension agents, or paucity of trained personnel resulting from unstable governmental policy
- routine bureaucratic inspection visits which offer little advice or paternalistic approach by technicians
- attempts to sabotage the program by threatened, established interests
- discrepancies in pay or responsibility between nationals and foreign technicians (as was the case at Genaro Herrera)
- technical assistance planning which has not taken account of available credit or markets so that assistance is given when farmers lack economic/management resources to execute a production program.
- decisions may be made in a head office completely out of touch with extension agents
- lack of a clearly thought out and project-specific extension plan and schedule means that technical assistance will be no more than a reaction to problems such as plagues or crop failures

The quantity and quality of extension agents are aspects of

colonization project design about which it is almost impossible to set ground rules. For example, at Tingo María, saturation extension has been applied with one extension agent per 180 families, compared with the Peruvian average of 1 to 3,500 families (Nelson, 1973). The best possibility of getting a good, stable field staff rests on placing executive responsibility with a prestigious agency that can offer both salary and career advancement incentives and that has a policy of delegating major authority and responsibility to the field office. Where processing industries can be established they can provide satisfactory extension services as part of their contract and credit relationships with settlers.

3.3.6. Participation of Target Population

No amount of technical planning, or resource and marketing studies will ensure achievement of project goals without the willing participation of the target populations. Indeed, it goes without saying that the more public involvement in the planning stages, the more personal incentive to follow the plan and achieve project goals.

Examples to the contrary abound. At Tingo María, the centers for basic services were placed outside of the old, established towns, against the advice of residents who consequently did not use them because they were quite out of the way (CENCIRA, 1973). At Marichín, project plans did not include a school although the colonists had expressed a need for one. A school was finally established in 1973 through the efforts of the colonists themselves who even paid the teacher's salary (Martínez, 1974a).

4. SUMMARY AND CONCLUSIONS

A review of directed colonization projects in Peru (Table 1) has revealed common features which have adversely affected their planning, implementation and evaluation:

- A lack of project-specific goals and objectives to give concrete form to nationally-stated political goals.
- Difficulties with focus and targeting of studies on natural resources capacity, target social groups and economics of alternative project designs.
- Weaknesses in project design such as
 - . lack of land tenure schedule for existing and incoming populations
 - . lack of any plan for management of the existing natural resources
 - . lack of an integrated production schedule for agriculture, livestock and forestry
 - . lack of a schedule for development of infrastructure
 - . lack of plans or schedules for credit, technical assistance and participation of target populations

Both the government of Peru and the international lending institutions have learned from previous errors and a process of institutional change is underway. This summary focuses on the office of the Proyecto Especial Pichis-Palcazu (PEPP) with a discussion of corrective measures already inherent in the planning framework and suggestions for AID assistance

where these measures have yet to be designed. 1/

4.1. Project-Specific Goals and Objectives

The very existence of a Special Projects Office with broad powers to specifically execute and control the development of the Pichis and Palcazu valleys has been perhaps the most significant institutional change in the Peruvian government's approach to colonization of the Selva region.2/

In addition to general, political goals, the PEPP has set forth 1981-85 objectives to:

- Incorporate the natural resources of the Pichis, Palcazu and Pachitea Valleys into the national economy through the construction of new roads
- increase food production levels by incorporating more land for agriculture, livestock and forestry use
- increase the level of employment; creating new sources of work and bettering existing sources by consolidating settlements and promoting new ones for agriculture, livestock, forestry or mixed production in accordance with soil capacity
- better the living conditions of the rural population through implementation of education, health, housing and other services

1/ This summary is not intended as a vehicle for specific project planning in the Palcazu Valley (See accompanying Central Selva Project Design Report to AID), but should serve rather to illuminate salient errors and corrective measures for future development planning by AID, other international lending organizations, and the national governments themselves.

2/ Five Special Project Offices are now in existence, all directly under the executive branch's Council of Ministries. The Proyecto Especial Pichis-Palcazu was established in Oct. 1980, under Supreme Decree No. 137-80-AA, with funding from a September, 1980 AID Convenio de Donación.

- o better occupy the national territory with new settlements, planned to generate economic and social flow between the project area and the rest of the country
- o maintain ecological equilibrium to preserve the natural resources that determine the potential of the project area and its neighboring watersheds

In addition, PEPP has delineated 1981 physical and financial goals for the penetration road, natural resources evaluation, rural cadaster/topography work, land tenancy, technical assistance services, basic services to the population, hydro-energy studies, operation of rural development centers, forestry police stations, executive direction, and an integral development plan (PEPP Informe Trimestral, 1981). The Informe Trimestral does not contain a time schedule or long-range budget; both of which are essential, of course, to tie the "dream" to reality. These are anticipated in the Five-Year Plan expected by November, 1981, which must lay the groundwork for this level of specificity in order to be a useful working document.

4.2. Target Studies

4.2.1. Natural Resources Capacity Studies

Among PEPP's 1981 goals is the Palcazu environmental impact study being carried out by AID. A land-use capability map being generated by this study will enable a specificity of planning previously impossible for the "patchy" distribution of soil suitability types in this wet tropical forest. The land-use capability interpretation 1/ is based

1/ The PEPP directorate has expressed interest in employing this land use capability mapping system in the Pichis and Pachitea valleys, but the system should receive full support from AID if the PEPP is confronted with political pressure from major land-use interest groups.

on a previously-completed Life Zone map of the project area overlain with the ONERN soils map of the valley floor. Weak links in this process that need to be considered in future assessments include the lack of topographic information for the mountain ranges flanking the valley (ongoing mapping work continues to be concentrated on the valley floor) and the paucity of actual field work by ONERN to substantiate their soils classification and evaluation map.

PEPP has also signed an agreement with La Molina Agrarian University for a forest inventory study, forest management and exploitation plan for the Pichis-Palcazu region.

4.2.2. Target Social Groups

Understanding that soil capacity and the extent of current holdings in the Palcazu effectively eliminate additional colonization, PEPP has not directed resources to any study of potentially incoming colonists. 1/ Construction of a road through the valley, however, will bring spontaneous colonists and the likely target populations must be understood in order to be addressed during project implementation. This target colonist analysis has yet to be carried out. However, this analysis plus the Miller/Martinez anthropological study of the Palcazu residents (contracted by AID; the first time an international lending organization has analyzed social feasibility before project design), if available to PEPP in Spanish, are sufficient analysis of social structure and history to serve as a basis for planning.

1/ Note must be made of the fact that while PEPP can avoid colonization in this valley, it is likely to become successively more difficult as the focus moves to the Pichis and then the Pachitea.

4.2.3. Economic Studies

In addition to economic information contained in road feasibility studies contracted by PEPP, La Molina has collected considerable cost data on logging, transport and processing for stratified wood uses. When available, the yield, cost and value data should be useful for an economic analysis of forest exploitation, forest colonization, sustained yield forestry, etc. in the Palcazu Valley. PEPP has as yet identified no other plans for economic studies (markets, etc.), although these may be forthcoming in the 5 year plan expected in November, 1981. Basic economic information has also been provided by the Central Selva Natural Resources Management team for livestock and agricultural production systems. Beyond this, further analysis by AID will of course, address the return to AID of investment in this high jungle project (relative to certain types of sierra or coastal projects). Constraints to the proposed project, such as markets, credit and labor should also be carefully examined in close coordination with PEPP.

4.3. Project Design

4.3.1. Land Tenure Schedule

PEPP has signed an agreement with the Ministerio de Agricultura for a cartographic study of the Palcazu valley floor at a scale of 1/10,000 and a cadaster study of same, both under the Oficina General de Catastro Rural. Also under that agreement, the Dirección General de Reforma Agraria y Asentamiento Rural will regularize the tenancy of old settlements and adjudicate new settlements. Seven native communities have been titled to date, but the process is so slow (no new titlings since 1978) that PEPP is planning to issue temporary certificates of

Ownership until such time as legal ownership is achieved. New agrarian cadastral procedures developed by the AID Subtropical Lands project have been adopted (January, 1981) by the cadastral office (mapping) and the agrarian reform office (legal issues and titlings). They are designed to eliminate much of the duplication between the cadastral and titling activities. The status of these procedures and indeed, of the whole Palcazu titling process is unknown at this time and merits close attention by AID in the Project Paper since this is a high priority and sensitive issue.

Titling has not even begun for the colonists (the native communities receiving priority) and PEPP is well aware that they cannot know the extent of available land until existing ownership and boundaries have been determined. The matter of a strictly-enforced schedule for titling appears to lie outside of PEPP's hands since they can apply only limited pressure to the Agriculture Ministry.

4.3.2. Other Weaknesses in Project Design

Other areas which have historically been very weak in project development include:

- lack of any plan for management of the existing natural resources
- lack of an integrated production schedule for agriculture, livestock and forestry
- lack of a schedule for development of infrastructure
- lack of plans or schedules for credit, technical assistance and participation of target populations.

The key to project success lies in the combined GOP-USAID (or other funding agency) commitment to the careful design and implementation of these parameters in an integrated form.

Experience in Peru has demonstrated that the construction of roads, establishment of agricultural production and credit programs solely has not been sufficient for the successful development of colonization schemes in the Selva. Therefore it is important that any project encouraging improvement of agricultural production needs to be accompanied by programs in technical assistance, marketing research, agro-industrialization and education. (Pool appendix, 1981).

Both institutions have a responsibility to clearly define their priorities. It is on the base of overlapping priorities, then, that the project can be built.

While the host country carries the primary responsibility for implementation, the funding agency can greatly influence project success by its approach to project design. Past colonization project experience in Peru shows that the key is integration of functions and agencies dealing with management of existing resources, new production, development of infrastructure, credit, technical assistance and local participation. Institutional temptations meriting careful scrutiny include:

- Use of project money to develop "new" levels of host country bureaucracy for "coordination" etc. The funding agency's project design can greatly influence at what level this coordination will take place. While the development of Special Projects Offices in Peru may represent an improvement in terms of project management and coordination when compared to previous experience under the Ministry of Agriculture, PEPP actually contracts much of its work back to the Agriculture and other Ministries. That work can be only as good as the quality of their staffs.

o To bring in outside experts to run the project. International funding institutions have long used this approach to project assistance, with negligible long-term effects. There needs to be a clear commitment on the part of AID to strengthen GOP institutions rather than merely amplify them; i.e. simultaneous project training of in-country counterparts at La Molina, the Ministry of Agriculture or other Ministries, REDINNA, INIPA, Yuzimaguas Tropical Soils Experiment Station, as well as ongoing selva development projects such as the Upper Huallaga Agricultural Development.

AID is on the cutting edge of a new Amazonian development thrust. A host of international funding agencies are waiting and watching to see what approach AID is going to use in the high jungle of Peru. The fact that the Palcazu valley resources have turned out to be so poor further stiffens the challenge. Should AID accept this challenge, it will be in a position to build a model of assistance to rural populations based on sustained yield, which will have an impact substantially more far reaching than that of the watershed limits of the Palcazu valley, Peru.

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MAP OF MAJOR LAND
USE CAPACITY

by : J. A. Tsai C.
1: 100,000

September 1981

HIGHEST JSE CAPACITY

SYMBOL	DESCRIPTION
A	Corn Cultivation
P	Pasture
C	Timberland
F	Intensive Production Forest
F ₂	Non-timber Production Forest
X	Complete Protection



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