A Midterm Review of the Bolivia Associated High Valleys Project

Prepared for the U.S. Agency for International Development under contract number 511-0543-C-00-9022-00

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Consisting of Development Alternatives, Inc. and Tropical Research and Development, Inc.

July 1990

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SECTION ONE

PROJECT BACKGROUND

FOREWORD

This report outlines the background and history of the Associated High Valleys (AHV) Project. In Section One, the paper examines the Chapare Regional Development Project, the AHV design, the involvement of Development Alternatives, Inc. (DAI), and the establishment of the Advisory Team. Section Two looks at project start-up, site selection in the Valles Altos region, and the biophysical and cultural characteristics of the project area. Section Three covers project implementation, and Section Four discusses project design by sector. The final section, Section Five, provides recommendations for 1990/1991 project activities.

The chronology of events for the AHV Project is listed below.

TABLE 1

CHRONOLOGY OF ACTIVITIES RELATED TO THE AHV PROJECT

DATE		ACTIVITY
August	1983	U.S. Agency for International Development and the Government of Bolivia (GOB) sign contract to establish Chapare Regional Development Project (CRDP)
August	1984	GOB establishes the Secretariat for the Development of the Bolivian Tropics (SDBT)
September	1986	Tropical Research and Development, Inc. (TRD) evaluates CRDP and recommends development activities in source areas of migrants
June - July	1987	DESFIL (Development Strategies for Fragile Lands) designs implementation components and prepares the environment assessment of the AHV Project, published in 1988
November	1987	Amendment No. 7 to the CRDP is signed which provides for rural development activities in the Valles Altos region; SDBT is renamed the Regional Program for Alternative Development (PDAR)

TABLE 1 -- Continued

DATE		ACTIVITY
Dec. 12	1988	USAID contracts with Development Alternatives, Inc. (DAI) to implement the Bolivian Associated High Valleys Project. Contract effective date January 5, 1989
Dec. 20		PDAR dismisses all technical staff
January	1989	DAI/TRD six-person Advisory Team arrives in Bolivia
Feb. - May		Advisory Team conducts field reconnaissance of project area. An estimated 270 person-days spent in project area
May 15		AHV Advisory Team submits Five-Year Implementation Plan and estimated budget to USAID/Bolivia
June 7		PDAR hires Technical Director (Dr. Salinas)
June 15		DAI removes AHV Advisory Team's Chief-of-Party (Mr. Drager). Will McDowell named interim COP
June		USAID approves Five-Year Implementation Plan
July 15		USAID assigns new AHV Project Manager (Mr. Charles Hash)
July 26		DAI assigns interim Chief-of-Party (Dr. Colegrove)
August 1		Administrative Director of PDAR is dismissed (Sr. Holters)
August 4		USAID releases $200,000 for "High Impact" subprojects; AHV Advisory Team begins designing subprojects
September		Implementation of 27 "High Impact" subprojects
October 1		PDAR hires AHV Advisory Team counterpart technicians
Oct.- November		Subprojects funded by PL-480 are designed by PDAR Technical staff and AHV Advisory Team; 17 subprojects and budgets submitted to PDAR Planning and Administrative department
Oct. - December		Long-term subprojects for 1990-1991 are designed and budgets prepared
November 15		PDAR names new Director (Lic. Decker)

TABLE 1 -- Continued

DATE	ACTIVITY
November	DAI internal assessment of AHV Advisory Team
December 17	Departure of DAI interim Chief-of-Party; Soil and Water Management Advisor (McDowell) assumes COP responsibilities.
December 26	PDAR dismisses Bolivian Irrigation and Farming System counterparts; Environmental counterpart resigns
December	PDAR submits 1990 Work Plan to USAID, which is approved in January 1990
December 31	USAID and PL-480 staff approve seven PL-480 subprojects
January 1990	PDAR hires new irrigation counterpart (Colque)
Jan. - March	AHV Advisory Team and PDAR technical staff continue project activities with PL-480 funding
March	PDAR interviews new Farming Systems, Hydrogeology, and Ecology counterparts
April 1	USAID/B approves nine subprojects for 1990

CHAPARE REGIONAL DEVELOPMENT PROJECT

The Chapare region in Bolivia is a major source of coca leaf for the international narcotics industry because of its ideal growing conditions and the proximity of abundant cheap labor from the central Andean highlands. The migration of settlers and wage laborers to the Chapare region is part of a larger process of out-migration from a chronically underdeveloped area in the Andean highlands. The project assumes that investment in rural development will provide viable economic alternatives to coca production and stem the tide of migration.

In August of 1983, USAID funded the Chapare Regional Development Project (CRDP) to implement a rural development and crop substitution program via the Secretariat for the Development of the Bolivian Tropics (SDBT), which became operational in August 1984.

An evaluation in late 1986 documented the difficulties in implementing crop substitution activities and recommended agricultural development and management of natural resources in the Andean highlands. Through late 1986 and early 1987, staff at USAID and the SDBT worked together to design

rural development and resource management project concepts to stem the flow of migrant workers from the southern district of the Cochabamba Department [29].[1]

THE ASSOCIATED HIGH VALLEYS PROJECT DESIGN

In 1987, DESFIL designed the implementation and technical assistance components and prepared the environmental assessment for the AHV Project. Part of the contract objective was to assist in developing the in-house technical capacities of the PDAR.

Amendment No. 7

In the last few months of 1987, the original CRDP project was amended (Amendment No. 7), which formalized the Associated High Valleys Project (USAID/Bolivia, 1987). The amendment changed the name of the SDBT to the Program for Alternative Development of Cochabamba (PADC), now referred to as PDAR (Regional Program for Alternative Development). Under the amended contract, PDAR assumed responsibility for administering, supervising, and monitoring the activities of the CRDP, which consists of two geographical areas: Chapare and Associated High Valleys.

Amendment No. 7 lays out the objectives to guide both PDAR and the AHV Advisory Team and recommends that the Chapare Regional Development Project expand its development activities into the Associated High Valleys region of the Department of Cochabamba with twin goals of

> (1) inducing out-migration of coca farmers and processors from the Chapare to the AHV region, where they would undertake legitimate agricultural activities, and (2) providing economic incentives to the AHV resident population to remain in place and not seek seasonal or permanent work in coca production in the Chapare.
>
> The Associated High Valleys will receive investments which will serve as catalysts for out-migration from the Chapare region. [The] creation of new economic opportunities and improved social conditions in areas of origin of migrants will facilitate the transition of many of the poor people leaving the Chapare. The Project will therefore serve the relatively poorer areas of the AHV in the southern districts and Tarata. While these areas have a high economic potential, they are currently receiving very little financial support from private and public organizations.
>
> The Project will finance activities in the AHV region in agriculture and forestry production, rural industry and marketing, production, transport, and community infrastructure, rural industry, investment financing, implementation analysis and analysis and planning, and institutional development.[10]

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[1] These numbers refer to bibliographical references at the end of the paper.

DAI INVOLVEMENT IN THE AHV PROJECT

In December 1988, USAID contracted with Development Alternatives (DAI) and its subcontractor Tropical Research and Development, Inc. (TRD) to provide six long-term advisors. The Scope of Work asked the team to:

- Conduct studies to formulate strategies and management systems to develop the AHV Project area;
- Provide technical advice in the design, implementation and management of the project's immediate and medium-term activities in integrated management, crop and livestock production, erosion control, soil conservation, range management, irrigation design, and promotion of environmental management; and
- Identify technical training for project staff and participants.

The contract stated that, "the primary responsibility of each advisor will be to work with his/her counterpart in the implementation of the CRDP's Associated High Valley activities." Further, each advisor "will work with" and "coordinate" his/her activities through the PDAR.[11]

Project oversight was to be provided by the La Paz offices of Sub-Secretary of Alternative Development (SUBDESAL) for the Bolivian government and by USAID/La Paz. Final technical and funding approval would be given by the USAID Project Manager after the USAID Field Coordinator in Cochabamba had reviewed all proposals presented by the PDAR.

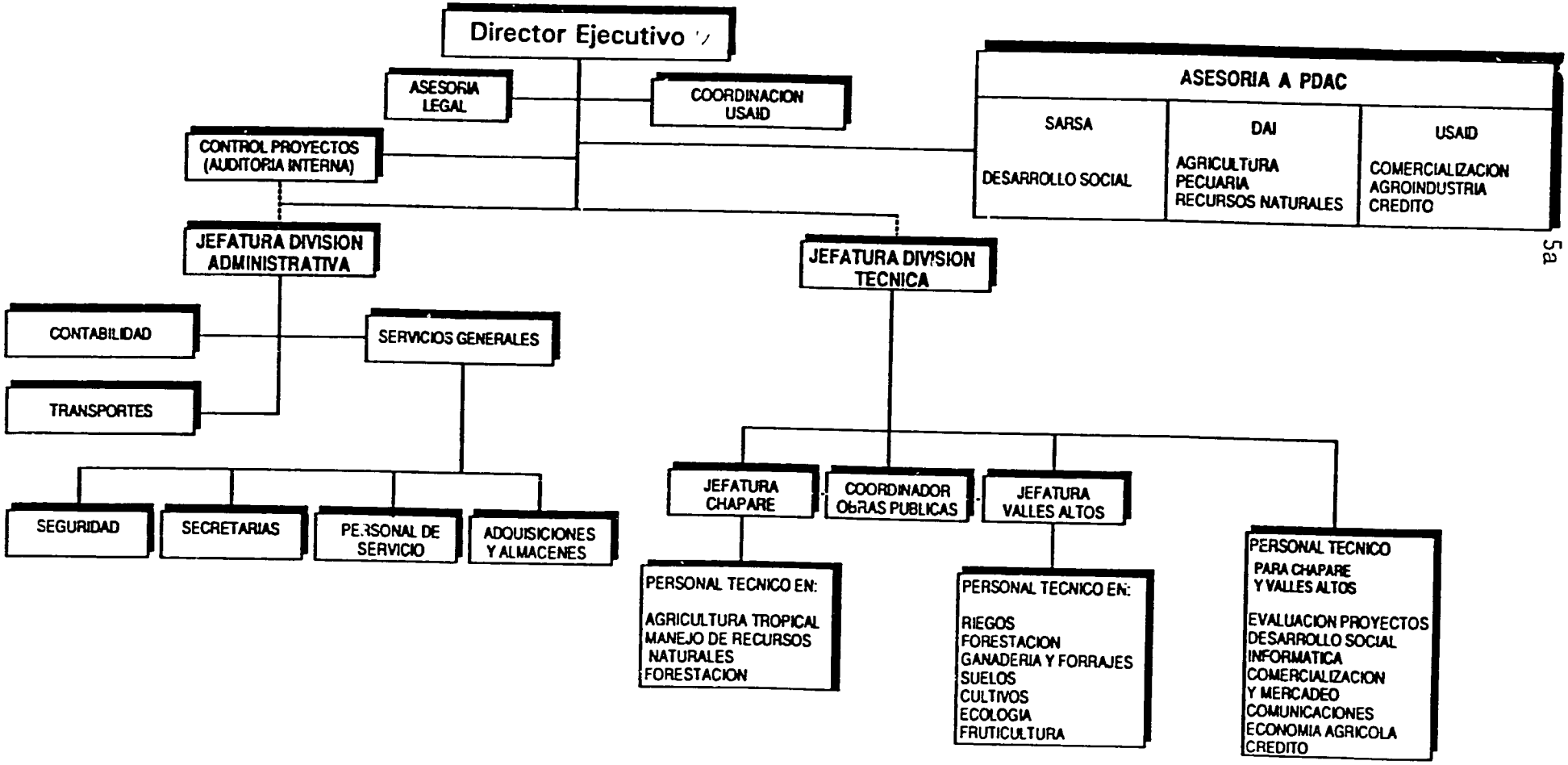
Specific responsibilities for AHV activities were divided between the Advisory Team and the PDAR. The Advisory Team would provide six advisors, office support staff, and vehicles. The Advisory Team would work within PDAR as advisors, and through Bolivian counterpart technical staff hired and supported by PDAR. Project identification, development, and presentation would be a joint effort of the PDAR and the Advisory Team. The final review and acceptance of the projects, and the submission to USAID, would be the responsibility of the PDAR administration. An organization chart follows.

Project field activities would be administered by the PDAR. Office space would be provided in Cochabamba and a regional office and guest house in Aiquile. All financial accounts and input acquisition would be handled by the PDAR support staff.

THE AHV ADVISORY TEAM

The AHV Advisory Team activities are interdependent, and implemented in cooperation with the PDAR administration and through Bolivian counterparts. Each advisor's responsibilities are specifically stated in the "Statements of Work" within the USAID Contract:

ORGANIGRAMA DEL PROGRAMA DE DESARROLLO ALTERNATIVO DE COCHABAMBA (PDAC)



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Advisor in Farming Systems - Chief of Party
(Mr. James Drager, January-June 1989)
(Dr. Michael Colegrove, July-December 1989)

The chief of party is to spend 50 percent of his time on general project administration and liaison with USAID and the PDAR. He will coordinate PDAR and Advisory Team contacts with other technical and research institutions, NGOs, and with donor agencies working in the project area. He will also foster an integrated farming systems approach to both rainfed and irrigated agriculture involving input from other technical experts, ecological and physical sciences, economics, and social sciences. He will assist in the design and implementation of training activities for farmers and technicians. He will develop a flow of technical information to farmer groups and agencies, a data collection and analysis system at the farm level, and the means of extending information to farmers on increasing agricultural production and improving the management of their natural resource base.

Advisor in Animal Science
(Mr. Wayne Hickey)

The animal scientist will concentrate on on-farm research planning and analysis concerning animal production systems. He will design and implement surveys of animal populations, land carrying capacities, and processing of animal products. Marketing surveys for the use of animal products will be conducted. The advisor will develop alternative programs to improve animal production. He will develop management strategies for sheep and goats that will restore and improve the ecosystems of the AHV.

Ecology Advisor
(Mr. Carlos Aliaga)

The ecologist will provide assistance on environmental monitoring and resource management and, in coordination with other project personnel, collect, analyze, and interpret the required baseline environment data. He will carry out continuous monitoring of environmental variables, including those related to regional biological diversity, which may be affected by project activities, and orient the PDAR and executing agencies to the utility and necessity of environmental concepts being built into the project design. The advisor should monitor all the activities that are being defined and implemented during the course of the AHV Project, in coordination with each project specialist, and document both positive and negative aspects of each activity.

Advisor in Forestry
(Mr. Leonidas Vega)

The forester specialist will work closely with public and private agencies, community groups, and individual farmers. He will develop an integrated program to prepare a forestry resource inventory and develop a management plan; identify the extent of biological diversity and how to maintain and utilize it; conduct cost/benefit and social analyses for alternative reforestation programs; develop programs to use different species for agroforestry and artisan needs; identify both native and exotic species for

alternative utilization; development of a multi-product, multi-use agroforestry program; and develop life zone and land use capability maps of the project area.

Advisor in Irrigation and On-Farm Water Management
(Mr. Ira B. Richards)

The irrigation specialist will provide operational support to agencies carrying out irrigation activities, coordinate procurement of equipment, evaluate the soundness of irrigation proposals, and assure that proposed irrigation water management is not in conflict with local usage, water rights, or environmental concerns. He will coordinate such activities as water and salt balance studies, geohydrology mapping, main canal routing, and master water plan preparation. The advisor will provide on-farm water management support to rainfed crop production activities including feasibility studies for alternative irrigation studies and on-farm water conservation/drainage practices. He will develop a strong technical information base related to climatology, hydrology, water use, salinization, and crop yields. Finally, this advisor will coordinate technical assistance and training courses related to all aspects of irrigation.

Advisor in Soil and Water Conservation
(Mr. William McDowell)

The conservationist will provide technical support in the areas of soils, soil management, soil conservation, rangeland management, and native woodland management. He will survey the project area, design a baseline data collection system and recommend soil and rangeland management practices to improve the productivity in the project area while maintaining the natural resource base. The advisor will develop information delivery systems for farmer groups and implementing agencies. He will also design and implement training activities for farmers and technicians, including short courses, farmer meetings, and field days. The advisor will propose educational extension systems and personnel development programs.

SECTION TWO

THE AHV PROJECT

START-UP ACTIVITIES

The AHV Advisory Team arrived in Bolivia in January 1989. The team set up an office with support staff and rented vehicles for reconnaissance studies in the project area. Until the PDAR hired permanent counterparts, the team hired Bolivian technicians on monthly contracts. Upon arrival, the team found only minimal PDAR administrative staff and a procurement system that lacked defined operational procedures. USAID had also failed to clearly outline administrative procedures and provide financial resources for implementing the AHV component of the CRDP.

Between February and May, over 30 reconnaissance trips of 270 person-days were made into the project area by the advisors and their technician assistants. These trips provided valuable background information on farmer organizations, irrigation and water management needs, livestock diseases and forage production, natural resource degradation, agroforestry and forest production potential, and environmental management issues. Furthermore, the team made contacts with other organizations working in the project area, and reviewed the previous activities of PDAR and several other institutions.

The advisors outlined long-term objectives for their sectors, and designed a series of subprojects to meet those objectives. By late April, the Advisory Team had sufficient information and experience to develop an integrated plan for the project area. This Five-Year Implementation Plan was produced and presented by mid-May to USAID, which gave its approval in June 1989.

The implementation plan established program budgets, designated public and private sector implementing agencies, and defined five years of activity for the PDAR. USAID was alerted to the need for field project funds. Due to previous USAID commitments to projects in the Chapare region, no USAID funds were approved for AHV projects. Instead, PL-480 funds were available but procedures for using these funds for AHV projects were not well understood.

In mid-June 1989, the PDAR hired a full-time Technical Director and, in July, USAID assigned a new Project Manager for the CRDP. These appointments greatly enhanced the communications between USAID, PDAR, and the AHV Advisory Team. In October 1989, PDAR Bolivian counterparts were assigned to work with each advisor.

Coordination with Regional Organizations

The Advisory Team developed projects with assistance from many local organizations. The intention was for these organizations to execute the projects with financing and technical assistance from PDAR and the AHV Advisory Team. Some of the organizations are listed in Annex II. The existing organizations involved in rural development in Cochabamba, such as farmer organizations, community development programs, nongovernmental organizations (NGOs), government agencies, and church-sponsored groups, constitute a resource pool for implementing AHV projects.

Assessment of Regional Institutions

During the preliminary field studies, the AHV Advisory Team met with many of the organizations working in the project area. It was obvious that many other projects were ongoing, or had been tried, in the Campero and Mizque Provinces. As the advisors began to formulate their impressions about the project area, they also tried to identify existing organizations that could undertake implementation activities under PDAR administration.

Such rural development activities as agricultural extension, on-farm training, and community development are carried out by all advisors. Consequently, the Advisory Team strongly recommended that all agricultural technical assistance to campesino communities be coordinated through a single agency wherever possible. For example, organizations like Accion Rural Agricola de Desarrollo Organizado (ARADO) and Asociacion de Servicios Artesanales Rurales (ASAR) were approached because they had worked cooperatively in the area for over 20 years and had a record of successful projects in agricultural development. In other cases, particularly for the baseline studies required in the project contract, specialized institutions or outside organizations were needed to conduct the work.

Finally, it was decided that organizations already well established in specific regions of the project area would be supported. The Advisory Team and PDAR realized that overlap and conflict would be prevented if AHV projects were initiated with regard for ongoing programs and if a single organization were to implement most of the projects.

Not until the development of the 1990 subproject plans did the Advisory Team make final choices of implementing organizations that would best fit the needs of the AHV Project. In some cases, it was a delicate decision between too few organizations implementing too many projects, or too many separate organizations directing too many different projects. The advisors made their recommendations to the PDAR, which, in turn, made the final choice in cooperation with USAID.

SITE SELECTION

After initial reconnaissance of the project area, the Advisory Team recognized one of the first tasks was to select a specific geographic area for focused project implementation. The project area defined by the two Provinces, or by the "Southern District," was simply too large, with too dispersed a population for an integrated rural development effort, given available funding. Also, Amendment No. 7 called for the development and testing of a "model" within a limited geographic area. Map 1 shows the location of the project area.

The advisors felt that the chosen areas should be representative of major natural resource and social conditions prevalent in the two Provinces. The advisors also felt that project lessons could easily be transferred to other areas.

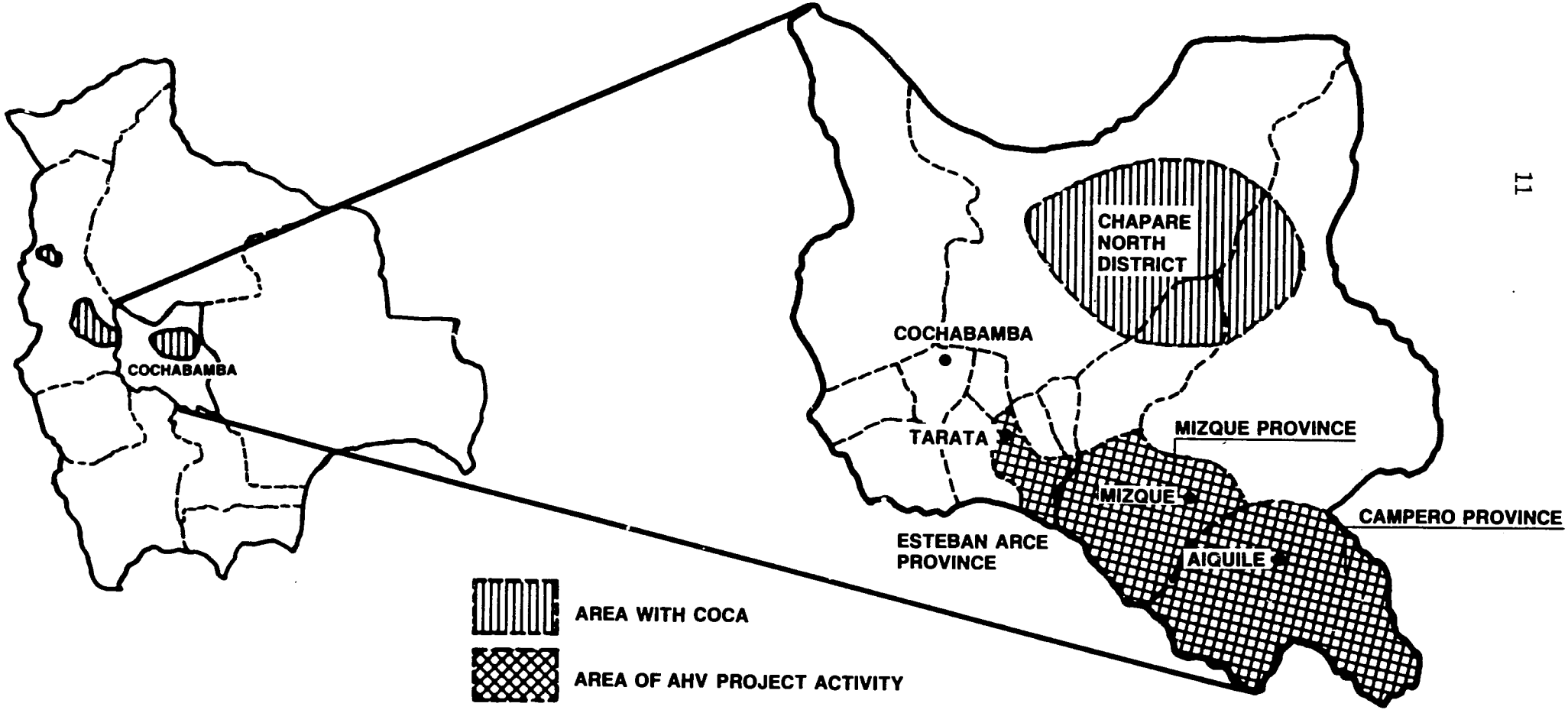
The following criteria were used to select the specific areas for the focused activities:

- The concentration and distribution of population;

MAP 1
LOCATION OF
PDAC/ASSOCIATED HIGH VALLEYS PROJECT

REPUBLIC OF BOLIVIA

DEPARTMENT OF COCHABAMBA



- The impact that development activities would have on reducing migration to lowland coca producing areas;
- The availability of technical and cultural information about the area;
- The size and number of development projects that could be effectively established;
- The resident population's need for assistance;
- The natural resources available;
- The potential level of impact;
- The incentives available for the participant population;
- The access to the area; and
- The terms of reference in Amendment No. 7, and the USAID/DAI contract.

PROJECT AREA DESCRIPTION

The selection of the project area for the Associated High Valleys Project was based on an analysis of land use capabilities, which indicated that Mizque and Campero Provinces had the highest agricultural potential in the temperate zone of Cochabamba Department.[19] The area surrounding Tarata, in Esteban Arce Province, was later added to the project area.[31] Field trips by advisors and counterparts and initial implementation activities focused primarily on Mizque and Campero Provinces.

After many reconnaissance trips, the AHV Advisory Team and the SARSA (Cooperative Agreement on Human Settlements and Natural Resource Systems Analysis) social science advisor selected three target areas for focusing early project and PDAR activities:

- The Uchuchajra River Watershed: a 420 sq. km. basin including the regional market town of Aiquile and surrounding agricultural valley;
- The Tipa Jara River Watershed: a 250 sq. km. basin between Mizque and Aiquile, which includes a major alluvial valley with excellent potential for expanded irrigated agriculture; and
- The Tucma River Watershed: a 250 sq. km. basin, which includes a narrow lowland valley with abundant irrigation water and a highland zone representative of the upland agriculture in northern Mizque Province.

Rationale for a Watershed Focus

The advisors intentionally chose watersheds as a logical planning unit in the project area, and defined their area priorities on this basis. Map 2 indicates the area of priority watersheds.

In semi-arid environments, which characterize much of the project area, rural organizations and production activities focus on access to water. During field trips, the rural population revealed great interest in managing water resources to improve agricultural productivity.

The Advisory Team recommended that the PDAR use watersheds as the basic planning unit in designing development activities. The reasons for using watersheds in project design include:

1) Use of watersheds as a planning unit demands that all entities involved in the PDAR program recognize the relationship of the natural resource base to the long-term sustainability of rural development activities in Campero-Mizque. This focus on sound natural resource management as the foundation of sustainable rural development is a key part of the Associated High Valleys project design as elaborated in Amendment No. 7.[10]

2) Watershed boundaries are widely used in the area to delineate the boundaries of farmer *sindicatos* (campesino unions), the local political units essential to project implementation. For example, the sub-centrals of Tipa Jara, Novillero, and Agua Blanca, which form the headwaters for the Tipa Jara, Novillero, and Aiquile River watersheds respectively, all have land boundaries largely defined by watershed divides.

3) The project must concentrate on developing financial and human resources in defined geographic units long enough for the benefits of integrated rural development activities to take effect. Watersheds are widely-recognized local geographic units in Campero/Mizque.

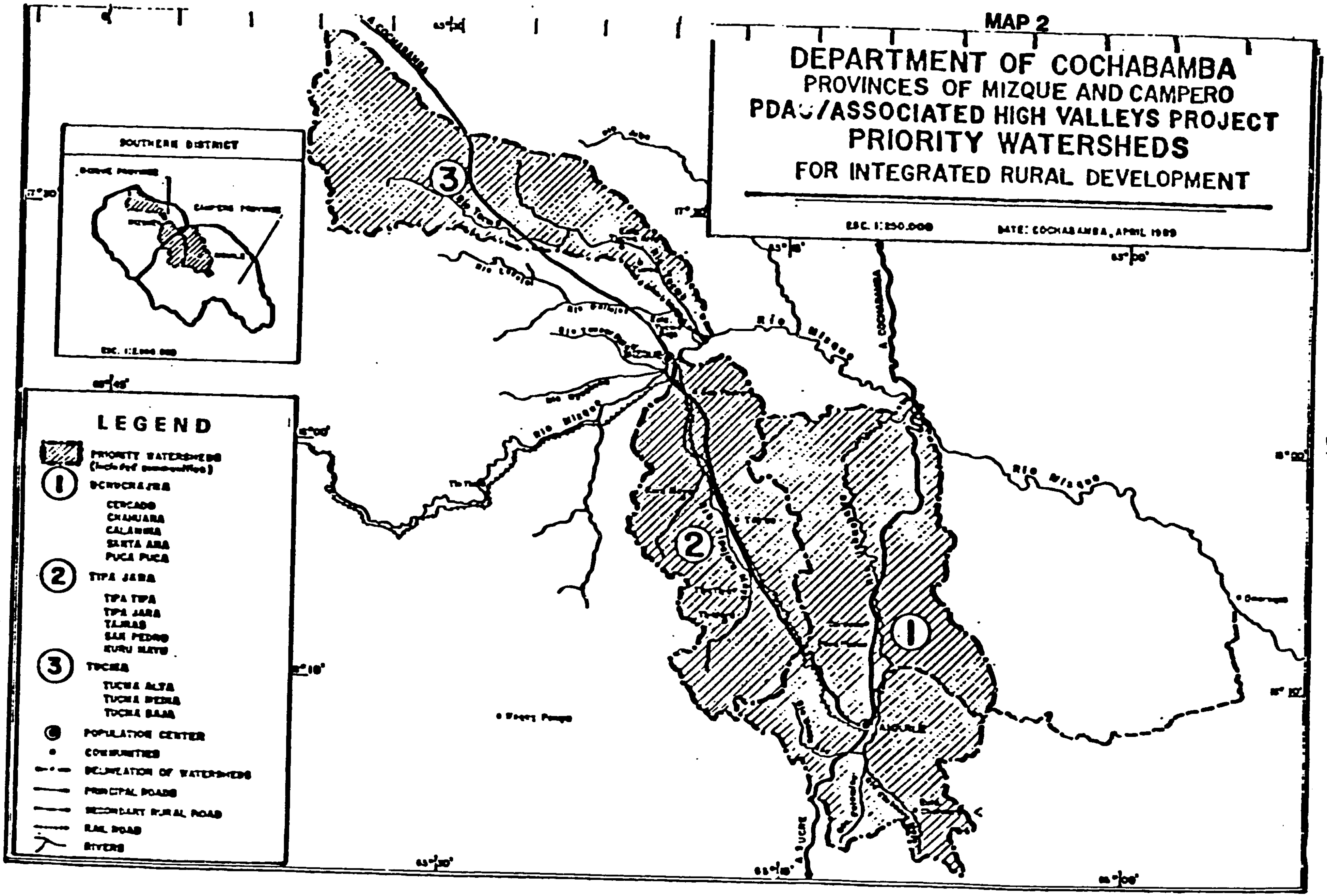
4) Irrigation projects are a high priority in Mizque/Campero due to the scarcity of water resources in the area and distribution of water between upstream and downstream users must be carefully planned on a watershed basis.

5) Natural resource management activities, including soil and water conservation, forestation and forest management, and range management must be coordinated with irrigation, potable water and livestock water projects. Public works projects can be used as a motivation for participation in natural resource management.

6) Upland soil, vegetation, and forests influence the quality and quantity of water available in each watershed. In order to assure long-term economic and ecological growth, management of upland soils, vegetation, and forests need to be closely linked with downstream irrigation and agriculture programs.

Geography

Mizque and Campero Provinces are the southernmost provinces in Cochabamba Department, with a total combined area of 8,280 square kilometers, or about 15 percent of Cochabamba Department. The project area lies almost entirely within the watershed of the Mizque River, which drains into the Rio


MAP 2
DEPARTMENT OF COCHABAMBA
PROVINCES OF MIZQUE AND CAMPERO
PDAC/ASSOCIATED HIGH VALLEYS PROJECT
PRIORITY WATERSHEDS
FOR INTEGRATED RURAL DEVELOPMENT
ESC. 1:250,000
DATE: COCHABAMBA, APRIL 1989
SOUTHERN DISTRICT
LEGEND
PRIORITY WATERSHEDS
COMMUNITIES
RIVERS
Rio Mizque
A COCHABAMBA
AIQUILE
1
2
3

Grande at the eastern end of Campero Province. Elevations range from 1,500 to 4,000 meters above sea level.

Geology and Land Forms

The Provinces of Mizque and Campero are located entirely within the Eastern Andean Cordillera, a land unit comprised of generally steep dissected ridges and narrow valleys. Land use capability has been assessed only at a reconnaissance level for Mizque and Aiquile areas,[19] and at a semidetailed level in selected areas by the Ministry of Agriculture and Campesino Affairs as part of two soil surveys in 1969 and 1972.

The geology of the area is highly folded and faulted tertiary sedimentary rocks, including sandstones, siltstones, and lutites. Synclinal and large alluvial valleys are rare, but important agriculturally (for example, Tipa Jara and Mizque).

The major physiographic units are:

Valleys. Flat to undulating lowlands located at elevations between 1,500 and 2,300 meters. There are floodplains, alluvial terraces, colluvial terraces, and undulating piedmonts included within this unit. Soils represented are entisols, inceptisols, aridisols, and alfisols. Agricultural activities are intensive in most valleys, with both dryland and irrigated cropping. There are an estimated 13,700 hectares of land under cultivation in the valley land unit, of which up to 3,000 hectares are under irrigation and an additional 2,000 hectares may have irrigation potential. Approximately 8,000 hectares of cultivated valley lands are Class III to Class V lands, primarily due to slope, erosion and rockiness.[8]

Hilly/Mountainous Uplands. Most of the landscape in the Mizque and Campero Provinces is hilly/mountainous uplands including lands from 1,500 meters elevation to 3,500 meters. Variations in this land unit include steep to moderately sloping dissected ridges and hills as well as rocky outcrops and bedrock canyons. Soils are varied but often thin and rocky, and highly eroded. There are up to 6,000 hectares of cultivated lands in this land unit, primarily dryland farming, and most are Class III to Class VII lands. Most land in this unit is used for grazing and forestry.

Upland Mesas. The upland mesas are flat to moderately undulating, located between 2,700 and 3,300 meters elevation, and of limited areal extent. Soils are primarily alfisols and inceptisols, and are sometimes deep and relatively fertile, although erosion problems are widespread. Due to the elevation, moisture regimes are favorable for intensive dryland cultivation of temperate Andean crops. Approximately 5,000 hectares of upland mesa are under cultivation, primarily in the two largest areas of this type: Racaypampa and Laguna Pampa, both in Mizque Province.

Climate

The climate of the project area is classified as dry or arid. The classification ranges from temperate subhumid, to temperate semiarid, to subtropical arid, depending on geographic position and elevation. Rainfall declines from subhumid in northern and western areas of Mizque Province to arid in lower elevations of eastern Campero Province.

Annual precipitation and elevation for a series of project area communities are outlined in Table 2.

TABLE 2

MEAN ANNUAL PRECIPITATION IN project area (1959-1979)

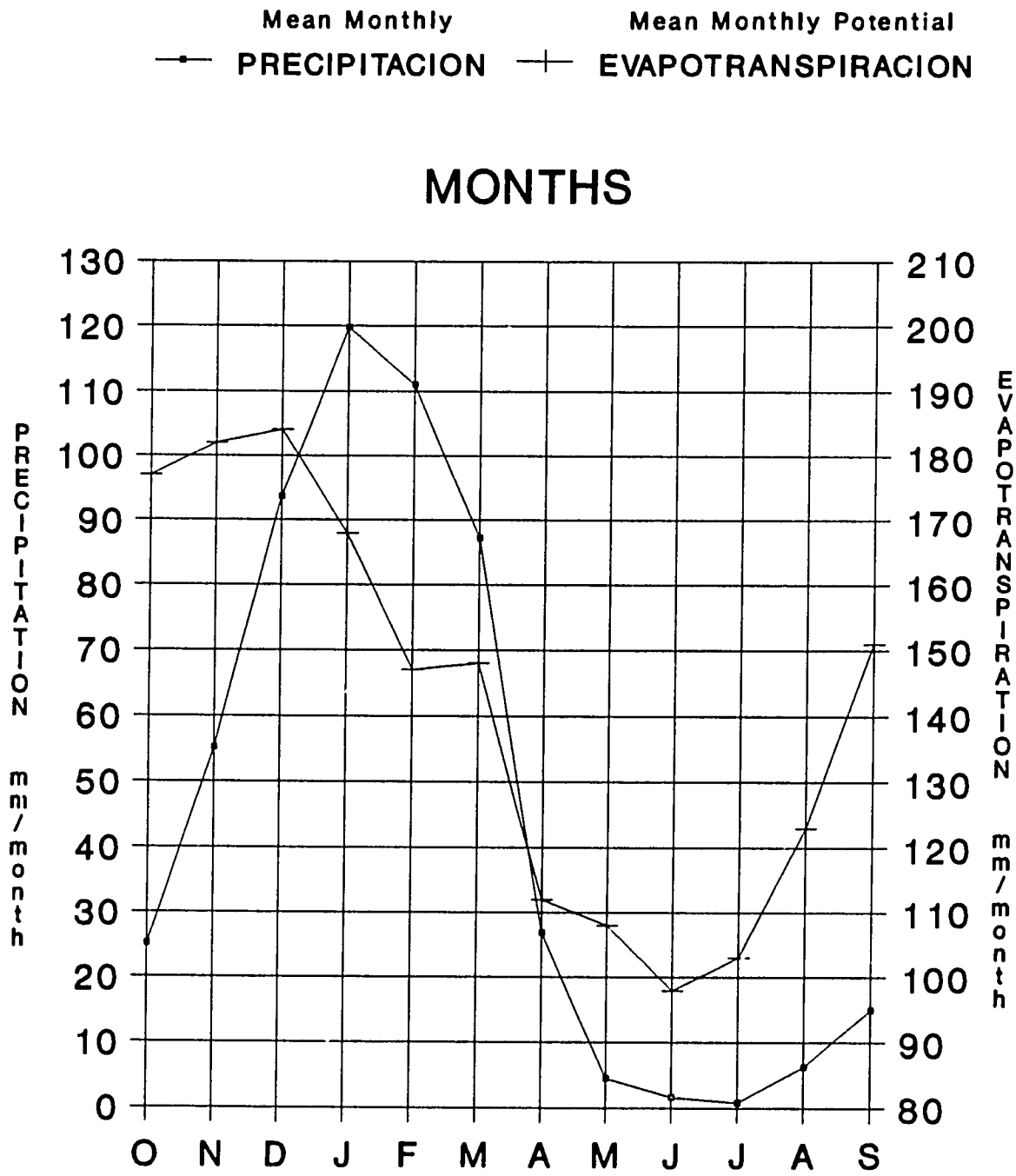
	Elevation (meters)	Precipitation (mm)	Classification
Campero Province			
Pasorapa	2090	393	Semi-Arid
Puente Taperas	1439	342	Arido
Villa Granado	2140	570	Semi-Arid
Aiquile	2250	514	Semi-Arid
Mizque Province			
Mizque	2025	543	Semi-Arid
Sivigani	2190	645	Semi-Arid
Vila Vila	2560	713	Semi-Arid
Alalay	3250	719	Moist

Almost all the annual precipitation is recorded between October and April, with December, January, and February being the wettst months. Graph 1 presents the monthly water balance for Aiquile.

Rainfall in the project area is erratic and short in duration, coming from high-intensity storms. A pattern of short dry spells during the rainy season induces crop stress. Approximately 75 percent of the available rainfall occurs in storms of greater than 10 mm. Between 5 and 90 percent of these large storms become runoff, leaving only a small portion for infiltration. The prevalence of high-intensity storms in a semiarid environment creates high rates of erosion on farmlands throughout Campero-Mizque. Graph 2 gives rainfall distribution for Aiquile.

Temperatures in Aiquile range from a low of 14°C from May through June, to a high of 22°C during November through March. Frosts occur in May, June, and July and prevent agriculture above approximately 2,800 meters. Cold-tolerant crops, potatoes and onions, are grown through the winter months below 2,800 meters elevation with irrigation. Subtropical perennial crops, mandarins, papaya, and bananas, are grown with irrigation below 2,000 meters elevation, primarily on the alluvial soils in the Mizque River canyon.

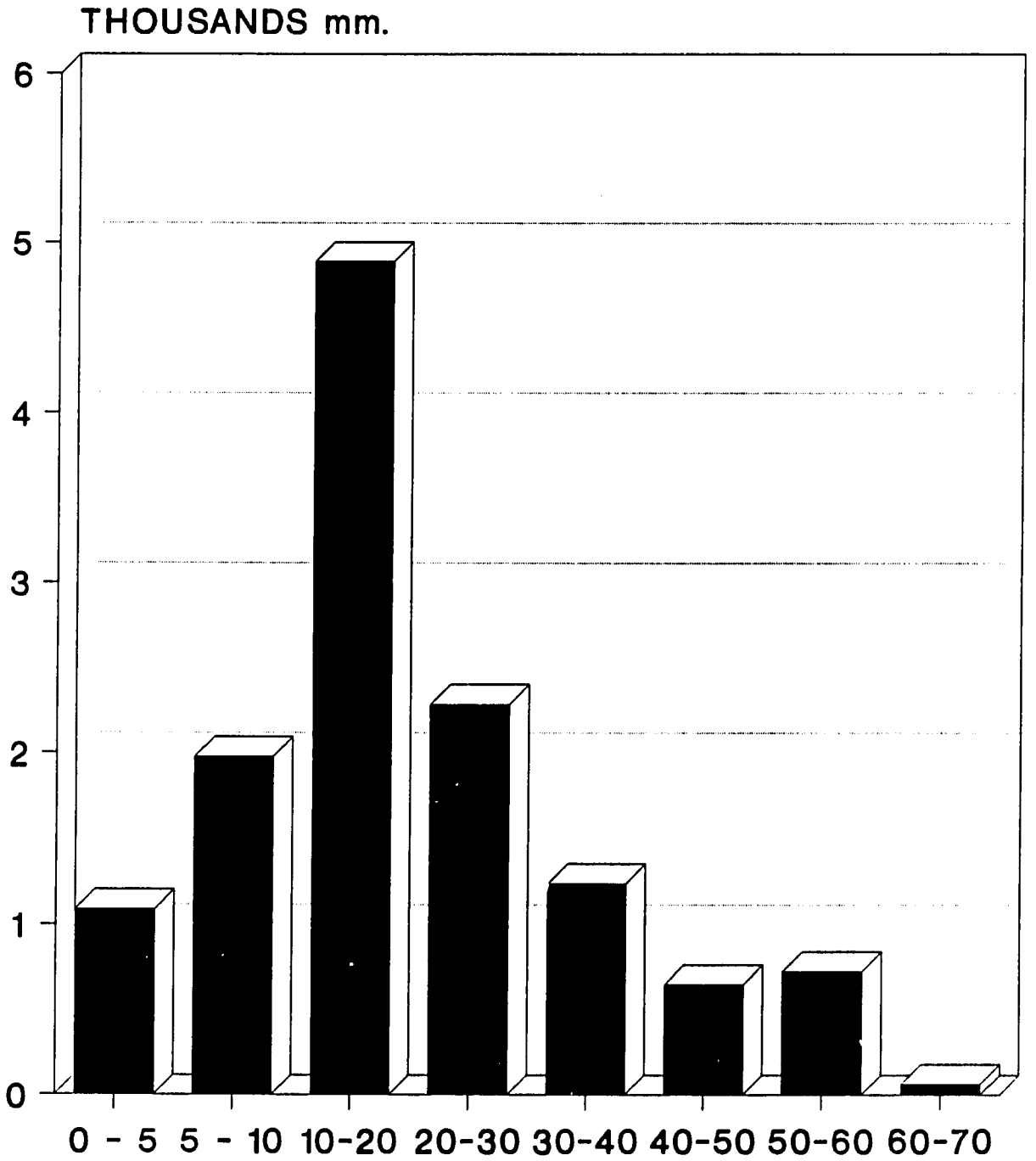
GRAPH NO. 1
WATER BALANCE FOR AIQUILE



Aiquile Hydric Balance (Potential Evapotranspiration 1959 to 1975; Monthly Average Precipitacion 1959 - 1979

TOTAL RAINFALL DEPTH DISTRIBUTED BETWEEN EVENT CLASSES

GRAPH NO. 2



Natural Vegetation

The native vegetation of the project area consists of dry xerophytic shrubs, thorn steppe and dry forest with trees up to five meters, montane forest, and highland savanna or steppe. A portion of the native vegetation in the project area is substantially altered by the impact of the long history of settlement and relatively high density of human and livestock populations.[3]

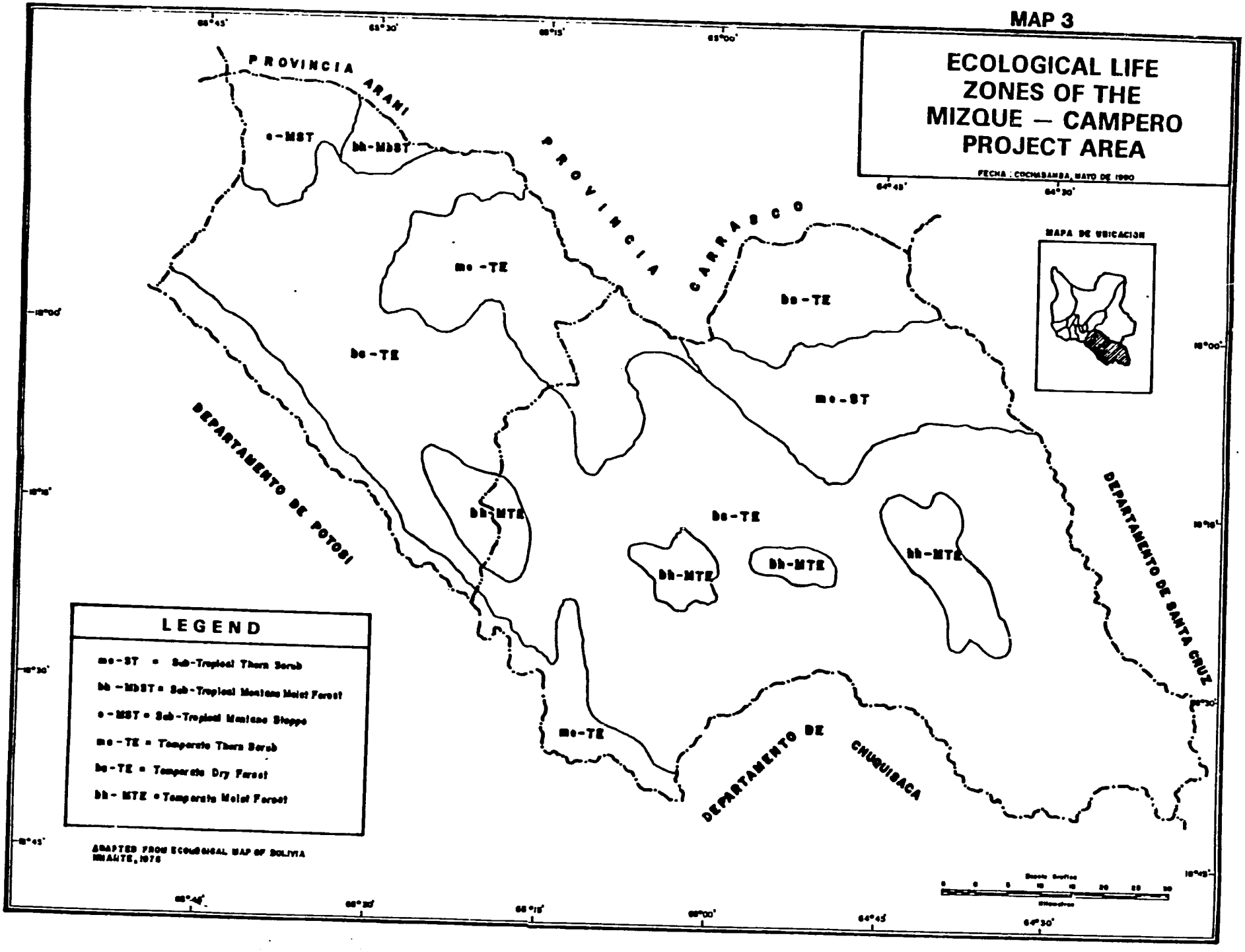
TABLE 3

ECOLOGICAL CLASSIFICATION AND NATIVE FLORA IN
THE project area ACCORDING TO THE HOLDRIDGE LIFE ZONE SYSTEM

Ecologic Life Zone	Indicator Species	Typical Location
Sub-Tropical Thorn Steppe	*Palo brea* *Neocardensia sp.*	Omereque
Temperate Thorn Steppe	*Prosopis juliflora* *Acacia cavens* *Acacia visco* *Aspidospermum sp.*	Cercado-Marquilla
Temperate Dry Forest	*Tipuana tipu* *Jacaranda sp.* *Schinus molle* *Dodonea viscosa*	Rumi Cancha Tipa Pampa
Temperate Humid Montane Forest	*Alnus sp.* *Podocarpus sp.* *Polylepis incana* *Baccharis sp.*	Curi
Temperate Steppe	*Graminae sp.*	Laguna, Racaypampa, Alalaya

The species diversity of shrubs, forbs, and grasses is generally high in all these environments, although much of the nonwoody vegetation is ephemeral in response to the severe winter dry season. Grazing impact is often severe, and some highly palatable species have undoubtedly been reduced or eliminated throughout the project area. Map 3 shows the Ecological Life Zones of the AHV project areas.

MAP 3


ECOLOGICAL LIFE ZONES OF THE MIZQUE – CAMPERO PROJECT AREA
FECHA : COCHABAMBA, MAYO DE 1990
MAPA DE UBICACION
PROVINCIA ARANI
PROVINCIA CARRASCO
DEPARTAMENTO DE POTOSI
DEPARTAMENTO DE CHUQUISACA
DEPARTAMENTO DE SANTA CRUZ
e-MST
bh-MbST
me-TE
bs-TE
me-ST
bh-MTE
LEGEND
me-ST = Sub-Tropical Thorn Scrub
bh-MbST = Sub-Tropical Montane Moist Forest
e-MST = Sub-Tropical Montane Steppe
me-TE = Temperate Thorn Scrub
bs-TE = Temperate Dry Forest
bh-MTE = Temperate Moist Forest
ADAPTED FROM ECOLOGICAL MAP OF BOLIVIA HOLDRIDGE, 1976

Population

The estimated population for Mizque and Campero Provinces and the Tarata area is between 52,000 and 81,000 persons.

TABLE 4

ESTIMATED POPULATION FOR MIZQUE AND CAMPERO PROVINCES

	Urban Pop.	Rural Pop.	Total
Campero:	7,024	33,615	40,639
Mizque:	2,142	32,283	34,425
Tarata area:	About 7,000 people would be affected by project activities.		

Eighty-eight percent of the population in the two provinces is rural, while the urban population is primarily concentrated in Aiquile (4,000), Mizque (1,500), and the smaller towns of Omereque, Pasaropa, Minas Asientos, and Molinero.

Only in the towns of Aiquile, Mizque, and Minas Asientos (a mining town) are there significant numbers of people engaged in activities other than farming; in the remaining communities, agriculture is the primary economic activity.

The population is dispersed throughout the two Provinces, although density is highest on the upland mesas and in the irrigated valleys where more favorable climate and soil conditions prevail. In most rural areas the residents live in dispersed communities, with each homestead surrounded by their fields. Only in a limited number of rural communities, such as Tipa Tipa, Negro Pujio, and Novillero, is there consolidation of homes around small plazas.

Land Tenure

The 1985 Department of Cochabamba Agricultural Census revealed that the average farm size in both Mizque and Campero Provinces ranges between 2 and 4 hectares; 91 percent of the farmers own less than 10 hectares. The wealthiest 10 percent of the farmers control approximately 33 percent of the privately owned land resources.[30]

The 1989 CORDECO (Cochabamba Regional Development Corporation) survey revealed that 24 percent of rural landholders in Mizque-Campero acquired their land during the 1953 Agrarian Reform, another 24 percent inherited their land from family members, and 49 percent have subsequently purchased their land.

The small landholders cannot support a family year-round with current technology, especially without irrigated land. The advisors estimate that approximately 70 percent of the farm families in the project area have no irrigated land. The CORDECO survey reported 77 percent of the cultivated land in the two districts is cultivated in dryland conditions, [29] although this sample apparently overestimates irrigated land due to the selection of particular communities.

Agricultural land with irrigation water rights is substantially more valuable than unirrigated farm land. The extent to which there is an ongoing concentration of ownership of arable land due to purchase and accumulation is unknown. The vast majority of the actual land area in Mizque-Campero is communally controlled land, almost all of which is rugged canyon and hill country used for livestock grazing and forest production.

Availability of Useable Land

All arable land is already cultivated. The limit of land resources in the project area is one of the major constraints in agricultural development.

An intensification of agricultural land use will require expansion of existing irrigation. Rustic irrigation systems now exploit the majority of permanent water resources. AHV irrigation projects are improving efficiency and expanding irrigated acreage.

Due to aridity and low fertility, agricultural yields on dryland farms is marginal. The control and use of runoff is a key to the rehabilitation of these lands. Management of semiarid and arid pastures and woodlands will require improvement in livestock grazing practices and forage production.

Land Use and Agricultural Cropping Patterns

Data on land use is limited but patterns can be deduced from the agricultural census data and soils reports (Table 5). The total land area of the two provinces is 828,000 hectares, of which approximately 25,000 hectares, or 3 percent, is cultivated.[19, 29] Of this, 3,200 hectares or 13 percent is under either permanent or supplementary irrigation. Approximately 21,000 hectares of the "cultivated" land was actually in crops during 1987; the remainder was presumably fallow[19] (Table 6).

TABLE 5

LAND USE IN MIZQUE AND
CAMPERO PROVINCES (shown in hectares)

Type of Land Use	Mizque	Campero	Total
Irrigated Cropland	2,200	1,500	3,700
Non-irrigated Cropland	9,060	12,438	21,498
Grazing/Pasture	261,740	541,062	802,802
Total	273,000	555,000	828,000

Approximately 800,000 hectares in the hilly mountainous land unit are not cultivated due to extremely rough topography, shallow soils, and aridity. These primarily communal lands are vegetated with degraded woodland and forest, and used for open range, harvest of wood for construction, firewood, crafts, and for some hunting.

TABLE 6

AGRICULTURAL PRODUCTION IN MIZQUE AND CAMPERO PROVINCES, CORDECO AND MACA (1988)

Crop	Total Hectares	Yield KG/HA	Produc. Cost/HA	Labor (Days)	Price $US	Total Volume
Grapes	140	4,684	3,600	123	0.9	655,760
Citrus	60	9,000	2,700	105	0.5	540,000
Chirimoya	100	10,000	4,000	100	1	1,000,000
Papaya	20	7,000	800	60	0.2	140,000
Sugar Cane	100	40,000	1,500	160	0.05	4,000,000
Fava Beans	80	1,750	620	46	0.5	140,000
Beans	5	1,200	565	91	0.5	6,000
Peas	40	4,684	3,600	123	0.9	187,300
Maize	12,900	1,400	454	91	0.35	16,060,000
Potato	1,900	5,562	1,143	110	0.3	10,567,800
Onion	900	5,819	1,426	171	0.25	5,237,100
Tomato	550	8,517	1,064	179	0.2	4,684,350
Peanuts	500	1,200	400	80	0.6	600,000
Sweet Pot.	50	8,000	700	100	0.2	400,000
Wheat	2,600	1,200	315	37	0.3	3,120,000
Barley	1,200	980	321	44	0.35	1,176,000
Oca	90	2,000	600	70	0.35	180,000
Papaliza	50	2,000	580	90	0.3	100,000
Forages	50	24,000	418	68	0.03	1,200,000
Total	21,335					

SECTION THREE

PROJECT IMPLEMENTATION

PREPROJECT IMPLEMENTATION EFFORTS

In 1987 and 1988, the PDAR planned regional development activities in Campero, Mizque, and parts of Esteban Arce Provinces in the valleys of southern Cochabamba Department. Over 12 specific agricultural and natural resource projects were designed by the PDAR technical staff in coordination with local institutions. Of these projects only two, Programa de Control Integrado de Plagas (PROCIPLA) and Escuela Tecnica Superior de Agronomia (ETSA), were funded in 1988.

Government organizations and NGOs working in the provinces were to execute the majority of the rural development activities funded by the project. The role of the PDAR, as set out in the project redesign, was to coordinate the work of executing agencies within a coherent regional development framework. PDAR would also provide the local agencies with technical, logistical and administrative backstopping.[10]

The planned activities included the expansion and improvement of irrigation infrastructure; improvement of agricultural production technologies; upgrading and construction of roads, water supply systems, and electrification systems; and natural resource management activities.[10] However, development activities through 1988 were constrained due to political factors, changes of personnel in PDAR and USAID, and severe budget limitations. Only the PDAR roads projects, implemented by the National Roads Service (SNC), received constant funding and support.

PDAR AND AHV ADVISORY TEAM ACTIVITIES IN 1989: SHORT-TERM, PI-480, AND LONG-TERM PROJECTS

The Five-Year Implementation Plan, developed by the AHV Advisory Team in May 1989, was designed as the overall guide to AHV objectives.

Between September 1989 and January 1990, the Advisory Team designed and implemented 27 short-term, high impact projects for local populations (Table 7). Each subproject was to cost no more than $10,000 and be completed in six months. In these first five months, the total allocated for these short-term projects was $180,000. The Advisory Team also designed seven projects that were approved by USAID for 1989 at a value of $250,000, using PL-480 funds. While designing and implementing the short-term and PL-480 projects in 1989, the Advisory Team also developed 30 long-term projects to be funded in 1990 for a total of $3.2 million.

TABLE 7

SUMMARY OF AHV PROJECTS

Type of Projects	Number of Projects	$
Short-Term (High Impact) Projects Funded in 1989 (each <$10,000)	27	180,00
PL-480 Projects Funded in 1989	7	250,000
Long-Term Projects Designed for 1990	30	3.2 million

Short-Term, High Impact Subprojects

The Advisor Team recognized the urgency to implement small projects before the rainy season to maintain the confidence of campesinos and the implementing agencies. As Bolivian counterparts were hired in September, they immediately joined the implementation process. This rush of implementation activity meant that long-term strategies and project plans became second priority.

The short-term, high impact activities were well received by the local farmer organizations and development agencies. They also met the Amendment No. 7 Implementation Strategy objective "to begin visible, concrete activities...to indicate clearly the commitment of the Project to the improvement of economic opportunities in the Associated High Valleys area."[10]

Benefits

The 1989 High-Impact Projects had a tremendous, positive impact on PDAR. First, PDAR, suddenly gained credibility in the project area by demonstrating its ability to respond effectively to felt needs in the area. Second, this new credibility allowed PDAR to take a leadership role among local development agencies. Third, the implementation of these field projects provided an opportunity for new PDAR technicians to be involved in worthwhile, satisfying work, thereby raising the morale of the entire institution.

Misconceptions

The projects, although well designed and executed, led to some misconceptions. The first concern was the size and type of the subprojects undertaken. Given the time the project had to organize and implement a large number of subprojects, in the face of the approaching rainy season, much of the financial assistance went to ongoing work in the local communities. This led to the misconception that

all project area activities were going to be small-scale projects. USAID, which to a large degree shaped the types of projects through the late funding and restrictions, criticized the selection of some subprojects at this planning stage.

The second misconception was voiced as criticism from outside observers that the PDAR and the Advisory Team were administering too many subprojects directly. This was not the intent of the original contract, which stated that activities in the area were to be carried out by local organizations. The short time frame for beginning activities pressured PDAR and the Advisory Team into direct administration of projects. Limitations on funds for individual projects made the services of several local organizations unaffordable. However, several projects were ultimately directed by Centro de Desarrollo Agropecuario (CEDEAGRO), Radio Esperanza, and CARE. To involve local beneficiaries as much as possible, local supplies and labor were used. In addition, campesinos constructed and executed public works nurseries and demonstration plots in this phase of the project.

Funding for additional short-term, high impact projects is available for 1990. The Advisory Team is in various stages of designing, obtaining approval, and implementing (and in some cases continuing existing) short-term, high impact projects for 1990. Table 8 lists 1989 subprojects.

PL-480 Funded Projects in 1989

While the AHV Advisory Team was developing high impact projects, USAID indicated that large amounts of PL-480 funds were available for AHV subprojects. The advisors used the May 1989 Five-Year Implementation Plan as the conceptual guide for developing more subprojects. The PL-480 funds, available for 1989, were to be allocated before the end of the year, further pressuring the Advisory Team.

The Advisory Team designed projects that would use PL-480 funds as a bridge between the termination of the High Impact Subprojects, and the release of USAID funds for long-term projects during the second quarter of 1990. In this way, the advisors could continue implementation activities in the project area and not lose continuity with the implementing agencies and local community organizations.

The AHV advisors and PDAR technicians presented to the PDAR administration 17 proposed projects with a provisional budget of $797,848. The PDAR Planning and Technical Divisions reviewed and approved seven projects (total value of $249,857), which were approved by USAID PL-480 administrators by the end of 1989 (Table 9). The remainder of the proposals were submitted for USAID-funding in 1990.

TABLE 8

SHORT-TERM, HIGH-IMPACT SUBPROJECTS - 1989

Specialty			US $	(Total)
Animal Science				
Animal Disease Survey			5,636	
Native Vegetation Inventory			8,120	13,756
Ecology				
Baseline Mapping			8,045	
Ecology Training Center (Women and children)			2,000	
General Ecology Training Center			2,000	12,045
Farming Systems				
School Demonstration Plots (4)			400	
Experimental Plots (13)			4,549	4,949
Forestry				
Forestry Nursery (Aiquile)			7,000	
Forestry Nursery (Mizque)			7,000	
University Thesis Projects			7,000	21,000
Irrigation and On-Farm Water Management				
Infiltration Galeria		Lora Mayu	7,486	
"	"	Pucara Esquina	8,471	
"	"	Puca Puca	7,254	
"	"	Marquilla	4,977	
"	"	Salvia Alta	7,889	
"	"	Salvia Baja	7,625	
Potable Water		Puca Puca	8,759	
Diversion Channel		Taucarpillo	6,125	
Dam		Tipa Tipa	4,504	
Canal and Siphon		Chilijcha	7,757	
Canal Works		Tipa Tipa	7,361	
Canal Works		Lampasillos	7,240	
Pump and Tanks		Tarata	8,520	93,968
Soil and Water Conservation				
Conservation Demonstrations		(Rumi Cancha)	1,194	
Water Supply System		(Rumi Cancha)	7,240	
Irrigation/Conservation		(Suero Mayu)	8,882	
Erosion Run-off Plots		(San Juan)	7,186	24,502
Educational Materials			10,000	10,000
		Total for 27 subprojects		180,220

TABLE 9

PL-480 SUBPROJECTS APPROVED FOR 1989

Specialty	Code	Title	US$
Animal Science	1121	Livestock Improvement	21,400
Farming Systems	1161	Agricultural Tech, Transfer	78,428
	1162	Integrated Pest Management	86,393
	1163	Grape Production	16,846
Irrigation	1211	On-farm Irrigation (Aiquile)	14,751
Soil Conser.	1141	Soil Conservation Training	9,804
Training	6261	Educational Materials	22,235
		Total PL-480 Funding	249,857

Long-Term Projects

At the same time that the above-mentioned, short-term and PL-480 subprojects were being designed, the USAID/La Paz Mission requested a project implementation budget for the fiscal years 1990-1991.

The original budget submitted by the AHV Advisory Team and PDAR was for $5.12 million and $5.38 million for the years 1990 and 1991, respectively. This budget was revised in October 1989 to a combined total of $6 million for 49 subprojects. For 1990, the PDAR approved 30 projects with a budget of $3,196,786. These long-term projects now form the core of the 1990 PDAR Operation Plan and are listed in Table 10.

Projects Designed for 1990

In January 1990, USAID approved the 1990 PDAR Operating Plan. The PDAR and AHV advisors proceeded with project design and development in collaboration with local implementing organizations. During February and March, PDAR reviewed sets of subprojects and forwarded them to USAID/La Paz for their approval. As of April 1990, only nine PL-480 and long-term subprojects had been funded.

TABLE 10

LONG-TERM SUBPROJECTS SUBMITTED FOR 1990

SPECIALTY	CODE	TITLE	US$
Animal Science	1121	Livestock Improvement	89,700
	1122	Disease Survey and Control	58,200
	132	Forage Improvement	81,950
		Total	229,850
Environment	1332	Institutional Support	55,000
	611	Productive Management of the Environment	30,100
	63	Program Evaluation	63,363
	631	Evaluation and Monitoring Unit	46,920
		Total	195,383
Farming Systems	1161	Agricultural Tech, Transfer	36,900
	1162	IPM, Environ. Contamination & Ecologic Degradation	160,280
	1163	Grape Production	98,950
	1165	Fruit Production (Tarata)	65,550
	1166	Fruit Production (Mizque)	33,250
	1168	Fruit Production (Aiquile)	27,250
	1167	Crop Technology Transfer	55,960
		Total	478,140
Forestry	1311	Plantations & Silviculture	99,400
	1411	Forestry Nurseries	71,700
	613	Community Forest Programs	28,200
		Total	199,300
Irrigation	1211	On-farm Irrigation (Aiquile, Omereque)	133,570
	1212	On-farm Irrigation (Tarata)	82,500
	1213	Irrigation Management (Mizque)	125,600
	1351	Water Resource Studies	109,000
	411	Small & Medium Construction	750,000
	451	Hydrometerology Network	109,790
		Total	1,259,390

TABLE 10 -- Continued

SPECIALTY	CODE	TITLE	US$
Soil Conser.	1141	Soil Conservation (Aiquile)	95,163
	1142	Soil Conservation (Mizque)	35,360
	1341	Soils Data Base	14,200
	1342	Erosion and Flood Control	50,000
	612	Organization & Training	20,000
		Total	214,723
Other	43	High Impact Community Project	500,000
	6261	Educational Materials	120,000
		Total	620,000
Total for related subprojects			$3,196,786

SECTION FOUR

PROJECT DESIGN BY SECTOR

ANIMAL SCIENCE

Focus

The strategy of the animal husbandry sector is to improve (1) animal sanitation, (2) animal stock through selective breeding, and (3) forage crop production. By improving the productivity of individual animals (for example, meat, milk, and cheese) and thus securing the farmers' confidence, the project will be able to reduce livestock numbers, introduce grazing management systems, and rehabilitate native pastures.

Constraints

The continual degradation of communal upland grazing lands is linked to (1) extreme stocking densities; (2) limited range facilities, such as fences and stock waters; and (3) the lack of livestock management practices. These and other problems are outlined below.

High Livestock Density. The livestock population for Mizque-Campero surveyed by the 1985 Cochabamba Agricultural Census,[29] combined with the land use data (Table 5), provides an estimate of the number of animals per hectare on non-crop land (Table 11).

TABLE 11

LIVESTOCK NUMBERS AND ESTIMATED DENSITY

Province	Cattle	Goats	Sheep	Ha/AUY*
Campero	28,062	40,954	31,371	12.0
Mizque	9,781	23,957	47,108	9.9
Total	37,843	64,911	78,479	11.2

*AUY = one animal unit year = one cow for one year or four goats or four sheep for one year.

Actual animal densities are undoubtedly higher in the areas with high densities of human population. For example, livestock densities range from 1.6 to 3.5 Ha/AUY in villages intensively sampled by the Advisory Team.

Livestock ownership has been corroborated by field surveys conducted by PDAR and AHV advisors revealing a range of 6-8 cattle, 7-17 sheep, and 7-18 goats per rural family in Campero Province 3,67 (Table 12).[3, 6]

TABLE 12

MEAN HOUSEHOLD LIVESTOCK OWNERSHIP

Province	No. of Households	Cattle	Goats	Sheep
Campero	4,816	6	11	9
Mizque	3,854	3	10	15

Severe Health Problems. Campesino-owned livestock have severe health problems, such as rabies, hoof-and-mouth disease, swine cholera, nutritionally induced diseases, and several skin infections.[7] Improving animal health is critical to increasing animal productivity and should help convince livestock owners to adopt innovative methods of livestock management.

Forage Shortage in the Dry Season. The semiarid project area produces insufficient native forage in the wet season to feed the existing livestock under free-ranging conditions. The potential for improving this situation lies in such practices as growing forage species within the same area as cultivated species; storing native hay; and storing ensilage in trench silos using native forage, crop residues, by-products, and mixing highly desirable but unused native species. The potential for use of native forages in interseeding of communal grazing areas is very high and seeds are being collected from numerous species for reproduction plots.

Animal Product Marketing Studies. Animal-product marketing studies are nonexistent. The market potential for products from the project area associated with cattle, goats, sheep, and chickens — such as hides, broiler chickens, cheese, dairy, beef, wool and mutton — will become a project priority.

Lack of Credit. Credit and loans for animal management and animal feed production are needed to support small-scale industries and entrepreneurs in the project area.

Short-Term, High Impact Projects

By November 1989, two studies were initiated to remedy the total absence of information on livestock diseases and forage and pasture in the project area. Although studies are not generally considered high impact projects, both of these studies were received with enthusiastic approval of local campesinos, who participated with complete cooperation in data gathering.

ASAR and Servicio Nacional contra Aftosa, Rabia y Brucelosis (SENARB) were contracted to provide training classes and demonstrations in villages, including the distribution of training material and the collection of baseline information about village livestock. The sessions provide farmers with information on animal disease control, livestock management, and forage production, as well as an introduction to soil conservation and crop management. In 1989, 89 demonstrations and trainings were conducted. In May 1990, a total of 171 sessions were conducted.

ASAR is also selecting farmers who are progressive, industrious, and strategically located to establish demonstration farms. These farmers own sufficient hectares to demonstrate the integrated aspects of the AHV project (in other words, soil and water conservation and irrigation management). The Advisory Team is collaborating with ASAR in designing the program.

A live fencing program was started through the collaboration of the Animal Husbandry and Forestry Advisors. They are guiding the work of a PDAR technician who has planted live fences on 32 farms.

PL-480 Projects in 1989

Livestock Improvement (1121)

Three approaches are being used to disseminate information: training sessions and training material, farm demonstrations, and field day tours at demonstration farms once they are operational. Dr. Alfonso Villagomes is directing the activities and working through SENARB, ASAR, and PDAR. The project objectives are listed below:

- Animal health will be improved by training farmers in the identification of diseases and parasites, providing syringes and vaccines at affordable rates through SENARB, and training livestock owners in maintaining sanitary conditions;

- Livestock nutrition will be improved by introducing grazing and feeding systems that demonstrate methods of alimentation through the use of composts, methods of interseeding, and methods of ensilage production;

- General improvement of livestock size and quality will be accomplished through training in castration, selective breeding, and selection of the poorest animals for sale; and

- Establishment of a live fence program will reduce erosion, assist in pasture restoration, and promote lower stocking rates which reflect the carrying capacity of the marginal lands.

Long-Term Subprojects Designed for 1990/1991

Disease Survey and Control (1122)

PDAR counterpart, Dr. Alfonso Villagomes, will coordinate livestock improvement activities with SENARB. The survey activities are being implemented through questionnaires, necropsies, and inspection and analyses of sick animals. The disease control activities are being implemented in collaboration with ASAR and SENARB through training sessions, training material, and demonstration farms. Projects include:

- Livestock Disease and Parasite Study - This study should be finished and ready to print in illustrated form by the end of 1990;

- Disease Control - This is being accomplished through an active and intensive training program in which individual families bring their animals to central locations. An indoor training session is conducted on all aspects of disease control, types and names of diseases, symptoms, and treatment of sick animals. Then, each individual animal is either vaccinated, treated for parasites, or both, at the cost of only the medication and vaccine. The treatment is done by Dr. Villagomes and the veterinarians of ASAR and SENARB; and

- The AHV project is supporting SENARB in its program to control rabies and brucellosis (contagious abortion). SENARB is able to purchase veterinary supplies and medications cheaper than many organizations. Through a contract with PDAR, SENARB is providing supplies and medications at cost to people who participate in training.

Forage Improvement (132)

The livestock and forage activities are directed by two counterparts who are working with UMSS, SEFO, ASAR and others. The veterinarian described above and Ing. Rene Caballero are supervising forage improvement by undertaking the activities described below:

- Native Vegetation Study: The study involves an inventory and taxonomic identification of native vegetation, including the scientific names and common names (Spanish and Qechua), and phenological development. The palatability and protein content are analyzed during growing and dormant seasons. An illustrated report should be ready for printing by the end of June 1991;

- Seeds: Seeds for forage and soil stabilization are being collected for use in reproduction plots. The plants will be propagated in large quantities for use in projects by SEFO;

- The Live Fencing Program: The live fencing program is integrated into livestock control, revegetation, forage production, forestry, and soil conservation. Species are being selected and seeds collected, cleaned, treated for dormancy and fungus before being disseminated through ASAR to communities and individuals. Nurseries are being used to develop stock and many kilometers of direct seed plantings are being established;

- Ensilage and Compost Production: Training sessions and demonstration projects are underway to help farmers develop compost and ensilage supplies; and

- Training and demonstrations for both interseeding sparsely vegetated areas and reseeding of denuded areas are planned.

SUBPROJECT SUMMARY:

Organization	Code	Title	$US
ASAR	1121	Livestock Improvement	89,700
SENARB	1122	Disease Survey and Control	58,200
ASAR	132	Forage Improvement	81,950
		Total	229,850

ECOLOGY

Focus

The Project Paper for the CRDP project required an initial environmental assessment of the project area which was prepared by DESFIL in June 1987 (Environmental Assessment: The Valles Altos in Bolivia). The Ecology Advisor has primary responsibility to coordinate the execution of the Environmental Assessment recommendations. The DESFIL document recommended that USAID/Bolivia through PDAR provide:

- Early collection of baseline data on hydrology, sedimentation, land use and land-capability, and identification of endemic, rare, and endangered flora and fauna and their native habitats;

- Monitoring of water, soils, and biotic elements which could be damaged by project activities;

- Environmental education of local residents;

- Support for reforestation, revegetation, and conservation;

- Support for training in sustainable resource management;

- Support and guidance in the implementation of productive infrastructure, such as roads, irrigation systems, hydroelectric power development, and riverbank protection to minimize environmental degradation; and

- Establishment of management plans for critical areas for the protection of threatened and endangered ecosystems and species in support of biological diversity preservation.

Constraints

Institutional Constraints:

- The legal status of the Environmental Assessment, and the necessity that the Ecology Advisor conduct the recommended activities in the assessment were not fully understood by USAID/Bolivia and the Bolivian government. The misunderstanding is now being resolved;

- Financial and institutional support for the Baseline Study has been impossible to secure due to political factors. The Ecology Advisor created alternative project mechanisms to meet the basic requirements of the Baseline Study in 1989, and in early 1990; and

- There are very few executing institutions in Bolivia with the requisite experience to carry out the ecology component activities.

Ecological Constraints:

- According to the key ecological cycles, analyzed through the Applied Holistic Resource Management method, the water cycle is damaged by drastic reduction of plant cover resulting in high rates of runoff and sedimentation, droughts, and floods. Water quality has declined due to high sediment loads. The mineral cycle is being negatively affected by excessive rates of grazing/browsing, by high rates of erosion, and by capped (hardened) soil surfaces. The vegetative process of succession is apparently moving backwards towards a predominance of less productive and useful plant species and reduced species diversity; and

- The process of environmental degradation is so severe that it is affecting the entire rural economy and linked to the widespread declines in productivity. Seasonal migration out of the area, to the Chapare and other destinations, is a direct response to environmental degradation and the failing economy.

The Ecology Advisor reformulated the Environmental Strategy to respond to the particular institutional and environmental problems.

The terms of reference for a major Baseline Study were formulated after the May 1989 Implementation Plan was approved and reflected revisions to the PDAR 1989 budget. CUMAT (Capacidad de Uso Mayor de la tierra) was designated as the appropriate executing agency in the

Implementation Plan but problems between CUMAT and the funding agencies delayed implementation indefinitely. As of April 1990, negotiations were still taking place to solve these institutional problems.

The Ecology Advisor arranged for baseline data collection to begin in August 1989, using satellite imagery acquired through an agreement with Stanford University and the Ecosystem Science Laboratory of NASA in the United States. Students from Stanford University and the Universidad Mayor de San Simon (UMSS) carried out the preparation, analysis and ground-truthing of the satellite information. The CUMAT study, once approved, will verify the satellite data.

Short-Term, High Impact Projects

In 1989, the Ecology Advisor supervised the implementation of three high impact projects.

The Ecology Restoration Mapping Project was conducted by a student from Stanford University to identify priority areas for restoration of degraded lands and sites for sustainable land use practices. The Advisory Team, PDAR, and UMSS students in Cochabamba helped transfer satellite imagery to a geographic information system and create maps of soil, vegetation, and socioeconomic characteristics. The map information is being validated through ground-truthing.

The project, **Training in Ecological Restoration**, is designed to improve the institutional capacity and physical infrastructure of mothers' clubs. Two projects helped local mothers' clubs in the villages of Tucma and Cercado. Construction materials were used to repair buildings and training programs were developed and conducted. Three seminars were organized to address such local issues as the role of women and children in controlling overgrazing in upper watersheds, the relation between water quality and human health, improvements in water availability through revegetation, and the importance of latrines in health and pollution control.

PL-480 Projects

Water quality monitoring was conducted in 41 sites to establish baseline data where AHV projects are constructing potable water systems and irrigation canals. Environmental assessments were also conducted for the proposed construction of *atajados* (small ponds) and for the construction of small roads: Aguirre-Tiraque (20km) and Aiquile-Pena Colorado (10km). A short environmental impact assessment was also conducted for the reintroduction of cochinilla.

Long-Term Subprojects Designed for 1990/1991

Baseline Data Generation and Confirmation Study (1331)

The main objective will be the generation and verification of baseline data for the purposes of planning. This will be conducted by CUMAT. Examples of data required are water flow rates, quality, and sediment loads for potable and irrigation water activities; land-use capability assessments for potential

agricultural and natural resources conservation activities; floristic, faunistic, and habitat distribution data for activities to protect or restore endangered or critical ecosystem components.

Evaluation and Monitoring Unit (631)

A unit will be established to monitor environmental parameters and conduct environmental assessments for those subprojects or activities not included in the 1988 Amended Environmental Assessment.[14] Monitoring activities are being conducted but this unit will be under the control of the PDAR and operate in a more systematic fashion. Some subcontracts will be made with certain agencies to conduct specific studies, such as water analysis.

Organization and Education for the Productive Management of the Environment (611)

This subproject aims to develop a human resource base for the productive management and engineering of the environment. A division (Instituto de Estudios Sociales y Economicos) of the UMSS will be the implementing agency because of its success working in rural areas[15] and its educational orientation. The UMSS personnel are being trained by the Ecology Advisor. The program will be aimed at training residents of the project area as well as other Bolivian institutions about all aspects of environmental awareness.

Institutional Support (1332)

This subproject is being designed to strengthen the ecological awareness of four Bolivian institutions: Servicio National de Desarrollo de Comunidades (SNDC), Institute of Archeology, PRODEMA, and the Liga Defensa des Medio Ambiente (LIDEMA). These institutions will incorporate ecological protocol and ecosystem management planning into their programs. SENPAS's PROBIOMA will be the implementing agency because of its 13 years of experience managing more than 60 projects.

SUBPROJECT SUMMARY:

Organization	Code	Title	US$
CUMAT	1331	Baseline Data Generation and Confirmation Study	120,000
PROBIOMA	1332	Institutional Support	55,000
IESE	611	Productive Management of the Environment	30,100
PDAR	631	Evaluation and Monitoring Unit	46,920
		Total	252,020

FARMING SYSTEMS

Focus

The farming systems program focuses on improving crop production for small- to medium-sized landholders under both rainfed and irrigated conditions. Past activities by the Instituto Boliviano de Technologia Agropecuario (IBTA), ARADO/PROCIPLA, and NGOs established the need for stronger information delivery systems for farmers covering a wide range of problems. Studies are being systematically developed to address the need for agronomic information through a cooperative program with farmers and executing agencies.

Constraints

The small- and medium-sized landholders lack information and many basic inputs to efficiently and sustainably utilize the limited resource base of the project area.

Cropping Information: There is insufficient information on basic agronomic management techniques available for farmers and extension is poorly coordinated and inconsistent. The existing information is often generated outside the project area, indeed outside of Bolivia, and is not adequately tested at the farm level.

Seed Supplies: Farmers lack enough high quality seed for almost every crop. Programs by SEFO, SEPA, and ARADO are very successful in developing high quality seed, but are unable to meet farmers' demand. Programs to produce larger quantities of quality seed within the project area do not exist.

Soil Conditions: There are no detailed soils studies of the project area and the small amount of existing information is based on broad management classes following USDA's classification system or Holdridge's vegetative classes. When the advisor arrived, there was no way to develop soil fertility management regimes for any crop. Data on soil fertility and physical characteristics are often unavailable and there is little information concerning quality and quantity of water.

Alternative Crops: Visits to various sites in the project area reveal an agricultural base of mostly traditional crops. Most production is for on-farm consumption. Only a small amount is sold commercially in district markets. Some horticultural crops are produced under irrigated conditions and sold to regional markets. No systematic research is being conducted, either at research stations or on demonstration farms, to test or introduce alternative, marketable crops.

Pesticide Use: Pesticides are widely used in the project area but often used incorrectly. Farmers continue to apply agrochemicals at the wrong time, at the wrong rates, and often for the wrong purposes. The ARADO/PROCIPLA program developed a good set of research/demonstration plots in the region but lack funds to continue the program.

Extension Efforts: The need for good information and qualified personnel to deliver information far exceeds existing capacity. For years, several development agencies and national programs worked in the project area but did not coordinate efforts and the programs had little lasting impact.

Short-Term, High Impact Projects

In late 1989, two high impact projects in farming systems were approved: School Demonstration Plots ($US 400) and Experimental Plots ($US 4,549). These projects were implemented by PDAC technicians with assistance from short-term ASAR technicians and a thesis student.

Planting was done in November and December 1989. In December 1989, the PDAR Crops Advisor was fired and the Farming Systems Advisor left the project. The Advisory Team decided to hire the thesis student, Mauricio Rojas, as a field promoter to provide continuity to the crop trials. Sr. Rojas has monitored the crop trials, coordinated the harvesting and data compilation, and is writing reports based on the data. Sr. Rojas coordinated four training courses with the institutions PROCIPLA and IBTA in the communities of Tipa Tipa and Puca Pila, and provided crop management consulting services to over 20 farmers.

School and community gardens were established in two communities that have irrigation water, Puete Pampa and Puca Puca. The gardens were established, in part, to test new vegetable crops with teachers, students, and community members.

Thirteen crop variety trials were established with farmers in the communities of Loro Mayu, Tipa Tipa, Puca Pila, and Rumi Cancha. These trials were maintained as demonstration plots and included local and improved varieties of maize, beans, peanuts, potatoes, tomatoes, and onions. Various crop management techniques (mulching, and pesticide treatments) were presented to groups of local farmers. In some cases, especially with the *Puca toralapa* variety of potatoes that are resistant to *Phytophtora* and with local varieties of beans, the demonstrations were successful in encouraging local farmer interest.

Long-Term Subprojects Designed for 1990/1991

In order to address the constraints noted through systematic surveys of the project area, several integrated subprojects were designed for 1990/1991.

Cropping Systems and Transfer of Technology (1167)

Four subproject activities address aspects of crop management technology transfer: crop management on demonstration plots, development of an improved seed program, development of soil fertility data, and information on nutritional aspects of crops (in coordination with the social science subprojects). These activities are to be developed and executed in cooperation with ASAR.

Fruit Production (1165, 1166, 1168)
Grape Production (1163)

A series of subprojects were developed to introduce alternative cropping opportunities and technologies in the project area. Three are devoted to the introduction of peaches, chirimoya, and other various temperate and subtropical fruits in Tarata, Mizque, and Aiquile. In addition, seminars and technical bulletins will be developed to ensure that farmers are aware of how to manage the trees.

The fourth subproject (1163) will introduce improved varieties of table grapes in the Mizque area. All of these subprojects will be coordinated under the IBTA programs through the San Benito and Mayra research stations.

Integrated Pest Control, Environmental Contamination, and Ecologic Degradation (1162)

This subproject will generate information to reduce the types and amounts of pesticides to safe but effective and economical rates. The project will also develop information for farmers on how to reduce the risks of human and environmental contamination. Lastly, the program will present programs to farmers on alternative pest management systems. This subproject will be conducted by ARADO and is a continuation of their PROCIPLA activities in the project area. Training, extension, and management bulletins are all part of the above mentioned projects.

Agricultural Technology Transfer (1161)

Extension needs in the Estaben Acre area will be dealt with through a special subproject utilizing final-semester students from ETSA. Several demonstration orchards will be established in the Tarata area. Farming families will be given instruction in crop management and farm accounting. Methodologies developed by the subproject will be used to structure other programs in the project area.

Marketing studies and farm credit programs are needed in the project area. Although these programs directly influence the nature of cropping activities in the project area, they will be developed by other PDAR departments.

SUBPROJECT SUMMARY:

Organization	Code	Title	US$
ETSA	1161	Agricultural Tech, Transfer	36,900
ARADO	1162	IPM, Environmental Contamination and Ecologic Degradation	160,280
IBTA	1163	Grape Production	98,950
IBTA	1165	Fruit Production (Tarata)	65,550
IBTA	1166	Fruit Production (Mizque)	33,250
IBTA	1168	Fruit Production (Aiquile)	27,250
ASAR	1167	Crop Technology Transfer	55,960
		Total	478,140

FORESTRY

Focus

The project area is almost devoid of forests of commercial value, although the predominant native vegetation is often trees. The Forestry Advisor has analyzed the forestry resources and designed projects from a multiple-use perspective, based on rapid appraisal of the traditional uses of trees and other native woody vegetation in the project area.

The overall strategy is to develop a community forestry program that addresses major problems, insofar as possible, with an emphasis on increased production and improved management of trees and perennial crops.

Constraints

The Forestry Advisor began investigating problems in the project area in June 1989 using a farmer survey (*Practicas de Uso de Recursos Naturales en los Valles Altos de Aiquile, 1989*) and UMSS thesis students as enumerators. The survey revealed:

- There is a critical shortage of firewood for domestic and commercial production. Dry forest and woodland areas near densely populated valleys and uplands are severely deforested for firewood and building materials. Overexploitation of wood supplies is particularly severe near Aiquile and other urban centers, because of the great demand for firewood in urban restaurants and chicha factories. Many campesino families depend on the cutting of commercial firewood for their income in the dry season;

- Forage shortages for livestock are severe in the dry season. Native vegetation is predominantly woody in the dry forest and thorn steppe ecological zones. Cattle, goats, and even sheep depend on woody species for much of their dry season forage. Native trees and shrubs known for quality forage production need to be identified, studied, and propagated;

- Chronically low agricultural production forces farmers to over-exploit firewood and grazing resources to supplement low incomes from annual crops. Increased tree production in association with crops through various agroforestry schemes could have beneficial effects on soil organic matter, soil structure, and soil fertility;

- Dense populations of large and small livestock cause damage to rangelands because of the lack of grazing management. Due to lack of appropriate fencing materials, unsupervised livestock often damage crops. These problems can be partly addressed by using native thorny trees such as algarrobo (*Prosopis juliflora*) for fencing, but current practices require repeated mutilation to provide the dead branches. Instead, live fences could be developed from several multiple-use tree species; and

- The lack of tree cover in the project area has negative effects on soil and water resources. Erosion of bare rangeland soils is severe and erosional runoff from denuded slopes with compacted bare soils is very high. The lack of tree cover also tends to increase evaporation from soil surfaces and causes local aridity. Livestock suffer directly from a lack of shade during the heat of the late dry season. Increased tree planting will have a beneficial effect in all these areas.

Short-term, High Impact Projects

Four short-term, high impact projects were implemented in 1989 or initiated in 1990.

A project was designed to propagate genetically useful species of trees. Two nurseries were established in different communities, with the capacity to produce over 300,000 seedlings each year. Over 100,000 seedings were produced in the last three months of 1989 (Table 13).

TABLE 13

NURSERY PLANTINGS OCTOBER-DECEMBER 1989

Location	Species	Number of Seedlings
1) MESA RANCHO (CERCADO)	Spartium junceum	25.860
	Leucanea leucocophala	11.620
	Tipuana tipu	4.800
	Acacia visco	4.860
	Prosopis juliflora	11.500
		58.640
2. RUMI CANCHA (MIZQUE)	Acacia visco	15.000
	Tipuana tipu	15.000
	Prosopis juliflora	7.700
	Acacia Cavens	7.700
		45.400
Total Seedling Production in 1989		104.040

Demonstration plots were established to test silviculture treatments of a favorite native tree, *Dodonea viscosa*, used by campesinos for construction and firewood. Other demonstration plots were established with live fencing on 32 farms in eight communities. Silvo-pasture systems were also established for grass-legume and native tree combinations on demonstration plots of two hectares.

Short-term, high impact funds supported university students in conducting the following studies:

- the design of silvo-pasture systems,
- an economic evaluation of several site preparations methods,
- a study of *Opuntia* in relation to cochinilla production,
- caloric values of tree species used for firewood,
- nutritional quality and digestibility of native tree forage,
- phynotipic characterization of *Prosopis*, and
- the design of live fencing systems.

Forestry training publications were funded with short-term funds including seven educational booklets and five large posters for presentations and training.

Long-Term Subprojects Designed for 1990/1991

Plantations and Silviculture (1311)

This project has three objectives: (1) to establish community forest plantations in suitable locations using pine and native species, (2) to inventory remaining native forest areas, and (3) to conduct socioeconomic studies of local demand for forest products. The executing agency for this project will be CORDECO, with its excellent experience establishing plantations and silviculture research in Cochabamba.

The implementation of this project will continue activities started in 1989 as high impact projects and expand to more locations. The high impact project money was used to establish silviculture management plots with *Dodonea viscosa* on four private farms located in Rumi-Cancha.

Forest Nurseries (Production of Plant Material) (1411)

The forestry nurseries project is intended to establish four community nurseries capable of producing a total of 300,000 plants annually. This is an expansion of the nursery project initiated in 1989 with high impact project funds. The nurseries will be administered by CORDECO, and produce multiple-use native species selected by the forestry research program.

Community Forestry Programs (613)

The community forestry program is a training program aimed at preparing extension agents, promoters, and nursery attendants in the basics of nursery management, forestry plantations, and agroforestry. This program will be executed by the PDAR in cooperation with Radio Esperanza.

SUBPROJECT SUMMARY:

Organization	Code	Title	US$
CORDECO	1311	Plantations & Silviculture	99,400
CORDECO	1411	Forestry Nurseries	71,700
PDAR	613	Community Forest Programs	28,200
		Total	199,300

IRRIGATION

Focus

The Advisory Team reviewed numerous studies from the project area, and all studies reached the same conclusion: the scarcity of water is the largest constraint in improving agricultural productivity in the Associated High Valleys. Therefore, irrigation activities will focus on capturing as much water as possible, from all sources, and improve efficiency of on-farm water use. Greatest use of available water will entail construction of many types of hydraulic structures to exploit both surface and ground water. Complimentary delivery systems and training programs will be needed to ensure proper on-farm water management.

Constraints

The Irrigation Advisor reviewed existing data and conducted trips to the project area to identify problems and potential opportunities for projects.

Climate: Detailed analysis of precipitation and available moisture on a monthly basis in the Mizque and Aiquile valleys reveals severe moisture deficits from April to November. The wet months, December to March, receive enough precipitation for short-cycle dryland crops only in "good" years.[18]

Supplementary irrigation is necessary in many areas during the wet months in order to protect crops from stresses due to dry periods. This requirement for supplementary irrigation is above and beyond the need for irrigation between April and November.

Access to Irrigation: CORDECO's 1988 survey revealed that improved access to irrigation water was the number one priority for farmers of Campero Province. Farmer interest in irrigation was borne out by subsequent field trips of the Advisory Team.

The areas under irrigation in the Mizque-Campero project area according to Colque (June 1987) are as follows:

Dry Season	1,200 hectares
Supplementary only	2,500 hectares
TOTAL	3,700 hectares

Data indicate that less than 15 percent of the 25,000 cultivated hectares in Campero-Mizque are irrigated.

Restricted Locations of Major Irrigation Water Sources: The majority of existing irrigation water comes from surface sources, such as the major perennial rivers, the Mizque, Uyuchama, Lamparsillos, and Tucma, which empty into the Mizque Valley. These river waters supply most of the dry season irrigation in the project area.

Alluvial groundwater is tapped in the river beds through infiltration galleries and sub-surface dams in the Tipa Jara and Novillero watersheds. These technologies are rapidly spreading to other watersheds in the area.

In the Mizque-Campero area, groundwater pumping for agriculture is still relatively rare although it is increasing in importance around Tarata. The electrical infrastructure inhibits the installation of groundwater pumps. However, the hydrologic potential for groundwater pumping is significant in the Mizque Valley and in the quaternary alluvium of the Tipa Jara Valley.

In many upland areas and dry valleys, especially in Campero Province, water resources are limited in the dry season. Farmers are restricted to the use of small springs and shallow wells for domestic livestock. The area that can be irrigated from this type of source is negligible, leaving extensive upland areas with little potential for irrigation. However, on the slopes above the valley floor, communities such as Badeno make use of excess water from village domestic water systems to irrigate fruit and vegetable gardens dying in the dry season. During the wet season, earthen dams and tanks, such as those in Cercado and Oloy, provide important supplementary irrigation between rainfall events.

Other Constraints:

- Absence of hydrologic data and preinvestment studies;
- Lack of information at both the community- and farmer-level on the status of on-farm water management;
- Lack of information on the potential benefits of on-farm water management, including the costs per hectare of various systems; and
- Socioeconomic studies of farmers affected by irrigation projects.

Short-Term, High Impact Projects

During the last quarter of 1989, the PDAR irrigation unit initiated the implementation of 14 high impact irrigation projects. Through the first quarter of 1990, five multipurpose waterworks were built to provide water for domestic use, livestock, and for the irrigation of family gardens. An additional 15 such works are under construction or programmed for completion in 1990. Local farmers provided the labor and PDAR directs the construction. The participating communities are obligated to follow-up the waterworks with fencing and reforesting of the watersheds. Once these forestry activities protect watersheds from livestock and revegetate the steepest slopes, the water captured by the small filtration tanks and galleries should increase. Farmers will see the relationship between trees/vegetation and better water quality/quantity, and this should encourage them to plant trees on their own.

In 1989, PDAR was constructing or improving irrigation systems in 11 sites. A total of 33 small irrigation projects are programmed for 1990, including those started in 1989 but not finished. The cost per hectare of the irrigation projects ranges from $US 100 to $US 600 and will affect from 20 to 400 hectares each.

Farmers who might otherwise have migrated out of the area in search of employment stayed to work in the construction of water projects. As many as 75 percent of the men in some villages were accustomed to leaving the area during the dry season but remained to work in the construction of waterworks.

Long-Term Subprojects Designed for 1990/1991

The following projects have been designed to address the above mentioned constraints:

On-farm Water Management Projects (1211, 1212, 1213)

Three on-farm water management projects focus on improvement of irrigation practices. The long-term objectives are to increase productivity and farmer income as well as improve efficiency of water use. The projects will provide agronomic technical assistance through training, demonstrations, and field visits to other irrigation projects. Farmers will be organized into irrigation associations to manage water conservation activities. The on-farm water management project in Aiquile is run by ASAR, the one in Tarata by UMSS, and in Mizque the on-farm management project is directed by IBTA.

Hydrologic and Meteorological Studies (1351, 451)

These two studies are intended to provide the background for the exploitation of water resources in the region. The hydrologic study will analyze the availability of groundwater resources in the area. Preliminary studies by the Italian Cooperazione Internacionale indicate little potential for groundwater development in the Aiquile area.

The area of Mizque and perhaps the lower Tipa Jara River watershed have quaternary alluvial deposits that show more potential for groundwater development, but no studies have yet been done. This study, to be executed by the national government agency GEOBOL, will include perforation of observation wells to determine aquifer characteristics in areas with groundwater development potential. The associated agro-meteorological study is to be implemented by SENAMHI.

Small- and Medium-Scale Irrigation Works (411)

Improving existing small-scale irrigation systems can affect a total of 2,640 hectares in the project area, including 352 hectares in the Uchuchajra watershed, 835 hectares in the Tipa Jara watershed, 170 hectares in the Tucma watershed, and much of the remaining area in the Mizque Valley. The estimates of area effected are based on wet season data, when supplementary irrigation is required. The information has been collected for specific projects identified by the Irrigation Advisor; each is now the subject of a feasibility study.

The potential for building new irrigation systems (1,080 hectares) includes 280 hectares in the Uchuchajra watershed, 50 hectares in the Tipa Jara watershed, and 400 hectares in the Tarata area. Most of these are medium-scale projects (usually dams), which will require extensive study. Other watersheds

which have potential for developing new irrigation are Vichu Vichu and the Omereque-area of the Mizque River.

SUBPROJECT SUMMARY:

Organization	Code	Title	US$
ASAR	1211	On-farm Irrigation (Aiquile, Omereque)	133,570
UMSS	1212	On-farm Irrigation (Tarata)	82,500
IBTA	1213	Irrigation Management (Mizque)	125,600
GEOBOL	1351	Water Resource Studies	109,000
SENAMHI	451	Hydrometeorology Network	109,790
CORDECO, MACA, CARE, RADIO ESPERANZA	411	Small and Medium Construction	750,000
		Total	1,259,390

SOIL AND WATER CONSERVATION

Focus

The Soil and Water Conservation Program is disseminating information on improved soil and water management techniques to farmers, technicians, and local organizations. This program is designed to respond to the severe natural resource degradation problems seen in the project area. The technologies being recommended are on-farm soil conservation practices, rainfall-runoff water management, erosion control, crop rotation and soil management practices, farm planning, protection of riverine lands from flood and erosion damage, and support for pasture and woodland management.

The initial focus of the Soil and Water Conservation Program is on conservation practices in dryland cropfields where a large portion of the population produces its food.

Constraints

Institutional:

- Information on land use, land capability, and soils is needed to plan the soil and water conservation activities, but this information is difficult to find or unavailable for the project area. When the project began, plans were immediately made with the Ecology Advisor to gather information during the mapping efforts of the CUMAT Baseline Study to provide the missing data. This CUMAT study was postponed indefinitely for political reasons. Another hurdle in conducting the baseline studies is that few Bolivian institutions are capable of preparing or interpreting remote sensing imagery to provide the required information; and

- Institutions involved in agriculture and natural resource management in Bolivia are not familiar with the concept of on-farm soil and water conservation, but rather tend to associate soil conservation with tree-planting. Therefore, education and practical training of local personnel will be an emphasis of project activities.

Soil and Water Management Problems:

- Current land use practices include the heavy use of marginal land for crop production and for livestock grazing. Analysis of land capability from existing data suggests that 75 percent of the cultivated land in Mizque-Campero requires intensive conservation practices to maintain its productivity (this represents approximately 18,000 hectares of cultivated land);

- Climatic factors, including a short rainy season, erratic rainfall, and high-intensity rainfall events, cause severe soil and water management problems for dryland farmers in the project area:

  (1) Rainfall runoff from farm fields and pastures is extremely high, and soil moisture retention is low, which exacerbates the aridity problem. Runoff measured in 1989-1990 (preliminary data) was 31 percent of rainfall from hillside crop fields and 8 percent of rainfall from hillside pasture of native *Dodonea viscosa*. Farmers need to practice improved methods of rainfall infiltration in crop fields and to store excess runoff for later use.

  (2) Soil erosion is severe, even on mildly sloping farm fields during high-intensity storms. PDAR data from 1989-1990 indicate that soil losses from cultivated fields are up to five tons per hectare in a single heavy rainfall.

  (3) Soil organic matter is critically low in almost all dryland soils due to aridity, erosion, and cropping practices, while natural fertility is low to very low in most dryland soils. Crop rotation, agroforestry and other soil management options need to be developed to address these problems. Chemical fertilization regimes, by themselves, are inadequate; and

- Flash flooding from intense rainfall on denuded watersheds causes major flooding and fluvial erosion damage to riverine lands in much of the project area. Erosion control and upland watershed conservation measures to protect these lands are critical to the preservation of the small irrigated parcels which are located along river courses in the narrow valleys of the project area.

Short-Term, High Impact Projects

Four high impact projects were undertaken in the AHV by the Soil and Water Conservation program in 1989. New high impact projects for 1990, such as erosion-control structures, will not be implemented until a local executing organization is in place.

Farmer Training in Soil and Water Conservation

Under the farmer training in soil and water conservation project, the advisor and PDAR counterpart conducted six promotional meetings with slides, and 12 full-day practical courses in 1989 and early 1990. Over 300 campesinos attended the promotional meetings and over 100 persons participated in the practical courses. During, and immediately after the practical courses the farmers established 14 soil conservation demonstration plots on their fields, called comparison plots. These comparison plots are being evaluated in May 1990 to select practices for widespread promotion.

Water Supply - Rumi Cancha
Infiltration Gallery - Suero Mayu

Both projects were initiated at the request of communities in which the Advisory Team and PDAR were undertaking soil conservation activities. The water supply for Rumi Cancha was successfully completed, providing domestic water to 30 families, water for livestock, and water for a forest nursery. The Suero Mayu infiltration gallery was finished, but the canal to carry irrigation water to the fields of 22 families are still under construction.

Soil Erosion and Runoff Investigation

The soil erosion and runoff investigation involved two sets of rainfall/runoff plots with repetitions on hillside farmland. Two thesis students from the University of San Simon are managing these plots. One student is examining the effect of physical soil conservation practices on cropland runoff and erosion and the other is examining the effects of alternative crops on runoff and erosion. The field data is being collected until the end of May 1990. The plots have been very useful as a demonstration during training courses for farmers and technicians in the area.

PL-480 Subprojects

The Soil Conservation Technology Transfer Project began with ASAR in December 1989. A senior soil scientist conducted field research for two months to assess soils and traditional conservation practices, and began some preliminary soil fertility diagnosis. At the end of this project, ASAR was awarded a long-term project in Soil Conservation Technology Transfer for 1990.

Long-term Subprojects Designed for 1990/1991

Soil Conservation - Aiquile (1141)

This is a component of ASAR's integrated programs in agricultural extension and farmer training This component focuses on the dissemination of on-farm soil and water conservation practices for dryland farmers in Campero Province. Technicians and promoters are being prepared to train farmers in basic practices to conserve rainfall water, prevent erosion, and improve soil management. This component will work closely with ASAR's crops and forages programs.

Soil Conservation - Mizque (1142)

This program is similar to the ASAR program, but with a focus on vulnerable communities in the upland dryland farming areas which form the upper watersheds for Mizque. Several NGOs are being approached to implement this program.

Soils Database (1341)

The University of San Simon Agricultural Faculty has the best soils laboratory in Cochabamba, but soils data are notoriously difficult to access. This small project will help the UMSS set up a comprehensive database of soils information for Cochabamba, with early emphasis on the project area. This database will incorporate all existing data as well as design formats for all data gathered in PDAR projects.

Erosion and Flood Control (1342)

The natural resource degradation problems of the project area must be approached on a watershed basis. This project involves the study and implementation of riverbank defensive works where valuable croplands and towns are threatened. In addition, small-scale runoff will be controlled in the upper watersheds through the construction of ponds and torrent control structures.

Organization and Training (612)

The PDAR will undertake an aggressive program to train technicians in soil and water conservation. This project involves the presentation of training courses, seminars, and study tours for technicians from a variety of local institutions.

SUBPROJECT SUMMARY:

Organization	Code	Title	US$
ASAR	1141	Soil Conservation (Aiquile)	95,163
NGO	1142	Soil Conservation (Mizque)	35,360
UMSS	1341	Soils Database	14,200
CORDECO	1342	Erosion and Flood Control	50,000
PDAR	612	Organization and Training	20,000
Total for all Soil Conservation Projects			$214,723

SECTION FIVE

PROJECT RECOMMENDATIONS

The Advisory Team contributes to the success of the AHV Project beyond the specific responsibilities outlined in the USAID contract. The technical assistance provided through collaboration with Bolivian counterparts is only one way the Advisory Team helps strengthen capacity within PDAR and the project area. The Advisory Team also provides insights for improving the daily operations and coordination of activities within PDAR and provides recommendations for enhancing all project communications. By taking advantage of the team's collective experience, the advisors are able to analyze and evaluate project performance and adjust the team's operations. The following recommendations are offered to USAID, the Bolivian government, the PDAR, and the Advisory Team's employers to better meet project objectives.

INTRAORGANIZATIONAL COMMUNICATION

1. USAID should develop a clear line of command between La Paz and Cochabamba. Policy and procedures regarding the project have never been defined in written form beyond the original Project Paper (Amendment No. 7) and the USAID/DAI contract.

An area of particular concern is the selection and approval of implementing agencies presented in PDAR Operating Plan. The Advisory Team selected implementing agencies for the 1990 Operating Plan in coordination with PDAR technicians based on technical capability and each agency's implementation record. USAID expressed concerns about the capacity of several implementing agencies and investigated financial statements without seeking the Advisory Team's justifications for its selections.

Recommendation

The role of the USAID staff in Cochabamba needs to be clarified to alleviate confusion about who, in USAID, makes final decisions on the AHV Project. USAID should formalize, in writing, its technical and financial project review process and outline the criteria for selecting implementing agencies. USAID also needs to define its expectations of PDAR as a coordinating agency, as defined in Amendment No. 7.

2. The excellent communication between the Advisory Team and the USAID coordinating staff in Cochabamba is not an effective link with Project Management in USAID/La Paz. Direct communication between USAID/La Paz and the Advisory Team has not been effective. The team noted the need for improved, and possibly written, communication with USAID/La Paz in several of its quarterly reports. The quarterly reports also acknowledged hampered communication between the Advisory Team and both USAID and PDAR due to changes in the Chief of Party. Administrative communication within the Advisory Team has also been hindered by the subcontracting arrangement that divides administrative responsibilities between two teams.

Recommendation

Filling the Chief-of-Party position will establish stable and effective communication within the Advisory Team, and between the Advisory Team and USAID and PDAR.

3. PDAR has been forming an effective technical institution. A Technical Advisory Committee including USAID and consultants was established in 1990. Quarterly and annual project review meetings were instituted, and began to clear up communication problems within the now substantial technical staff of PDAR. Nonetheless, PDAR technical staff seem to operate frequently without any clear technical coordination. PDAR written communication is almost entirely devoted to administrative procedures. Policy on technical coordination is often discussed within the Technical Advisory Committee without decisions being instituted as written policy.

Recommendation

The Technical Advisory Committee meetings should be held once each month. The minutes should be promptly distributed following the meetings. Decisions made by the PDAR directorship on items discussed in the Technical Advisory meetings should be distributed in written form.

4. Implementing organizations are not always informed of PDAR activities and PDAR priorities. Local organizations are willing and interested in having PDAR as coordinator, but PDAR is letting this opportunity escape.

Recommendation

Meetings between groups of implementing organizations, Sindicato leaders, and PDAR need to occur regularly to coordinate activities.

AHV STRATEGY

The PDAR needs to develop a clear strategy statement for the Associated High Valleys project. The Project Paper (Amendment No. 7) provided basic guidelines for project work but was based on recommendations by outside advisors and USAID. The PDAR needs to prepare a more specific Strategy Statement based on criteria developed by its technical staff and based on work-to-date.

The current project can serve as a model for the expansion of rural development activities under the "alternative development" strategy adopted by the Bolivian government and USAID. The utility of this model will depend on the clarity with which PDAR defines its current goals, objectives, and operating mode, and its self-evaluation mechanisms. The use of this project in designing a model should be made explicit in the "alternative development" strategy.

Recommendation

The PDAR should prepare a specific strategy statement based on criteria developed by its technical staff and based on experience of current field activities. The PDAR needs to define its goals, objectives, operational plan and project evaluation criteria. The strategy statement should include:

- Goals and objectives for reversing migration from/to the Chapare;
- Socioeconomic indicators of project impact and detailed definitions of the target population;
- Activities to determine the human carrying capacity of the project area;
- The specific roles of high impact and long-term projects in achieving project objectives; and
- Specific PDAR mechanisms for coordinating activities of executing agencies.

ROLE OF THE PDAR

The various delays encountered early in the project and lack of qualified implementing agencies resulted in PDAR directly implementing subprojects. However, it is important that the PDAR resist this tendency and return to its role as coordinating agency.

If PDAR continues to be burdened by direct implementation, it will not have the capacity to manage effectively the wide range of activities contemplated for the future. Coordination in the field is already poor, and not likely to improve if PDAR technicians continue to direct activities.

The administrative costs of directly implementing field projects, with a large government staff based in Cochabamba, are too high. Also, administration in Cochabamba is burdened by cumbersome administrative regulations and a growing bureaucracy. PDAR needs to limit the unwieldy procurement responsibilities of the administrative branch in order to focus on project monitoring.

Recommendation

The PDAR should clearly define its role regarding "immediate impact" and "direct administration" subprojects. The specific technical assistance and support role should be amended to the Strategy Statement. However, improving the capacity of local organizations to manage projects will be the most valuable contribution to sustainable rural development.

Recommendation

The PDAR, as a coordinating institution staffed by high-level professionals, will function best when it acts in the dual role of technical assistance provider and funding agency. Direct subproject

implementation by PDAR should be limited to small demonstration activities, which can be implemented by local institutions once established. The PDAR should take a strong role in training professionals from local institutions through in-country programs, and by funding short-term overseas training.

GEOGRAPHIC AREA OF EMPHASIS

The geographic areas of emphasis for project activities must be better defined. The project area was first defined by the PDAR in 1987-1988 as the "Southern District." This included almost all the area of Mizque and Campero Provinces. Because of budget cuts, the AHV Technical Advisors defined a somewhat smaller project area in 1989, which focused on watersheds.

In 1990 and early 1991, given funding levels, the focus is on two major valleys (Tipa Jara and Uchuchajra) around Aiquile. Requests from communities have increased current project activities in Mizque, Novillero, and other areas near Aiquile. The ability of the PDAR to manage current projects and to respond effectively to new requests must be critically examined.

Recommendation

The plan for expanding project activities in 1992 needs to be developed immediately. This plan should be based on data from the Socio-Economic Study by CEFOIN-PDAR, and a critical analysis of the 1990 PDAR activities. PDAR's capacity to manage existing projects needs to be evaluated before responding to additional community requests for assistance beyond the these major watersheds selected for demonstration implementation activities.

BASELINE SURVEYS AND EVALUATIONS

Baseline surveys and mapping of the project area are a serious weaknesses in PDAR's planning and self-evaluation. Data on present and proposed land use and land capability are limited, and attempts to correct this deficiency through CUMAT have been delayed because of political difficulties. Without baseline data, an evaluation of PDAR activities is difficult. A coordinated plan for evaluating PDAR activities has not been designed, although some advisors are evaluating their own sectors.

Recommendation

PDAR needs to coordinate land use and land capability assessments in order to evaluate and plan project activities. The PDAR focus on migration and rural incomes needs to be emphasized in evaluation activities. A technical and socioeconomic project evaluation plan needs to be formulated as soon as possible.

PDAR STAFFING NEEDS

Capacity to manage the existing technical staff is now stretched to its limits with activities ongoing in both the Chapare and AHV. Most staff are very well qualified technically, although many would benefit from short courses in specific areas of need. A further increase in PDAR staff is inadvisable.

Recommendation

PDAR should concentrate on improving coordination and teamwork among existing staff. DAI advisors will work with PDAR technicians in 1990 to identify staff training needs and opportunities.

LOCAL IMPLEMENTING ORGANIZATIONS

Analysis of the project area by sector reveals that certain areas lack appropriate institutions to implement specific programs. Agricultural development in the Associated High Valleys will require institutions working in the following sectors:

- **Applied Agricultural Research**: Agricultural research is now being conducted by IBTA, but only for a few crops (potatoes, peaches, grapes). PROCIPLA is conducting trials on many other irrigated and dryland crops, and PDAR technicians are conducting crop and forage trials. Over the long term, IBTA should be reinforced financially and technically, but has little immediate capacity for expansion; it needs guidance in establishing on-farm research. The lack of improved production technologies for most crops is a bottleneck in project development throughout the project area. PDAR should assist current work, with an emphasis on production technologies for crops that IBTA is not addressing.

- **Agricultural Extension**: In the project area, agricultural extension is attempted only by NGOs, and the area covered by NGO extension programs is scattered. In most cases, NGOs are trying to adapt or improve local production technology with limited resources and without systematic planning. PDAR could play an important role in training and motivating young Bolivian agronomists to work in extension.

- **Credit Organizations**: Credit organizations are now being surveyed by the USAID credit advisor. The project area does not have visible institutions providing credit for small farmers.

- **Marketing Organizations**: A few Bolivian NGOs are experienced in developing locally based marketing organizations (producers organizations) but they have not established marketing organizations within the project area. For this reason, ASAR and ARADO are being encouraged to enter the project area. PDAR should provide technical assistance to these NGOs and to new producer organizations.

- **Infrastructure Construction**: Another important sector lacking local implementing institutions in the project areas is infrastructure construction of small-scale potable water systems and small-scale irrigation systems. Although it apparently functioned well in this

capacity in the 1960s and 1970s, the SNDC is almost defunct. The project should investigate the likelihood of reviving SNDC. In addition, the Advisory Team and PDAR should support CARE, an international NGO with abundant experience in Bolivia in small-scale construction. CORDECO is not functioning in small-scale construction outside of the immediate area of Cochabamba because of political constraints and administrative red tape. The local engineering firms that would be able to execute these projects with community labor are not being used. This is due primarily to the long delays in USAID contracting procedures for private firms, and doubts that these firms would be willing to work on schedules dictated by local volunteer manpower.

Recommendation

The option of improving existing capability or resurrecting defunct institutions needs to be investigated more vigorously by PDAR and the Advisory Team with a view to building and strengthening local capacity. The long-term viability of the activities in the AHV depends on the reinforcement of local government and nongovernment institutions. Only the local institutions will be present to carry out the long-term follow-up activities required for sustainable rural development.

INTEGRATION OF PROJECT ACTIVITIES

The integration of project activities is repeatedly criticized and needs significant improvement. Much of the existing conflict among the various project activities stems from the technical staff's interest in implementing projects on a one-by-one basis.

Recommendation

If PDAR were strictly involved in coordination functions — that is, in funding and technical assistance — this conflict could be considerably reduced.

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ANNEX 1

COORDINATING INSTITUTIONS

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Below is a description of the institutions that play important roles in AHV activities in the project area.

Government of Bolivia Agencies

CORDECO - Cochabamba Regional Development Corporation

CORDECO is a large regional planning agency responsible for implementing development activities throughout Cochabamba Department. Its work is extremely broad and includes regional planning, agricultural development and marketing, agribusiness promotion, natural resource management, irrigation, and road infrastructure planning and construction. Recognized strengths include regional planning, community forestry, and irrigation system planning. CORDECO has an overly large administrative bureaucracy and is heavily dependent on international agencies for project funding.

IBTA - Instituto Boliviano de Technologia Agropecuario

IBTA is the primary agricultural research and extension agency of the Ministry of Agriculture and Campesino Affairs. IBTA maintains two experiment stations in Cochabamba, with regional specialties. San Benito specializes in wheat, barley, peaches, and apples, and the Toralapa station works only with potatoes. There are also small IBTA facilities in Mizque (three staff working primarily on viticulture), and one staff member in Aiquile. IBTA staffing positions have been depleted because of low government salaries, and its impact in rural communities is negligible.

SENARB - Servicio Nacional contra Aftosa, Rabia y Brucelosis

SENARB, established in 1977 with a loan from the Inter-American Development Bank, was envisioned as developing a strong livestock health program beginning in Cochabamba and Santa Cruz, then expanding into other regions of the country. It lacked sufficient administrative and financial backing and never really got off the ground. Its present role is largely an inspection agency for slaughterhouses. Its role in the AHV project will be crucial in identifying the types, and severity of animal diseases in the Project area so that vaccination, dipping, and quarantine measures can be carried out.

Nongovernmental Organizations (NGOs)

ARADO - Accion Rural Agricola de Desarrollo Organizado

ARADO was formed in 1963 as an umbrella federation for a number of peasant organizations. It has two regional offices, one in La Paz and the other in Cochabamba. It has been very successful in crop improvement, livestock production, irrigation programs, road construction, reforestation, and input supply systems. It has also managed credit programs through the Inter-American Development Bank and USAID.

PROCIPLA - Programa de Control Integrado de Plagas

PROCIPLA is a project and not an organization, and as such is administered by ARADO. PROCIPLA has functioned since 1985 through USAID funding. Its specialty is in Integrated Pest Management (IPM) and has developed excellent programs to reduce the use and abuse of insecticides in the Mizque and Aiquile areas. It works primarily through on-farm experimentation and extension with individual farmers and with institutions including CEDAGRO, IBTA, and CENDA. It has a permanent staff of eight people, of whom five are agricultural professionals.

ASAR - Asociacion de Servicios Artesanales Rurales

ASAR was established in 1964 to provide technical and administrative support to peasant organizations trying to solve development problems, and to design and execute projects. ASAR technical assistance was instrumental in the early success of ARADO in Cochabamba Department. ASAR has been successful in attracting funds from several international sources. It has developed programs in agricultural support systems, organizing credit programs, potato seed production, and handicrafts. It has a good record of cooperation with other institutions, including ARADO, CEDEAGRO, COTESU, and IBTA. Since the amount of work ASAR conducts is dependent on outside funding, the number of staff varies. It has had as many as 40 people on staff at one time, which would indicate good administrative ability.

CARE - Catholic Relief Everywhere

CARE is an international NGO which has been in Bolivia for many years. It is best known for its potable water-rural sanitation projects; CARE staff have implemented more than 800 during the last 10 years in Bolivia. CARE is also working on community natural resource management projects in the southern part of Bolivia.

CEDEAGRO - Centro de Desarrollo Agropecuario

CEDEAGRO has been working in the Mizque area for eight years. It has been successful in attracting external funding for programs developed through several peasant organizations. It has eight full-time staff including agronomists, a forester, and a civil engineer. Its base of operations is in Mizque, and it has managed over 40 projects in irrigation systems, potable water, forestry, crop production, and farm credit.

CENDA - Centro de Comunicacion y Desarollo Andino

CENDA is based in Racaypampa (Mizque Province) and works exclusively in the surrounding communities. It has a small core technical staff, which includes agronomists, sociologists, nurses, and communication specialists. They are working on projects in potato production, forestry, and health care. They also publish a bilingual (Quechua and Spanish) newspaper called CONOSUR and make radio broadcasts to local communities.

CUMAT - Capacidad de Uso Mayor de la Tierra

CUMAT, established in 1983-1984 primarily through PL-480 funds and other donor financing, has developed a reputation as a center of excellence in environmental and land use capability studies. CUMAT has conducted studies with funding from the World Bank, Inter-American Development Bank, COTESU, and the Government of the Netherlands, among others.

ETSA - Escuela Tecnica Superior de Agronomia

ETSA is a technical school associated with the University of San Simon Agronomy Faculty. They train agronomy technicians in a two-year program. ETSA began working with the PDAR in 1988, executing a vegetable crops/fruit tree/beekeeping extension program in the Tarata area, with one of the main components being training of technicians.

RADIO ESPERANZA

Radio Esperanza was established in 1978 as a project of the Archbishop of Aiquile and since then has been funded primarily by the Franciscan Catholic Order. The radio station has its main broadcast facility in Aiquile. Almost all programming is locally produced, and the majority of programs are in Quechua. They also have a team of promoters and technicians that compliments and reinforces the radio broadcasts with follow-up visits to the communities. The technical staff work in small-scale irrigation, forestation, potable water, health education, and rural organization. Radio Esperanza will be used in the Project Area to disseminate technical information, alert farmers about field days and technical seminars, and eventually to inform farmers about marketing opportunities and conditions.

UMSS - Universidad Mayor de San Simon

The University of San Simon in Cochabamba includes faculties that perform research-related activities in agriculture and rural development. The Faculty of Agronomy includes the best regional Soil and Water Laboratory and a Bureau of Investigations, which coordinates field investigations being carried out by faculty in livestock, crops and pest control, irrigation, soils, forestry, and other areas. Projects associated with the university include CIFEMA, which specializes in small-scale agricultural implements, and AGRUCO, which specializes in sustainable agriculture.

Sindicatos

Sindicatos, or campesino unions, are the strongest local political entity in many parts of the project area. New activities undertaken in a rural community must be cleared through the sindicato leadership, and usually through meetings involving the entire membership. Campesino organization has a hierarchical element, with Sub-Central Committees responsible for 2-10 adjacent sindicatos, and Provincial Central Committees responsible for all the Sub-Central Committees in a Province. The authority of higher-level committees over the local sindicatos is not always clear.

Additional Government and NGO Agencies

The PDAR and Advisory Team have plans that will require groups not working in the project area to extend their activities into the Mizque-Campero Provinces. PDAR is concerned that these groups be self-financing once the AHV Project ends.

Bilateral and International Organizations

In late 1989, at the request of the Italian Cooperazione Internacionale, a meeting of representatives from over 40 assistance programs was held in Cochabamba. The intent was to coordinate, or at least avoid duplication, in implementing programs in the project area. Several other international development donor agencies have indicated interest in increasing their involvement in the project area.

Ongoing programs - Italian Cooperazione Internacionale
German irrigation efforts in Punata Swiss (COTESU)

Other organizations - Japanese, JICA
World Bank
Inter-American Development Bank
EEC