

Report to

**Agency for International Development
Honduras**

Office of Rural Development

**ASSESSMENT OF DEVELOPMENT
STRATEGY AND PROGRAMS
FOR THE COMAYAGUA VALLEY**

July 1987



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FOR THE COMAYAGUA VALLEY**

Report of
Winrock International Institute for Agricultural Development
Study Team
to
OFFICE OF RURAL DEVELOPMENT USAID/Honduras

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The members of study team were James Fitch (team leader and agricultural economist) and Kerry J. Byrnes (rural sociologist).

ABBREVIATIONS

ACDI	Agricultural Cooperative Development International
ADAI	Ateneo de la Agroindustria
ALCONH	Alianza Campesina de Organizaciones Nacionales de Honduras
ANACH	Asociación Nacional de Campesinos de Honduras
ARG	Agrarian Reform Group
BANADESA	Banco de Desarrollo Agrícola
BCIE	Banco Centroamericano de Integración Económica
BID	Inter-American Development Bank
CARCOMAL	Cooperativa Agropecuaria Regional Comayagua
CALs	Comités Agrícolas Locales
CAR	Comité Agrícola Regional
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CBI	Caribbean Basin Initiative
CEDA	Centro de Entrenamiento de Desarrollo Agrícola
CEFIHA	Centro de Fabricación de Implementos y Herramientos Agrícolas
COHDEFOR	Corperación Hondureña de Desarrollo Forestal
CONADI	Corporación Nacional de Inversiones
CONSUPLANE	Consejo Superior de Planificación Económica (now SECPLAN)
COPRHOE	Proyecto Cooperativas de Productos Hortícolas Empresariales
CORFINO	Corporación Forestal Industrial de Olancho
COSUDE	Cooperación Suiza para el Desarrollo
CTTA	Communication for Technology Transfer in Agriculture Project
DARCO	Dirección Agrícola Regional Centro Occidente
DIFOCOOP	Dirección de Fomento Cooperativo
DPS	Departamento de Planificación Sectoral
DRH	Departamento de Recursos Hídricos
DRI	Integrated Rural Development
EEC	European Economic Community
ET	Enlace Tecnológico
ETOC	Equipo Técnico Operativo de Campo
FACACH	Federación de Cooperativas de Ahorro y Crédito de Honduras
FAO	Food and Agriculture Organization of the United Nations
FECORAH	Federación Hondureña de Cooperativas de Reforma Agraria
FEPROEXAAH	Federación de Asociaciones de Productos y Exportadores Agropecuarios y Agroindustriales de Honduras
FHIA	Fundación Hondureña de Investigación Agrícola
FOHPRI	Honduran Foundation on Pre-investments
FOMLECH	Proyecto Fomento Lechero
FONEDI	Industrial Development Fund
Fruta del Sol	Cooperativa Regional Servicios Agropecuarios "Fruta del Sol" Ltda.
GDP	Gross Domestic Product
GOH	Government of Honduras
IADSL	Instituto Americano para el Sindicalismo Libre
IDRC	International Development Research Center

IESS	International Executive Secretarial Services
IHCAFE	Instituto Hondureño del Café
IHMA	Instituto Hondureño de Mercadeo Agrícola
INA	Instituto Nacional Agrario
INFOP	Instituto de Formación Profesional
JICA	Japanese International Cooperation Agency
Lps	Lempiras (2 Lps = \$S1.00)
MRN	Ministerio de Recursos Naturales
mz	manzana
OAS	Organization of American States
OPG	Operational Program Grant
PL-480	Public Law 480
PRODIVERSA	Proyecto de Diversificación Agrícola
PROMECA	Programa de Mecanización Agropecuaria
PTR	Proyecto de Tecnologías Rurales Rural Technologies Project
PVOs	Private Voluntary Organizations
RC	Regional Center (Centro Regional del INA)
SECOPT	Secretaria de Comunicaciones, Obras Públicas y Transporte
SECPLAN	Secretaria de Planificación (before CONSUPLANE)
SPATS	Strategic Planning and Technical Support Project
SRN	Secretaria de Recursos Naturales
UDA	Unidad de Desarrollo y Adaptación
UNC	Unión Nacional de Campesinos
UNDP	United Nations Development Programme

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EXECUTIVE SUMMARY

The Comayagua Valley lies in a pivotal position in westcentral Honduras. The valley's location is strategic because it is on the main highway between Tegucigalpa and San Pedro Sula. It lies in the middle of Honduras's main north-south growth corridor. The valley has recently been a center of developments in irrigation farming, vegetable production, and nontraditional exports. It has also become a center for food processing and related agribusiness.

As a result of an expanding agricultural economy, the valley has attracted migrants from other areas of Honduras. As a rural or secondary growth center, the area offers an alternative to the explosive growth that is occurring in the country's major urban centers. The Government of Honduras (GOH) has promoted the development of the valley in various ways, especially through investments in irrigation, research and extension, and food processing facilities.

While a number of USAID projects and programs have been active in the valley, USAID has never stopped to consider whether these activities are well balanced or focused to meet the area's development needs. Recognizing the potential that the valley has for contributing to the attainment of several of Honduras's development objectives -- i.e., to increase agricultural production, exports, and employment opportunities -- USAID/Honduras asked Winrock International to assess what could be done to accelerate the valley's development.

The specific objectives of the study were

- to review the resource endowment of the valley
- to compile a profile of the development activities currently planned and under way
- to propose a strategy for coordinating and integrating these activities

RESOURCE ENDOWMENT

The Comayagua Valley is 40,000 ha to 50,000 ha in area, depending on how its boundaries are defined. The topography is a mixture of plains, rolling hills, and gullies. Soils are varied in color, texture, depth and agricultural capabilities. Some 15,000 ha to 20,000 ha are cultivable, with the remainder being suited for pasture and woodlands.

Rainfall is highly variable within the year and from one year to the next. Mean annual rainfall is about 1,000 mm concentrated in the months from May through September. Moisture deficiency for support of year-round cultivation is normally about 559 mm, and most of this is needed from October to April.

Some 10,000 ha to 12,000 ha of land in the valley have soils and terrain suitable for irrigation. There are numerous rivers, and streamflow is normally more than adequate to provide the required supplemental

irrigation. However, the monthly and yearly patterns of flow fluctuate with the rainfall, and storage facilities are required if there is to be extensive irrigation in the drier months.

In the late 1950s, the GOH constructed El Coyolar Dam and two irrigation-canal systems in the valley. These were the first irrigation facilities to be established and managed by the Honduran government. There were some faults in design and construction, and several studies have concluded that the El Coyolar Dam is currently in need of major repairs.

Public and private irrigation facilities have been established, although these are not capable of serving all of the irrigable lands, particularly not in the drier months. In 1985, the valley had more than 10,000 ha under irrigation, some 2,000 of which were within the GOH irrigation districts. However, not all of this area is irrigated year-round since not enough water is available to do so during the drier months. Management and maintenance of the canal systems has continued to demonstrate weaknesses. Under improved management, more area could be irrigated with the existing system and available water.

The Comayagua Valley has a system of roads, communications, public health, and educational facilities that is better than average for Honduras. However, a problem exists in the maintenance of infrastructure. Municipal governments have limited financial capabilities and do not participate in the construction or maintenance of rural roads.

RECENT DEVELOPMENT HISTORY

Historically, the Comayagua Valley specialized in livestock and producing basic grains for subsistence. With cultivation based only on rainfall, cropping could be carried out only in the rainy months: May to October. Even in early times, however, private farmers and some municipalities developed small irrigation systems that were used to produce vegetables and to provide green forage during the dry period.

When the national highway system was improved, starting in about 1950, the valley was opened to a broader national market. This has placed the area in an excellent position for the domestic sale of vegetables and fruits.

The expansion of irrigation facilities after 1950 provided further impetus for agricultural growth, particularly in horticultural crops. In 1974 a major food processing plant, Mejores Alimentos, was established at Comayagua. Currently, this plant processes a large proportion of the valley's most valuable crop, tomatoes.

In recent years other processing facilities and agribusinesses have located in the area, thus expanding the local employment opportunities. In 1978, an effort was mounted to promote the exportation of cucumbers and other products to the U.S. winter market. Progressively, the area

has become a focal point in Honduras's drive to promote nontraditional exports.

ACTIVITIES THAT PROMOTE DEVELOPMENT

The valley is the site of a variety of government and foreign-donor activities that promote its development. Comayagua is the regional headquarters of the Ministry of Natural Resources (SRN), which has programs for research, extension, and water resources. The SRN has two small regional stations in the valley, one for basic grains research and the other for research on horticultural crops. The staffing of the SRN regional office has expanded significantly in the past 10 years.

Comayagua is also the site of the National Livestock Center. Recently, the Agricultural Training and Development Center (CEDA) was established in the valley, with Japanese funding, to engage in research and training related to irrigation. The International Development Research Center (IDRC), working with the Tropical Agriculture Research and Training Center (CATIE), has sponsored a program of cropping systems research within the SRN regional office. This effort has concentrated mainly on corn, rice, and soybeans rather than on horticultural crops.

With USAID sponsorship, Standard Fruit began work in 1978 to develop cucumber production for export. This evolved into the establishment of the Fruta del Sol growers' cooperative in 1983, with support from the Agricultural Sector II Project. Recently, Fruta has diversified its activities to include producing rice and processing tomatoes as well as export vegetables such as snow peas and winter squash.

FHIA and FEPROEXAAH, two private organizations that benefit from USAID support, have recently joined forces to establish a special farm in the valley for their horticultural demonstration project. The purpose of this farm is to field-test improved technologies for the production of export crops and to demonstrate the commercial feasibility of exporting them.

Other donors continue to be active in the valley. Efforts of Canada and Japan have been noted. Road projects funded by the Interamerican Development Bank have improved local infrastructure, and BID has expressed an interest in funding small-scale irrigation projects.

CURRENT OBSTACLES TO DEVELOPMENT

The total value of agricultural output of the valley has expanded substantially during the past 15 years, due mainly to increased production of vegetables and to more emphasis on fruit and coffee production. Nevertheless, local food-processing plants are still operating at less than 30% of capacity, and they have to pay relatively high prices for the products (mainly tomatoes) that they procure in the valley. Clearly, there is still widespread need for technical improvement to increase output and lower production costs.

While rice yields have improved dramatically, those for maize, sorghum, and beans have either stagnated or declined. Although yields of key vegetable crops such as tomatoes and onions have increased, average yields for these crops are still only about half of what farmers can produce with technical supervision, and they are less than 25% of the yields normally attained in irrigated areas of the United States.

One explanation for low yields is the limited use of modern inputs, which is at least partly attributable to limited availability of credit. Although more small farmers are now using credit than 15 years ago, only about 13% of valley farmers contacted in a 1985 survey reported using any type of credit.

The effective dissemination of available technical knowledge within the valley is still limited. This can be explained by the fact that some of the key research and extension entities are relatively new and that linkages between the various agricultural agencies and organizations are still weak.

The FHIA/FEPROEXAAH farm was not established until August 1986. Many of its research findings are still only preliminary. The farm has yet to devise a plan for disseminating its findings. The relationship between the farm, Fruta del Sol, and the SRN regional agencies is still only vaguely defined.

Similarly, CEDA, the new irrigation center, has not established an outreach program or a working relationship with the SRN Department of Irrigation. To date, CEDA has had little if any influence on improving the management of the existing irrigation systems.

RECOMMENDED USAID STRATEGY

The Comayagua Valley is already contributing to several of the common objectives of USAID and the Honduran government. Through the expansion of labor-intensive horticultural crops and related processing industries, badly needed new employment is being created. The area has also become a leading area in nontraditional exports.

While further development is hampered by problems with the irrigation system and by limited use of improved technologies, most of the resources needed to address these problems are already in place. However, they must be properly organized and focused if they are to have the needed effect.

Several USAID/Honduras projects are currently active in the valley, and two new projects -- the Irrigation Improvement Project and the Small Farmer Organization Strengthening Project -- are scheduled to start there soon. These projects are national in scope and have not been designed to meet the valley's needs per se. However, by coordinating these efforts within USAID/Honduras itself, with GOH, and with other foreign donors, the mission can play an important role in promoting the further development of the valley.

It is thus recommended that the USAID/Honduras Office of Rural Development establish a working group that includes the project officers for the projects with significant activities in the valley. This group would establish a plan of action and meet at least quarterly to see that it is being carried out. Contact would be maintained with SRN and its regional agencies active in the valley, and liaison would also be established with interested foreign donors such as IDRC and BID.

First priority should be given to supporting the continued development of the FHIA/FEPROEXAAH Demonstration Project. An effective mechanism must be developed for disseminating what is being learned on the demonstration farm, and this should be done immediately. Stronger ties must be developed between the project, SRN research and extension personnel, and farmer cooperatives capable of providing technical assistance to their growers.

Priority also should be given to strengthening existing cooperative organizations in the valley. As the Small Farmer Organization Project becomes more active, precedence should be given to the Comayagua valley. Two such organizations, CARCOMAL and Fruta del Sol, have been identified in this report and have benefited from USAID in the past.

Improvement of the valley's irrigation systems should be given next priority. As the Irrigation Development Project becomes active during the next year, Comayagua should be chosen as one of the first areas of Honduras to receive attention. While the construction of additional small-scale irrigation projects will be of benefit, the support and strengthening of existing valley irrigation institutions will be of the greatest value and should be given priority. Namely, technical assistance and training should be provided to the CEDA irrigation center and to the SRN agency that operates the existing government irrigation systems in the valley.

CHAPTER 1 INTRODUCTION

The Comayagua Valley lies geographically in a pivotal position (see figure 1). It is the center of recent developments in irrigated farming, vegetable production, and nontraditional exports. The Government of Honduras (GOH) and USAID/Honduras have made a number of efforts to promote the development of the country's economy, but only now is the valley beginning to be seen as a key rural growth center.

While USAID/Honduras has a number of projects and programs that are active in the area, no attempt has ever been made to focus on the valley as a programming entity or to coordinate the mission's activities there. Until now, the mission has never asked whether it is doing too little or too much in the valley, nor has it stopped to examine the needs of the valley as a developing regional economy.

OBJECTIVES AND METHODOLOGY

This study's objective is to provide USAID/Honduras's Office of Rural Development with a descriptive and analytical study of the Comayagua Valley that will help identify the current state of agricultural and rural development. It will recommend actions that could be taken by the mission to accelerate the valley's development.

The terms of reference state that the "study will compile a profile of the development activities planned and under way in the Comayagua Valley, review the resource endowment of the valley, and propose a strategy for coordinating and/or integrating such activities so that the development objectives are obtained efficiently and in a mutually supportive manner." The "desired outputs of the study are a strategy statement that describes how the GOH should proceed toward the achievement of its development objectives in Comayagua, and a detailed proposal of the actions that should be taken to assure the success of the endeavor."

This study was conducted March 16 to April 23, 1987, by a team comprising James Fitch, agricultural economist/team leader, and Kerry J. Byrnes, rural sociologist. The team relied mostly on secondary data obtained from documentation or through contacts with agencies having such data.

Preliminary contacts were made with USAID/Honduras's Office of Rural Development, followed by a 2-day visit in the Comayagua Valley. After several additional days of making contacts in Tegucigalpa, the team returned to the valley for a 3-1/2-day visit. On returning to Tegucigalpa, the team continued making contacts and began writing this report.

While the database for exploring changes in crop and livestock production in the valley is limited, more information is available for this region than for most other rural areas of Honduras. The following sources provide valuable background information:

- The 1961 and 1974 Censuses of Agriculture.

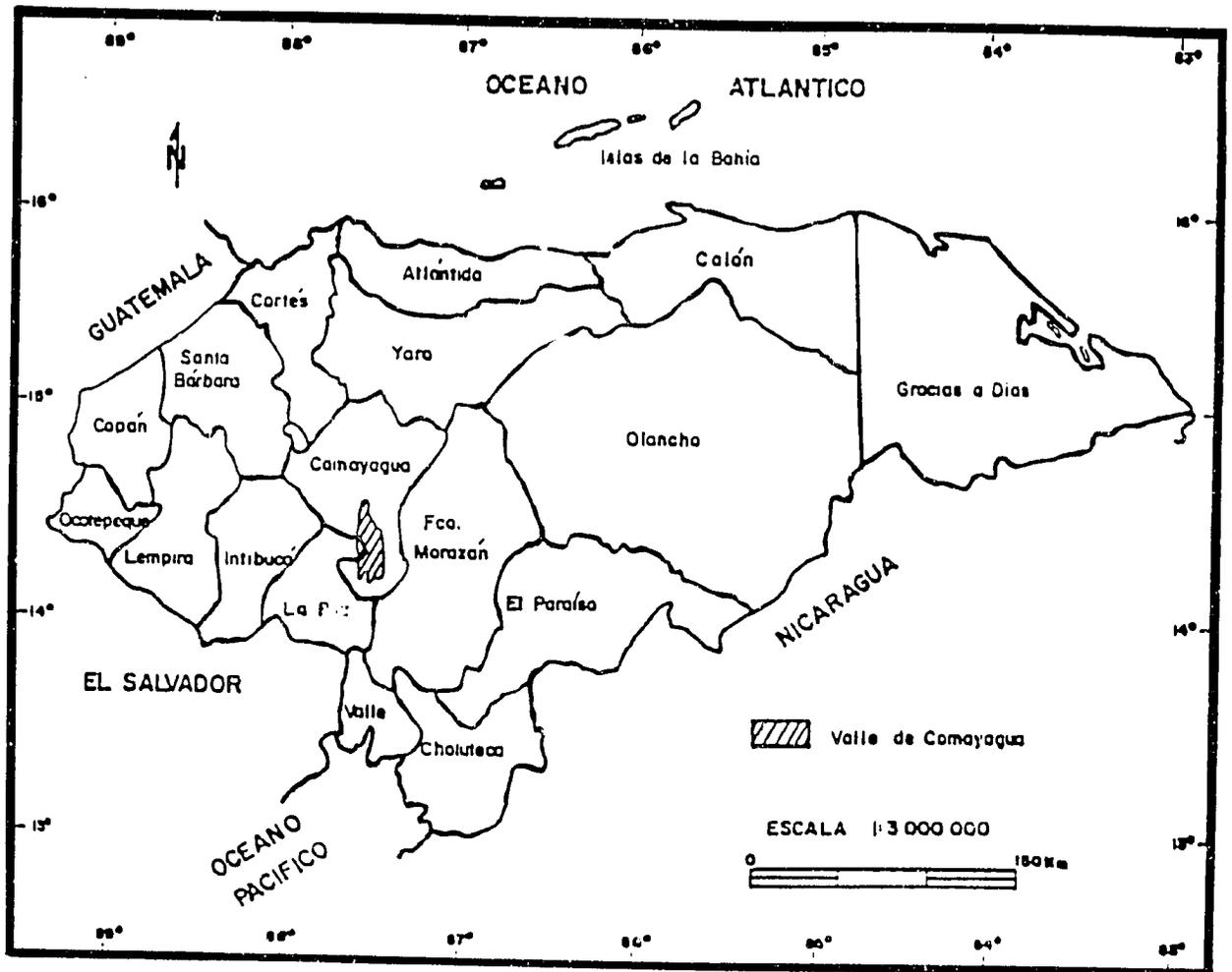


Figure 1. Location of Comayagua Valley in Honduras.

- A detailed, six-volume study of the valley and its water resources undertaken from 1969 to 1972 by the United Kingdom's Overseas Development Administration (ODA) and the contractor, William Halcrow and Partners (1972 and 1973).
- A 1975 study, Desarrollo Integral del Valley de Comayagua, conducted by SRN.
- Several studies of soils and land use (Dirección del Catastro, 1982, 1983, and 1985).
- The CATIE (1984) study on farming systems in the valley.
- The ADAI (1985) study of horticultural-crop marketing in the valley.

BACKGROUND

The Comayagua Valley

The Comayagua Valley is approximately 100 km north of Tegucigalpa, Honduras's capital, and 170 km south of San Pedro Sula, the country's major industrial and commercial center. Founded in 1537, the town of Comayagua was officially titled as a city in 1558 by Philip II of Spain. Comayagua served as the country's original capital until 1880 when the capital was moved to Tegucigalpa. Today, the city of Comayagua is the capital of the Department of Comayagua and is Honduras's eighth largest city (more than 10,000 persons). The valley's population is estimated to exceed 105,000.

Comayagua Valley is relatively flat, with a total area of 38,000 ha at an average 625 m above sea level. It is crossed by the Humuya River, which runs from north to south, and by a paved highway that passes through Tegucigalpa and San Pedro Sula, providing easy access to the south and north coasts. This north-south axis (known as the Región del Corredor Central) comprises what development planners define as the primary leg of a development-growth triangle, the other two legs consisting of the Puerto Corte's-Puerto Castilla axis (Región Litoral) and the Puerto Castilla-Puerto de Henecañ axis (Región del Corredor Oriental).

Traditionally, valley farmers have produced basic grains (corn and beans) and livestock. Irrigation was first introduced in the form of municipal and private systems. With the introduction in the 1950s of several public-sector irrigation systems, larger numbers of farmers have turned to higher-valued crops such as tomatoes, onions, rice, and other vegetables and fruits (such as watermelons). Whereas large haciendas producing cattle dominated the valley's economy in the past, a significant number of small and medium-size farmers are now participating in irrigated farming and vegetable production.

The transition from producing subsistence crops to growing cash crops has been accelerated by the establishment of several industrial growers and processors in the valley as well as by the development of export

markets. This transitional process and its implications for developmental growth in the valley are explored in this report.

Agricultural and Rural Development in Honduras

Honduras is the poorest country in Central America. As of mid-1984, the economy's real GDP growth rate had dropped from an average of 7% during the late 1970s, to a negative growth rate of over 1% in each of the 3 years preceding 1984. Approximately 63% of the country's population live in rural areas. As of 1978, rural income was less than one-third of urban income and 77% of rural residents had income below the estimated poverty line (\$230 per person).

There is considerable unemployment and underemployment in the rural sector (60% have jobs) and the problem is worsening. With an estimated population-growth rate of 3.4% yearly, the country's rate of employment expansion lags behind at 2.8%.

Honduras's economic development is impeded by a mix of interrelated constraints, including

- ...a rugged and mountainous terrain often unsuited for cultivation, use of a high percentage of the most fertile and tillable land for cattle raising, a fragile and deteriorating natural resource base, an economy largely based on tropical export agriculture subject to large swings in the terms of trade, ...weak private sector organization and aggressiveness, and government institutions with limited ability to effectively formulate and execute policies and programs (USAID/Honduras, 1984).

These problems are compounded by political instability in neighboring countries, the second highest population growth rate in the western hemisphere, a rapidly disappearing agricultural frontier, over-exploitation of the country's forests (over one-fifth of the remaining forests being destroyed during the last decade), declining foreign and domestic investment, a contracting external sector (such as for sugar), and a limited domestic market.

These trends have translated into a downward trend in per capita production. More than 50% of cultivated land is planted with basic grains, and yields for some of these crops (corn, beans, rice) are the lowest in Central America. Less than 20% of potentially cultivable land is actually used for agriculture -- twice this amount of land is left in fallow and nearly twice is classified as eroded. Further, although rainfall patterns are erratic, only 14% of potentially irrigable land is actually irrigated; three-fourths of the irrigated land area is planted with bananas and sugar cane.

Despite the untapped potential for increased cultivated and irrigated land, two-thirds of Honduran farms have less than 2 ha of land. Less than 10% of Honduran farmers regularly obtain credit from commercial banks and the Banco Nacional de Desarrollo Agrícola (BANADESA), and real

agricultural credit flows today are only at 1970 levels. Agro-industrial activities remain limited in scale and importance. Further, the public agricultural sector lacks not only resources but also coherence. There are many duplicative institutions; for example, both BANADESA and INA make loans to reform groups. Policy-making and implementation lacks clear, central authority. Where policies exist, they often tend to discourage investment, employment, and productivity.

While the economy's export sector has expanded in certain traditional commodities (coffee, bananas, shellfish), combined exports of the three other major traditional agricultural exports (sugar, lumber, beef) declined from \$100 million to \$80 million between 1983 and 1985. At the same time, however, there has been an encouraging trend in nontraditional agricultural exports, which increased from \$26 million in 1982 to a conservative estimate of \$47 million in 1984, an 80% increase. This trend indicates that nontraditional agricultural exports represent a major economic-growth opportunity for Honduras.

Except for Tegucigalpa and San Pedro Sula, Honduras is basically a rural country. Development planners are seeking to capitalize on the growth potential of the rural areas. The Secretariat of Planning has identified several intermediate growth centers such as the Corredor Central. The Comayagua Valley is the epicenter of this Corredor Central. Further, the valley has valuable experience in nontraditional export crops (cucumbers, tomatoes) and appears to have excellent potential for continued expansion and economic growth.

ORIENTATION TO AGRICULTURAL AND RURAL DEVELOPMENT

Government of Honduras (GOH)

In recent years the GOH has placed increased emphasis on the development of rural Honduras. The government has particularly been concerned with the beneficiaries of agrarian reform. As USAID/Honduras's agriculture-sector assessment noted in 1978, "The central thrust of GOH strategy for the agricultural sector during the past four years, i.e., the principal consideration around which individual strategy decisions have been taken, has been the implementation of agrarian reform."

Nearly a decade later, the GOH continues to be concerned with the agrarian-reform sector; however, the government is now beginning to place a greater emphasis on stimulating agricultural production and productivity in the private sector as well as the agrarian-reform sector. For example, Secretaría de Recursos Naturales (SRN) extension agents work with independent agricultural producers as well as farmers who are members of agrarian reform groups.

The GOH is currently operating under a national development plan covering the period from 1987 to 1990. The plan aims at achieving sustained economic growth, establishing internal and external financial equilibrium, generating employment, meeting the population's basic needs, and integrating regional development.

Agriculture is identified as one of the key sectors for the country's development. The policy objectives of this sector are using natural resources rationally, strengthening the capacity of the export sector, and increasing production and productivity while improving delivery of agricultural-support services.

The plan's public-investment program covers current obligations and proposed investments. Current obligations include implementation of projects in natural resources management, integrated rural development, development of water resources to support agriculture and meet basic human needs, and increased agricultural production through improved agricultural-support services, including both physical infrastructure and transfer of technology. Current obligations are estimated to be 33.4% of the total planned investment for the plan period.

Proposed investments include projects in integrated rural development, conservation of natural resources, development of water resources, agricultural diversification, and improvement of agricultural-support services. Proposed investments are estimated to be 67% of the total planned investment for the plan period and 23% of the total investment in all sectors of the economy. The GOH views this allocation as a significant reorientation of resources that will contribute to the economic self-sufficiency of the agricultural sector.

GOH is interested in the integrated development of the Comayagua region. In 1986, the government presented a proposal to USAID/Honduras to request funding for a prefeasibility study of the valley's development potential. The study was not funded.

A significant element of the GOH's agricultural policy in the past has been aimed at import substitution. Today the GOH, with donor encouragement, is placing increased emphasis on development of the country's potential as a producer of nontraditional agricultural exports for such markets as Central America, the United States, and Europe. The GOH, through its Secretaría de Recursos Naturales (SRN), is supporting the development of this potential in the valley.

USAID/Honduras

In view of the high percentage of Hondurans deriving income from agriculture and the country's potential as an agricultural producer, USAID/Honduras's long-term development program has been and will continue to be focused on improving the agricultural sector's functioning. The mission seeks to increase a) efficiency in traditional and nontraditional crop production, b) agricultural exports, and c) employment and income. Key target groups include traditional subsistence farmers, small- and medium-size commercial operators, and the landless.

The mission's current objective is to increase agricultural production by \$400 million between 1987 and 1990, this being the equivalent of raising the agricultural GDP growth rate by 1.3% over its past 3.2% growth rate, or 1.5% above the 3% population growth rate. Further, the mission seeks to increase the value of agricultural exports by \$270 million.

To achieve these objectives, USAID/Honduras is helping the government implement a production-oriented rural-development strategy integrating a) agricultural, rural and nutrition development and agroexport projects; b) policy negotiations; c) Caribbean Basin Initiative trade advantages; and d) local currency activities funded through ESF and PL-480 Title I/III local currency generation. This strategy seeks to help commercially oriented farmers move progressively into higher value crops for domestic and export markets and processors, thereby increasing labor demand for the landless and creating expanded market opportunities for traditional farmers who produce basic grains.

Appendix A summarizes the mission's current agricultural and rural development project portfolio. This portfolio includes projects in four basic areas: marketing development, small-farmer development, natural resources development, and institutional development. None of the current or new projects is aimed specifically at the valley. However, several have components that impact directly or could impact more directly on agricultural and rural development in the valley.

Projects currently anticipating major activities in the Comayagua Valley are Irrigation Development Project (small-scale irrigation systems), Small Farmer Organization Strengthening Project (working with regional cooperatives such as Fruta del Sol and CARCOMAL), Agricultural Research Foundation Project and Export Development and Services Project (continued development of the FHIA-FEPROEXAAH Comayagua Vegetable Demonstration Project), and Privatization of State-owned Enterprises Project (for example, Mejores Alimentos).

In addition to the project portfolio, the mission has engaged in policy dialogue with the GOH. The mission's assessment is that the government's agricultural policies have improved since 1982. Indicators of policy improvements include

- maintenance of a 17% positive interest rate for agricultural credit (fluctuating between 6% and 17% real interest rate)
- stricter lending criteria applied to agricultural co-ops
- divestiture of government-owned wood-processing operations and increased private-sector activity in lumber marketing
- modification of the "Ley de Fomento Agropecuario" to encourage new technologies (duty-free imports and fiscal incentives to agro-industries processing Honduran-produced raw materials)
- provision, in the case of loan default, for rural property given as loan collateral to be held by banks for up to 4 years, protected from Agrarian Reform Intervention

From 1987 to 1990 the mission will continue policy dialogue with the GOH, seeking to amend the Agricultural Development Law to a) establish procedures that will allow small- to medium-scale producers to benefit from the law's duty-free provisions either individually or through their associations, b) modify the law to provide greater flexibility (for

example, exempt inputs defined in terms of generic categories), and c) allow land rentals.

Programs Funded by Other Donors

The World Bank made a \$45 million loan to assist in meeting medium- and long-term credit needs of commercial farmers and agribusiness ventures. The bank has also made a \$60 million loan to the Industrial Development Fund (FONEDI) to assist in meeting the credit needs of agroindustry, seafood ventures, and forestry projects as well as other industrial activities.

The Interamerican Development Bank (IDB) is focusing on forestry (\$58 million), primarily for CORFINO (\$48 million), the government-owned sawmill. IDB's portfolio also includes \$16 million, channeled through BANADESA, for small-farmer credit. IDB has also provided a \$9.2 million loan to IHMA to increase IHMA's grain-storage capacity by 18,600 mt and to finance a rice mill. Further, IDB is financing a \$16 million Integrated Rural Development project in Honduras's north-eastern region. Finally, with the European Economic Community IDB is financing a \$7 million research and extension project in Danli and a \$6 million loan for an animal-health project to support a program to control ticks and worms.

The EEC has made a \$24 million grant to the Agrarian Reform Institute to assist in financing small, integrated rural-development projects and providing credit to agrarian-reform beneficiaries. Also, the EEC has initiated a \$4.35 million project to improve basic grain storage in small communities.

Several key projects are sponsored by agencies of the United Nations. FAO is supporting a banana and plantain research program in the Fundación Hondureña de Investigación Agrícola (FHIA). The International Trade Center supports several of FEPROEXAAH's agroexport projects.

None of these donor-supported initiatives specifically addresses the problems and potentials of the Comayagua Valley; however, some projects may allocate resources that directly or indirectly support development activities in the valley.

ORGANIZATION OF REPORT

The data-collection phase of the study was aimed at identifying and collecting three major categories of information on the Comayagua Valley: a) development of the economy and the agriculture of the valley since 1950 (chapter 2); b) resource availability and use in the valley (chapter 3); and c) institutions and organizations having programs, projects, or activities impacting on the valley's agricultural development (chapter 4).

Chapter 5 discusses the constraints to accelerated economic growth in the valley's agricultural sector and USAID/Honduras projects that could be marshalled to remove or relax the identified constraints. This

chapter also presents a recommended strategy that USAID/Honduras could follow to increase the effectiveness of development-assistance support to the Comayagua Valley.

CHAPTER 2 DEVELOPMENT OF THE ECONOMY AND AGRICULTURE OF THE COMAYAGUA VALLEY SINCE 1950

Many factors combine to give the Comayagua Valley an economy that is unique within Honduras. The valley does not enjoy the expansive plains, deep soils, and abundant precipitation of the large valleys along Honduras's north coast, but neither is it characterized by the steep slopes and remoteness common to many of the country's subsistence-farming areas nor by the aridity of the southern region. The distribution of the valley's land holdings is also different from that in other areas: the valley floor is not dominated by large haciendas or export-oriented plantations but is shared by a broad mixture of small, medium, and large holdings.

Comayagua is located on the main south-north highway running from the Pacific to the Atlantic coast, just an hour from Tegucigalpa and 2 hours from San Pedro Sula. It therefore enjoys a special advantage in national markets. Comayagua has benefited from a number of government programs and international-donor projects designed to promote economic development.

These factors have combined to produce a very distinct pattern of regional growth. This chapter describes how the valley has grown and evolved during the past three decades. The discussion proceeds from a description of population characteristics to employment, to agricultural development, and to recent developments in agribusiness.

POPULATION

While the Comayagua Valley has recently experienced population-growth rates exceeding 3% per year -- similar to those of Honduras as a whole -- it has not suffered from the ultra-high rates that have plagued the country's major urban areas. Nevertheless, the valley is growing more rapidly than other areas in the central region. Valley towns such as Comayagua and La Paz are gradually urbanizing, while some rural areas within the valley are in decline.

From 1961 to 1974, between the two latest censuses, the valley's population grew at an equivalent annual rate of 2.81% -- slightly higher than the 2.67% national rate for Honduras during the same period, and higher than the 2.65% annual rate of growth for the Department of Comayagua as a whole. Not all areas of the valley grew at the same rate. Table 1 shows that municipalities in the southwestern part of the valley -- Humuya, San Sebastian, La Paz, Lamani and Cane (figure 2) -- grew at much slower rates than Lejamani, Ajuterique, and Comayagua in the northern part. Villa de San Antonio, in the southeastern sector, just managed to hold its own.

Because there has been no census of population since 1974, it is difficult to determine exactly what has been happening to population growth

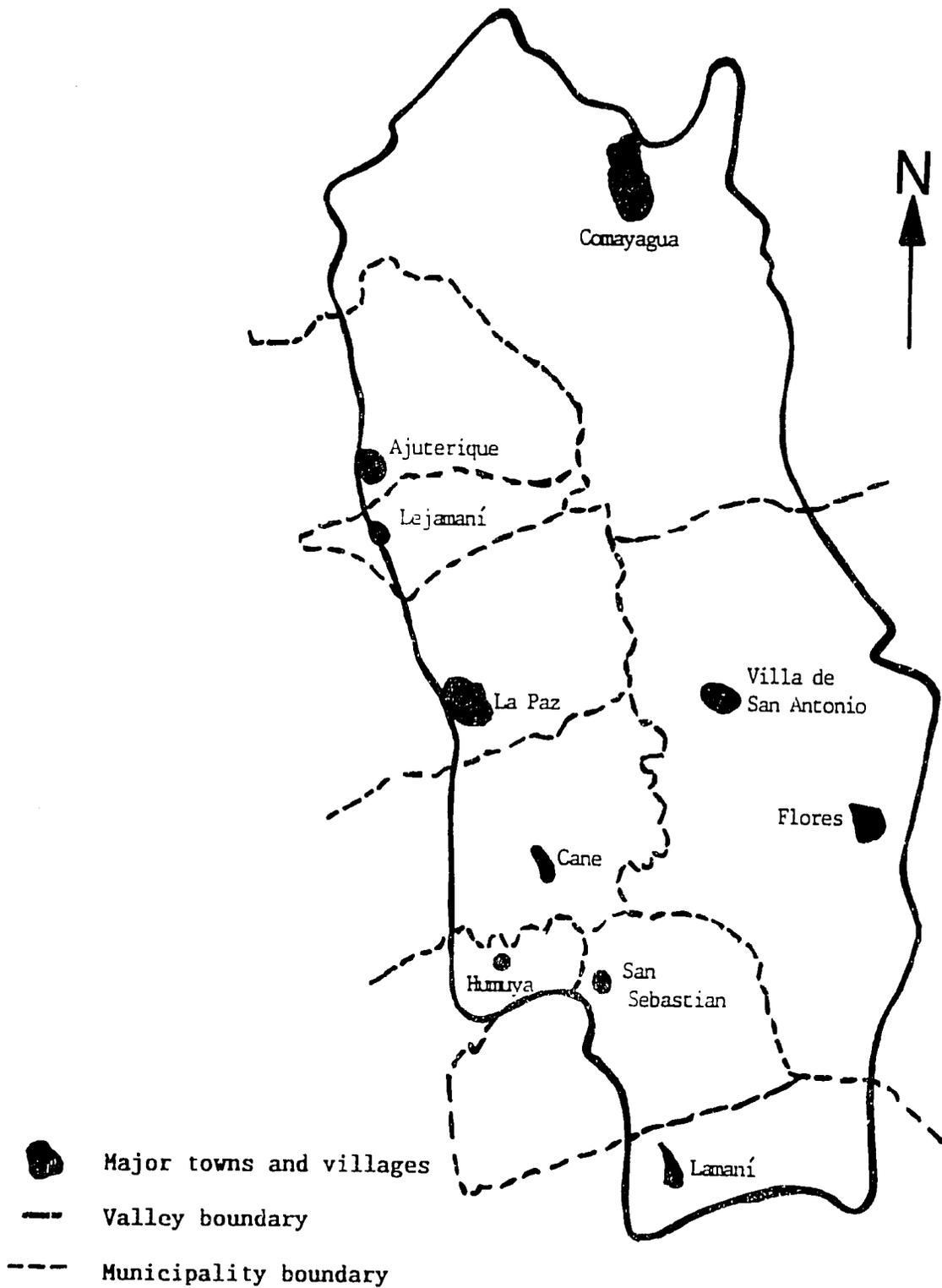


Figure 2. Population centers and municipal boundaries, Comayagua Valley.

Table 1. Population of the Comayagua Valley compared to Department of Comayagua and Honduras, 1961, 1974 and 1985 estimate.

Area	Population			Change during period		Percent change during period	
	1961	1974	1985	1961-74	1974-85	1961-74	1974-85
HONDURAS	1,884,800	2,653,900	4,372,487	769,100	1,718,587	40.8%	64.8%
DEPT. of COMAYAGUA	96,400	135,500	226,259	39,100	90,759	40.6%	67.0%
Municipality: (a)							
Ajuterique	3,132	5,165	9,447	2,033	4,282	64.9%	82.9%
Comayagua	19,055	29,854	56,053	10,799	26,199	56.7%	87.8%
Humuya	581	602	743	21	141	3.6%	23.4%
Lamani	2,844	2,849	3,419	5	570	.2%	20.0%
Lejamani	1,455	2,142	3,551	687	1,409	47.2%	65.8%
San Sebastian	1,269	1,528	2,148	259	620	20.4%	40.6%
Villa San Antonio	4,408	6,191	9,913	1,783	3,722	40.4%	60.1%
Cane	1,164	1,351	1,931	187	580	16.1%	42.9%
La Paz	8,876	11,652	18,438	2,776	6,786	31.3%	58.2%
Total, COMAYAGUA VALLEY	42,784	61,334	105,643	18,550	44,309	43.4%	72.2%

Source: National Population and Housing Censuses for 1961 and projections of the Superior Planning Council (CONSUPLANE), 1985

(a) The first seven Valley municipalities are in the Department of Comayagua whereas the last two are in the Department of La Paz.

during the past 13 years. CONSUPLANE's estimates of population for 1985 are shown in table 1. These estimates are obviously high since they imply a 4.64% annual rate of growth for Honduras from 1974 to 1985 and a 5.07% rate for the Comayagua Valley, whereas studies suggest that Honduran population has probably increased at a rate of 3.5% or less during this period. Nevertheless, the trends to be drawn from the CONSUPLANE projections may be indicative of what has been happening in the valley during the past 10 to 15 years. Figure 3 compares the changes during the two periods 1961-1974 and 1974-1985.

The pattern shown in figure 3 is similar for the two periods. The southwestern sector grew considerably more slowly than the valley and Honduras as a whole. The northern sector grew more rapidly, with the population having continued to shift within the valley from the south to the north. The fact that the valley grew more rapidly than the Department of Comayagua suggests that the valley was the subject of net in-migration from the rest of the department and from outside the department.

The study team's observations during its visits to the valley seemed to confirm the pattern indicated by the CONSUPLANE statistics with two possible exceptions: Villa de San Antonio and La Paz have probably grown more than figure 3 would suggest. Villa de San Antonio, which contains the Flores (Coyolar Dam) irrigation project, has experienced more intensive irrigation development during the past 15 years than other parts of the valley. La Paz, which is the primary municipality for the Department of La Paz, was the focus of an unprecedented public-works construction program during the government of President Suazo Cordoba, and this seems to have had growth impacts that are not reflected in the population projections.

Another important aspect of the valley's population is density or number of inhabitants per square kilometer. This is shown in table 2. The valley and Department of Comayagua are both more densely populated, on average, than Honduras as a whole. The valley's density (20 persons per square kilometer) was 18% higher than for Honduras in 1961, whereas it had increased to 51 (31% higher than for Honduras) according to the 1985 estimate. The two small municipalities of Ajuterique and Lejamaní have densities of 429 and 161 inhabitants per square kilometer, respectively, which is much higher than the valley average, whereas Cane, Humuya, and Lamani, in the southwest, are all very sparsely populated. The density figures must be interpreted with caution, however, since some of the municipalities (Comayagua and Villa San Antonio) contain much more open space and forest lands than others.

The Comayagua Valley's population growth and net in-migration trends are different from those of Comayagua Department as a whole. Table 3 shows that the department is experiencing slightly greater net out-migration than other departments in the country. Out-migration was estimated at .82% from 1969 to 1974 and 1.18% between 1979 and 1984.

While details as to specific directions of migration are not available for 1979 to 1984, the 1974 Census data indicate that Comayagua Department was experiencing heavy out-migration to such areas as Cortés,

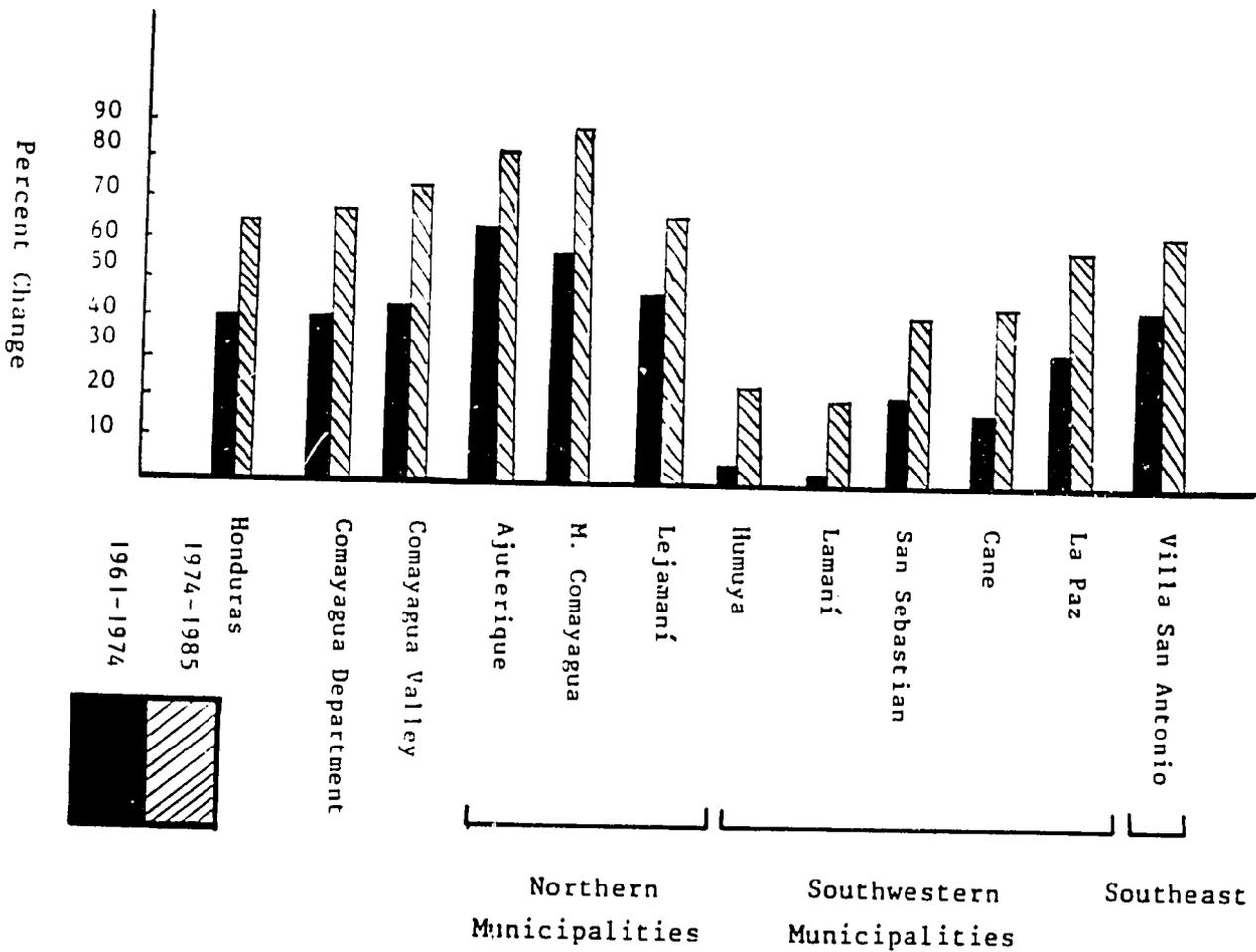


Figure 3. Population changes in the Comayagua Valley compared to Department of Comayagua and Honduras, 1961-1974 and 1974-1985.

Table 2. Population density of the Comayagua Valley compared to Department of Comayagua and Honduras, 1961, 1974, 1985 estimate.

Zone	Area (Sq. km)	Density (persons per sq. km.)		
		1961	1974	1985
HONDURAS	112,188	17	24	39
DEPT. of COMAYAGUA	5,196	19	26	44
Municipality: (a)				
Ajuterique	22	142	235	429
Comayagua	930	20	32	60
Humuya	35	17	17	21
Lamani	227	13	13	15
Lejamani	22	66	97	161
San Sebastian	35	36	44	61
Villa San Antonio	214	21	29	46
Cane	364	3	4	5
La Paz	239	37	49	77
Total, COMAYAGUA VALLEY	2,088	20	29	51

(a) The first seven valley municipalities are in the Department of Comayagua whereas the last two are in the Department of La Paz.

Table 3. Migration between Comayagua Department and other departments.

Department	In-migration from Department to Comayagua (1969 - 1974)	Out-migration from Comayagua to Department (1969 - 1974)	Net Migration to or from (-) Comayagua (1969 - 1974)
Atlantida	145	454	-309
Colon	25	296	-271
Copan	138	105	33
Cortes	1247	2402	-1155
Choluteca	222	65	157
Paraiso	231	167	64
Francisco Morazan	1428	2542	-1114
Gracias a Dios	38	35	3
Intibuca	793	218	575
Islas del la Bahia	13	13	0
La Paz	1453	390	1063
Lempira	161	23	138
Ocotepeque	95	27	63
Olancho	256	386	-130
Santa Barbara	396	260	136
Valle	254	29	225
Yoro	545	836	-291
TOTAL	7440	8248	-808
Men	4030	4001	29
Women	3410	4247	-837
Rate of net out-migration 1969-74, total			.82%
Men			-.06%
Women			1.71%
Rate of net out-migration 1979-84, total			1.18%
Men			1.09%
Women			1.27%

Source: For 1969-74, National Census of Population and Housing, 1974,
For 1979-84, CONSUPLANE survey, September 1983.

N.B. Details on flows to/from individual departments not available
for 1979-84.

Atlántida, and Colón Departments on the northern coast and to Morazan Department (including Tegucigalpa) to the southeast. At the same time, the department was gaining population from neighboring departments such as La Paz, Intibuca, Choluteca, and Valle to the west and south, while losing to neighboring Olancho to the east. Since migration tends to be based on the past experience of friends and family, it is likely that this same directional pattern has continued in more recent years.

EDUCATION LEVELS AND FACILITIES

Literacy has been rising among Comayagua Valley farmers. A 1985 Farm Survey taken by SRN's Department of Sectoral Planning found that 73% of all farm family members more than 7 years of age could read and write, equivalent to an illiteracy rate of 27% (see table 4). While earlier data on farmer literacy are not available, previous population censuses had measured illiteracy for all Comayagua Department inhabitants of 10 years or older. In 1950, 65% were illiterate, but by 1961 the rate had dropped to 53% percent (see table 4). In general, the illiteracy rate in Comayagua has closely paralleled the national average rate. Rural illiteracy in the Department was 49% in 1974. Thus, with illiteracy among valley farmers currently at 27%, it appears that significant progress has been made in the past decade.

In 1985, according to the National Statistical Annual, Comayagua Department had 455 primary schools. This was equivalent to 2.01 schools per thousand inhabitants, which is 33% higher than the national average of 1.50 per thousand. The Department had 178 primary students enrolled per thousand inhabitants, compared to a national average of 167 (see table 4).

Currently, Comayagua Valley has primary schools in all of the nine main municipality centers as well as several in other larger towns (for example, Flores). There are normal schools in Comayagua and La Paz, and the city of Comayagua also has secondary schools that offer certificates in business and secretarial studies. There are INFOP (National Professional Training Institute) training centers located near Comayagua and La Paz.

In general, it appears that Comayagua has a good school system compared to national norms, and this has undoubtedly contributed to the decline in illiteracy.

EMPLOYMENT

Comayagua's economic structure depends heavily on agriculture. While this is true for most rural areas in Honduras, Comayagua's agricultural dependence is particularly strong. Although there are no separate employment statistics for the valley, the last two censuses provide information on employment structure for Comayagua Department (see table 5). In 1974, 71.5% of all employment in the department was in agricul

Table 4. Characteristics of education and literacy in Comayagua.

	Republic of Honduras -----	Department of Comayagua -----
Primary schools per 1000 inhabitants in 1985	1.50	2.01
Primary enrollment per 1000 in 1985	1.67	1.78
Illiteracy among population older than 10 years:		
1950 Census, rural & urban	64.2%	64.8%
1961 Census, rural & urban	54.8%	52.7%
1974 Census:		
Rural: Male	49.8%	49.6%
Female	52.6%	49.0%
Total	51.2%	49.3%
Urban: Male	16.4%	24.4%
Female	21.4%	26.7%
Total	19.1%	25.6%
Rural & urban total	40.5%	42.3%
		Comayagua Valley -----
Illiteracy among farm family members older than 7 years of age, 1985 farm survey:		26.8%

Source: Population estimates CONSUPLANE, Schools and school enrollment from Department of Statistics, Statistical Annual, 1985; literacy from Population Censuses, 1950 and 1961; 1985 Comayagua Valley farmers literacy from 1985 survey by Ministry of Natural Resources, Department of Sectoral Planning.

Table 5. Economic activities and occupations of economically active population in Department of Comayagua and Honduras.

Activity	Honduras					Comayagua Department				
	1961 Census		1974 Census		%	1961 Census		1974 Census		%
	People	% tot	People	% tot		People	% tot	People	% tot	
Agriculture	379,125	66.7%	459,612	60.3%	21%	21,333	76.4%	26,749	71.5%	25%
Mining	1,769	.3%	2,328	.3%	32%	15	.1%	97	.3%	547%
Manufacturing	44,010	7.7%	84,284	11.0%	92%	1,629	5.8%	3,153	8.4%	94%
Construction	11,523	2.0%	3,276	.4%	-72%	522	1.9%	42	.1%	-92%
Public services	779	.1%	24,419	3.2%	3035%	28	.1%	983	2.6%	3411%
Commerce	27,045	4.8%	59,085	7.7%	118%	842	3.0%	2,069	5.5%	146%
Transp. & comm.	8,014	1.4%	20,745	2.7%	159%	234	.8%	703	1.9%	200%
Finance, ins.	n.a.		5,780			n.a.		69		
Other services	69,428	12.2%	87,580	11.5%	26%	2,429	8.7%	2,998	8.0%	23%
Other acts.	26,295	4.6%	15,686	2.1%	-40%	901	3.2%	535	1.4%	-41%
Total	567,988	100%	762,795	100%	34%	27,933	100%	37,398	100%	34%
Occupation										
Professional/tech	14,300	2.5%	30,982	4.1%	117%	629	2.3%	1,163	3.1%	85%
Administrators	3,342	.6%	7,012	.9%	110%	115	.4%	155	.4%	35%
Office workers	12,633	2.2%	31,784	4.2%	152%	296	1.1%	949	2.5%	221%
Salesmen	22,408	3.9%	43,907	5.8%	96%	777	2.8%	1,697	4.5%	118%
Farmers	374,222	65.9%	453,113	59.4%	21%	21,389	76.6%	26,705	71.4%	25%
Miners	1,210	.2%	6,461	.8%	434%	12	.0%	212	.6%	1667%
Drivers	6,324	1.1%	61,049	8.0%	865%	172	.6%	2,161	5.8%	1156%
Artisans	49,485	8.7%	39,201	5.1%	-21%	1,870	6.7%	1,758	4.7%	-6%
Unskilled	8,242	1.5%	24,697	3.2%	200%	248	.9%	704	1.9%	184%
Personal service	44,526	7.8%	49,674	6.5%	12%	1,444	5.2%	1,393	3.7%	-4%
Others	31,296	5.5%	14,915	2.0%	-52%	981	3.5%	501	1.3%	-49%
Total	567,988	100%	762,795	100%	34%	27,933	100%	37,398	100%	34%

Source: Census of Population and Housing, 1961 and 1974

ture, compared to the national average of 60.3%. Furthermore, employment in agriculture grew more in Comayagua (25%) during the preceding decade than it had in Honduras as a whole.

Other areas where Comayagua's employment was growing faster than the nation's were mining, manufacturing, public services, commerce, and transportation and communications.

Recent Growth in Agribusiness and Manufacturing

The valley's agribusiness and government-service sectors have grown substantially in the past 10 years. However, the valley's industrial activity is not new. The 1974 Census, cited above, reported 3,153 manufacturing jobs amounting to 8.4% of the work force of 37,398. A survey conducted in the valley in 1971 by the Statistics and Census Bureau classified the following industries:

- slaughtering animals
- canning and preserving fruits and vegetables
- refining sugar
- milling
- manufacturing feed
- producing tobacco
- spinning and weaving
- making leather products
- milling and selling wood

Altogether, 170 businesses employed 12,878 persons in these industries -- four times the number of people reported in manufacturing for Comayagua Department in the 1974 census. The 1971 study appears to be more reliable.

Agribusiness got its first big boost in 1974 with the location of the Mejores Alimentos food-processing plant adjacent to the city of Comayagua. Currently this plant is owned by the National Investment Company (CONADI) and has about 230 full-time employees. The Fruta del Sol agricultural cooperative was organized in 1982, with facilities for export of cucumbers. Subsequently, Rezco, a foreign joint venture, organized a packing shed for melons south of the city. This company later shifted to producing and packing tomatoes.

During the past year, several new agribusiness ventures have been organized or located in the valley. These include Agro Internacional, a foreign joint venture for vegetable production, packing, and exporting. Alimentos del Valle, a vegetable- and fruit-processing plant very similar to Mejores Alimentos, but privately owned, was built in 1986, and this company currently employs 90 people. Masa Rica, a mill for the production of corn flour, is currently being completed just north of Palmerola and is due to begin operations soon.

Also in 1986, the Fundación Hondureña de Investigaciones Agrícola (FHIA) established a commercial farm at Las Liconas, in the valley's center, to demonstrate the feasibility of a number of new technologies for producing export vegetables. This farm currently employs 70 to 160 people, depending on the season.

Comayagua has also benefited from several major nonagricultural activities that have located in the valley. In 1982 CONADI established a cement processing plant, Industria Cementera Hondureña, adjacent to the city, and this plant now has 280 permanent employees. In 1982, the United States established a military airbase at Palmerola, and this base has since become a major source of civilian employment. Currently, the Global Company has a contract to provide some 350 civilian employees to the base, most of whom live in or near the city of Comayagua.

In addition to manufacturers and agribusiness companies, Comayagua also has a broad base of supporting businesses such as transportation companies that offer regular trucking and bus service within the valley as well as between the valley, Tegucigalpa, and San Pedro Sula. There are also several substantial machine shops, several firms that cure hides, a wooden pole factory, and a brick factory.

These business entities are summarized in table 6, which accounts for some 1,200 to 1,400 full-time jobs. These represent the major employers in the valley that the study team identified. Significantly, the majority of these jobs have been created in the past 5 years.

Government Employment

Comayagua is also a major regional center for government employment related to agriculture. The city is headquarters for the Centro Occidente regional office of the Secretaría del Recursos Naturales (SRN). This office currently employs 305 people, up from 62 employees in 1975. BANADESA (Banco Nacional de Desarrollo Agrícola) employs 43 persons in Comayagua and La Paz, and the agrarian institute, INA, has 51 employees in the valley.

The valley is also the location of at least three national research centers. The Centro Nacional Ganadero, the national livestock research center, has been in the valley for more than 20 years and it currently employs 135 persons at all levels. In 1985 the Centro de Entrenamiento de Desarrollo Agrícola (CEDA) was located in the valley with Japanese government (JICA) financing. The center conducts research and training related to irrigation and currently employs 99 persons. The national center for aquaculture (El Carao) employs about 20 persons.

In all, employment for government agencies related to agriculture amounts to more than 530 persons (see table 7).

Nonfarm Employment

The fact that there are a growing number of nonfarm job opportunities in the valley is reflected in the incomes of farmers. A 1985 survey conducted by SRN found that 31% of the gross incomes of farm families was derived from off-farm sources such as handicrafts, commerce, and transport.

Table 6. Employment in major industries in the Comayagua Valley, 1987.

Name of Company	Type of business	Number of Employees	Remarks
Mejores Alimentos	Process veg. & fruits	230	+50-100 temp
Alimentos del Valle	Process veg. & fruits	90	
Global Company	Military services	350	
Agro Internacional	Veg. grower, exporter	n.a.	
FHIA Farm	Veg. production/research	70-160	
Ind. Cementera Hond.	Mfg. of cement	280	50 temporary
Fruta del Sol	Grower Cooperative	20	25-30 temp.
Rezco	Tomato growers/shippers	5	100 temp.
La Masa	Corn flour mill	20	estimate
Taller Mecanico Ind.	Machine shops, repairs	12	
Taller Cruz	Machine shops, repairs	12	
Transport Locatracho	Bus service	25	
Trajesa Transport	Trucking and hauling	30	
Tajosa Transport	Trucking and hauling	25	
Pole factory	in La Paz	35	
La Fortaleza Brick Co	in La Paz	35	
Total		1200-1400	+ 225-305 temp.

Source: Study team visits, including some data supplied by Ministry of Labor, Comayagua office.

Table 7. Employment in government agricultural agencies, Comayagua Valley, 1987.

Agency	Number of Employees
MRN Regional Office	305
Regional administration	
Department of Water Resources	
Regional Livestock Administration and Services Extension	
National Livestock Center	135
Irrigated Agriculture Center (CEDA)	<u>99</u>
TOTAL	539

Source: Study-team visits.

Underemployment

No current statistics indicate the overall level of employment or unemployment in the valley as a whole. A recent survey of urban employment found that Comayagua had a 11.5% of open unemployment, which was slightly lower than the national rate of 12.1%. At the same time, however, Comayagua had a 43.9% rate of underemployment, which was significantly higher than the 34.1% national rate. Underemployment among females in Comayagua (59.6%) was 25 points higher than for men (34.9%), but the spread was almost the same at the national level (unpublished data from CONSUPLANE survey, September 1986). Presumably, much of the Comayagua employment covered in this survey was in the valley's urban areas.

While there is evidence that a substantial number of jobs have been added to the valley's economy in the past decade, the figures on urban unemployment and underemployment seem to indicate that job opportunities have not grown as rapidly as the labor force. The agricultural wage rate in the valley seems to have remained at about Lps 5 to Lps 6 per day for the past several years. The mayor of Ajuterique, one of the outlying but more densely populated towns in the valley, complained that there are no job opportunities for the young men of the town.

Nevertheless, wages in the urban areas appear to be on the increase. Salaries at the military base reportedly range from Lps 300 to Lps 1,000 or more per month, and one of the food processing plants reported similar levels. Furthermore, the cost of housing and other living expenses in Comayagua was said to be increasing.

If any area of the valley is beginning to show some of the growing pains associated with economic development, it is the city of Comayagua, where all of the new industry and government employment is concentrated. Other areas of the valley have not shared in this growth in equal

measure. Comayagua is struggling to keep its streets in repair, the municipal water system is said to be inadequate for the current population, and there are problems with prostitution associated with the military base.

AGRICULTURAL PRODUCTION

The Comayagua Valley enjoys unique climatic and geographic circumstances that are well-suited for producing a wide variety of crops, including many vegetables and fruits. Until about 1950, however, communication with other parts of the country was limited and livestock production was the mainstay, together with sugarcane, cotton, and basic grains.

The valley's natural advantages have to do with altitude and prevailing temperatures, relative humidity, precipitation, soils, and water resources. While each of these topics will be discussed at length in chapter 3, the salient points are as follows:

- With an average altitude of 625 m above sea level, the valley enjoys temperatures that are relatively moderate and yet warm enough to support year-round crop production.
- Mean annual temperature is 24.5°C (76°F), and the mean minimum is 16.8°C, although in certain areas the minimum can reach as low as 5.5°C. Maximums seldom exceed 37°C (100°F).
- The valley is dry during most of the year, with average relative humidity ranging from a low of 53% in April to a high of 78% in December. Low humidity is a distinct advantage in the control of plant diseases and funguses known to attack horticultural crops. It offers the same advantages for control of livestock diseases.
- Precipitation averages almost 1000 mm per year while evapotranspiration potential is more than 1500 mm. Rainfall from May through October is normally sufficient to support production of forage, basic grains, and many other field crops, while horticultural crops normally require supplemental irrigation year-round.
- Soils and topography are highly variable. Most soils are alluvial in origin and vary in depth, texture, and natural drainage capabilities. Areas in the valley floor and along major streams tend to be flat, although the terrain is rolling in many of the intermediate zones, and some areas are divided by small canyons and ravines.
- The valley is crisscrossed with a number of rivers and small streams that afford the opportunity to irrigate during much of the year in many areas.
- While the valley is not uniformly irrigable, some areas enjoy a combination of stream proximity, topography, and soil capability that make irrigation easy and inexpensive.

- Other areas benefit from irrigation through the use of municipal and GOH canal systems, and one project area (Flores) enjoys year-round irrigation from El Coyolar Dam constructed by the GOH in 1956.

Without direct road access to larger markets, the natural advantage of the valley would obviously lie in the production of subsistence crops and livestock for meat. This seems to have been largely the case before 1950 when GOH road projects began to improve the valley's access to the national market. In addition to livestock, there was also substantial area in sugarcane for use in production of panela (sugar candy). However, sugarcane production appears to have begun to decline after about 1940, perhaps due to competition from El Salvador (ADAI, 1985, pp. 16-19).

Some vegetables had long been produced under irrigation in valley areas such as Ajuterique, but these were mainly for local production, and only a few onions were exported to other parts of Honduras. Tomatoes had probably long been produced in the area, but few if any would have been exported until the roads were improved.

Long before 1950, four valley municipalities had established small irrigation systems on ejido lands (communal lands) but the exact dates at which this all began are unknown. Furthermore, significant areas had been irrigated in the valley by private farmers for a long time, and several of the haciendas had developed their own systems, some of which were several hundred hectares in size; presumably, these would have been used mainly in forage production for livestock.

Between 1955 and 1960 the GOH constructed the dam at El Coyolar, above Flores. It also established diversion dams on the San José River and canal delivery systems for Flores in the southeast sector of the valley. During the same period, the government constructed a diversion dam at El Taladro on the Selguapa River and a canal distribution system for the Selguapa District in the northwestern sector.

Distribution of land holdings is skewed in the valley as in other parts of Honduras. According to the 1974 Census of Agriculture, 71% of farm units were less than 5 ha, but these accounted for only 13% of the total land area in farms. Nevertheless, many small and medium-size farmers do own land on the valley floor, and the good lands are not strictly the domain of large farms. Since 1974 agrarian reform has managed to redistribute about 10% of the land in the valley. Distribution of land holdings will be discussed at greater length in chapter 3.

As demonstrated earlier by Halcrow (1972) and CATIE (1984), the smaller and medium-size holders tend to concentrate on basic grains and horticulture, whereas larger farms are devoted more to livestock production. The following discussion explores changes in crop and livestock production during the past decade.

Crop Production

While the database for exploring changes in crop and livestock production is limited, probably more information is available for this region

than for most other rural areas of Honduras. Of course, there are the 1961 and 1974 Censuses of Agriculture. The ODA undertook a detailed study of the valley and its water resources from 1969 to 1972. The study was published in 1972 and 1973 in a six-volume report by the contractor, William Halcrow and Partners. This was followed by a study by SRN and Desarrollo Integral del Valle de Comayagua (1975), by several studies of soils and land use (Direccion del Catastro, 1982, 1983, and 1985); and by CATIE's study of the area's farming systems (1984).

In 1985, SRN's Sectoral Planning Department made a detailed farm survey of the entire Department of Comayagua. The planning department provided the study team with information relating to the valley from this survey.

There are problems in trying to compare data from these different sources of information. Each one defines the valley in a somewhat different way. For example, the Halcrow study was based on physical criteria that resulted in an estimate of 38,000 ha of farm area for the valley. To use census data, however, it is normally necessary to go according to municipalities, even though most of the area's municipalities contain higher areas which may fall outside the valley per se. Oddly, the 1961 census measured 70,700 ha in the nine valley municipalities, whereas the 1974 census found only 53,900 ha. The Catastro survey of land use (1983), based on aerial photos and physical criteria, measured 41,800 ha.

Land devoted to agricultural purposes seems to have increased from 1961 to 1974, with about 22% more area being devoted to annual crops and 33% more to permanent crops (see table 8). Area in managed pasture appears to have remained stagnant, and the amounts of forest land and natural pasture appear to have declined. Nevertheless, the reduction in overall area covered by the 1974 census makes it impossible to draw a firm conclusion on this.

The 1982 aerial survey conducted by Catastro uses a different classification of lands than the census (see table 9). It identifies lands that are rotated between basic grains and pastures and between basic grains and vegetables, rather than assigning them to one category or the other. Nevertheless, the sum of the first five categories containing annual crops in table 9 is 11,502 ha, which is less than the 12,845 ha in annual crops measured in the 1974 census. Land in permanent crops was found to be 845 ha by the 1983 Catastro study compared to 3,533 ha by the 1974 census.

It is doubtful that these differences correspond to lands technically outside the valley that would be included in the census but not in the Catastro physical area: lands outside the valley are more likely to be in forest, natural pasture, or open space, with relatively little area being cropped (with the possible exception of coffee on the higher slopes). Therefore, it is difficult to reconcile the differences between the Catastro and census data. Nevertheless, the Catastro data contains no indication that cultivated area has been greatly increasing in the valley.

Table 8. Land use in Comayagua Valley according to 1961 and 1974 Censuses of Agriculture.

Land area devloted to:	Area		Percent of total	
	1961	1974	1961	1974
	...hectares....			
Annual crops	10,544	12,845	14.9%	24.3%
Permanent crops	2,655	3,533	3.8%	6.7%
Fallow	4,444	5,227	6.3%	9.9%
Natural pastures	17,262	5,182	24.4%	9.8%
Managed pasture	23,044	23,074	32.6%	43.6%
Woods & forest	10,991	2,514	15.5%	4.7%
Other	1,760	576	2.5%	1.1%
TOTAL	70,700	52,951	100.0%	100.0%

Table 9. Land use in Comayagua Valley according to 1982 survey conducted by Dirección del Catastro.

	Hectares	Percent of Total
Basic grains	1,333	3.2%
Tobacco	614	1.5%
Basic grains x pasture	7,031	16.8%
Basic grains x vegetables	2,135	5.1%
Vegetables	389	.9%
Citrus	167	.4%
Mango, papaya, etc	664	1.6%
Coffee	17	.04%
Sugarcane	6	.01%
Experimental farms	23	.1%
Poultry farms	8	.02%
Natural pasture	3,556	8.5%
Natural pasture-matorral	5,130	12.3%
Managed pasture	13,145	31.4%
Forest	617	1.5%
Forest-matorral	5,719	13.7%
Population Centers	1,199	2.9%
Military centers	83	.2%
Penitentiary	14	.03%
TOTAL	41,850	100.0%

Source: Direccion Ejecutiva del Catastro, 1983, p.41.

It is also possible to make a comparison of cropping patterns, that is, the areas devoted to specific crops. There are essentially three sources of data on cropping patterns in the valley. Halcrow (1972) reports on areas cropped during the time of that study, presumably about 1970. There is no description of how the data were collected, but it is likely that they came from observation and discussions with farmers rather than from systematic census or survey. Halcrow reported 7,835 ha cropped during the year, of which 78% were in basic grains, 18% in vegetables and other annual crops, and 2% in permanent crops (see table 10).

Data from the 1973-74 Census of Agriculture is included in table 10 for comparison. The total crop area of 8,967 ha is 14% greater than that reported by Halcrow, but the proportion devoted to basic grains is almost the same. Many more vegetables are identified in the census, which counts tomatoes at 1,286 ha compared to Halcrow's 435 ha. Onions, on the other hand, are much lower in the census than in Halcrow. It is doubtful that these differences represent actual changes over such a short period. Overall, the census data is probably much more reliable.

The recent 1985 SRN survey data may be used for comparison to the 1974 census (see table 10). The sample for the 1985 survey covered 732 fields representing some 9.4% of the farm area in the valley. The degree of sampling error is expected to be relatively small, but it would be proportionally larger for minor crops, for which relatively few fields were represented in the sample.

The 1985 study shows that about 12,895 ha were cropped during the 1984-85 crop year -- about 44% more than in 1973-74. Basic grains expanded by 31% during the period, vegetables increased by 42%, tree-fruit area increased by 142%, and sugarcane declined by 38%. The comparison may be somewhat distorted in the case of coffee. No census data were encountered for coffee in the valley in 1973-74, although there undoubtedly was some area in coffee at that time. Furthermore, the 1985 study may include some coffee in fields which lie outside the valley per se. Current field observations show that coffee is a growing phenomenon in the valley, as some lowland varieties that do not require shade have been imported into the area.

Information is also available on two of the government irrigation districts, Flores and Selguapa (see table 11). These areas are characterized by smaller farms than many of the private irrigated areas in the valley. As table 12 demonstrates, area cultivated for basic grain increased dramatically (170% overall), particularly in rice, during the 16-year period involved. But increases were also significant in vegetable area (39%), fruit orchards (122%), and coffee (1,140%).

The overall 78% increase in area cropped in these two irrigated areas compares to a 65% increase between 1970 and 1984-85 for the valley as a whole (see table 10). The equivalent annual rate of increase in cropping area was 3.38% per annum from 1970 to 1985, and 3.36% from 1973-74 to 1984-85. Thus, expansion in area cropped is at least keeping up with population growth. The rate of growth also is greater in the

Table 10. Cropping pattern of the Comayagua Valley, 1970, 1974 and 1985.

Type of Crop	1970	1973-74	1984-85	Percent Change 1973-74 to 1984-85
	-----hectares-----			
Basic grains (a)	6,120	7,051	9,227	31%
Tobacco	100	153	196	28%
Vegetables:	840	1,609	2,283	42%
(Tomatoes)	(435)	(1,286)	(1,500)	17%
(Onions)	(280)	(180)	(375)	108%
(Cucumber)	N/A	(12)	(128)	968%
(Watermelon)	(125)	(25)	(137)	448%
(Others) (b)	N/A	(106)	(143)	34%
Other annuals(c)	590			
Permanent crops	185	154	1,190	673%
(Tree fruits)	N/A	(112)	(271)	142%
(Coffee)	N/A	N/A	(893)	N/A
(Sugarcane)	N/A	(42)	(26)	-38%
Total	7,835	8,967	12,895	44%

Source: Halcrow (1972), Census of Agriculture, 1974, and Ministry of Natural Resources, Department of Sectoral Planning, 1985 Farm Survey (draft)

N/A indicates information not available.

(a) Basic grains includes maize, sorghum, beans and rice.

(b) Other vegetables include cabbage, yuca, and chile peppers.

(c) Halcrow does not define these crops; they probably include other vegetables.

Table 11. Comparison of irrigated areas, Flores and Selguapa Districts, 1970 and 1986.

	Flores		Selguapa		Total		Percent Change
	1970	1986	1970	1986	1970	1986	
hectares...	hectares..	hectares..		
Corn	182.8	566.3	190.0	239.8	372.8	806.1	116%
Corn+beans	-	-	-	67.8	.0	67.8	N/A
Beans	10.8	56.2	2.0	6.8	12.8	63.0	394%
Sorghum	10.0	5.0	14.0	4.5	24.0	9.5	-60%
Rice	9.0	182.3	-	-	9.0	182.3	1,926%
Tobacco	40.8	14.9	12.0	-	52.8	14.9	-72%
Tomatoes	108.3	107.1	81.0	164.3	189.3	271.4	43%
Onions	7.0	3.1	111.0	191.0	118.0	194.1	64%
Cucumbers	-	1.9	18.5	38.0	18.5	39.9	116%
Cabbage	.8	-	1.8	2.8	2.5	2.8	10%
Watermelon	9.8	20.5	12.3	25.0	22.0	45.5	107%
Panteloupe	2.5	-	-	-	2.5	.0	-100%
Chile	17.3	35.4	15.0	12.8	32.3	48.2	49%
Puca	-	.9	50.0	.8	50.0	1.7	-97%
Apaya	-	1.3	-	26.0	.0	27.3	N/A
Other fruits	12.0	-	4.5	9.3	16.5	9.3	-44%
Coffee	1.8	42.0	2.0	4.5	3.8	46.5	1,140%
Sugarcane	2.0	-	-	3.5	2.0	3.5	75%
Pasture	111.5	29.6	31.5	48.4	143.0	78.0	-45%
Other	.3	-	-	9.25	.3	9.3	3,600%
TOTALS	526.0	1,066.5	545.5	844.9	1,071.5	1,911.4	78%

Source: Halcrow, 1973, Vol. 6; and Annual Report of Regional Office, Department of Hydraulic Resources, 1986.

Table 12. Changes in cropping pattern of Flores and Selguapa, 1970 to 1986.

Type of Crop	Area Planted		Percent Change
	1970	1986	
Basic grains	419	1,129	170%
Tobacco	53	15	-72%
Vegetables	435	603	39%
(Tomatoes)	(189)	(271)	43%
(Others)	(246)	(332)	35%
Fruits	17	37	122%
Coffee	3.8	47	1,140%
Sugarcane	2.0	3.5	75%
Other	143	78	-45%
TOTAL	1,072	1,911	78%

higher-valued crops (vegetables, fruits, coffee), implying that the overall value of production is increasing more rapidly than population and per capita value of production is increasing in the valley.

What about productivity? Table 13 shows average crop yields for selected crops for 1973-74 and 1984-85. It is normally appropriate to compare yields averaged over several years to dampen out the effects of weather, but the data are not sufficient to do that in this case. Nevertheless, the data suggest that yields for some of the more traditional grain crops -- corn, beans, and sorghum -- may be declining, whereas yields for crops such as rice, tomatoes, and onions may have increased. The information on tomato-yield increases seems to corroborate what observers who work in the valley report. Grain yields may be declining because more and more of the better land is being used for horticultural crops. Also, resourceful growers may be switching to vegetables, leaving the subsistence crops to resource-poor farmers with limited abilities.

While some crop yields may have increased, the overall yields shown in table 13 are still quite low by international standards. At 21 t/ha, for example, tomato yields compare to yields of more than 70 t/ha that are common in California. The planning department has reported yields of 42 t/ha for valley farmers receiving technical assistance (ADAI, 1965, p.50). Onion yields of 9 t/ha compare to yields of well over 45 t/ha under irrigation in the United States. They compare with yields of around 30 t reported by DRH for farmers with technical assistance (ADAI, 1965). Overall, there seems to be ample scope for improving yields in the valley. Nevertheless, yields of some of the region's growth crops such as tomatoes, cucumbers, and rice do seem to have been improving, and this has undoubtedly made a big contribution to the overall growth of the valley's economy.

Livestock Production

The Comayagua Valley has high density of livestock relative to the nation as a whole. The 1983 livestock census conducted by Latinconsult found 246,734 head of cattle in the entire Department of Comayagua, which represented 9.1% of the national herd. Density in Comayagua Department was 47.5 head/km², which was almost twice the national average of 24.1 head/km². SRN's 1985 farm survey provides information on which an estimate of the livestock population for the valley itself can be made: 47,888 cattle were held by recognized landholders in the valley at that time. Dividing by the 564.2 km² of total landholdings in the survey area, this gives an estimated herd density of 84.9 head/km², which is considerably higher than the averages cited above. The obvious conclusion is that the Comayagua Valley and the entire surrounding region constitute a significant livestock-productive area.

The 1985 survey data were also used to derive estimates of livestock other than cattle in the valley. The overall population estimates were as follows:

Table 13. Crop yields in the Comayagua Valley, 1973-1974 and 1984-1985.

Crop -----	Yield per hectare -----		Percent Change -----
	1973-74 -----	1984-85 -----	
	...metric tons.....		
Maize	1.65	1.41 (1.52)	-15%
Beans	.80	.16 (0.43)	-80%
Rice	1.70	3.37 (3.78)	98%
Sorghum	1.45	.92 (2.00)	-37%
Tobacco	2.40	1.10	-54%
Tomato	13.20	21.20 (56.70)	61%
Onion	6.75	9.15 (8.48)	36%
Watermelon	12.20	8.33 (10.45)	-32%

Source: 1974 Census of Agriculture and 1985 SRN Farm Survey

N.B. Figures in parentheses for 1985 are for Agrarian Reform groups whereas other figures are for the main sample of farmers in the "non-reform" sector.

Cattle	47,888
Oxen	2,654
Hogs	2,321
Goats	217
Horses/mules/donkeys	7,819
Poultry	41,028

The estimated 47,888 head of cattle in the valley in 1985 compares to 39,038 head counted for the nine valley municipalities in the agricultural census of 1973-74 (CATIE, 1984, p.69). While the study team has some reservations about the direct comparability of these two figures, they nevertheless imply a total herd growth of 23% during the 11-year period, or an annual rate of 1.88%. In other words, the cattle herd has not been expanding as rapidly as the human population, which is growing at about 3.5% per year, or as fast as the 3.38% rate at which the cropped area is expanding.

It is not possible to estimate changes in livestock production or productivity per se, since production data are far more limited for livestock than for crops. However, the generally slower rate of growth for herd size is probably indicative of overall production trends for livestock. This sector has not been the focus of the same level of development effort that the crop sector has received. The area devoted to managed pasture has not been increasing, and natural pasture area may be declining (see tables 8 and 9).

Historically, livestock production in Honduras and in Comayagua has depended on extensive use of land, which may have made more sense in an era when human population densities were lower. Livestock was the business of large haciendas while crop production was the province of small and medium-size farms. Population growth pressure has tended to divide the land into smaller holdings and has left less open space for grazing cattle. During the past decade, agrarian reform has also played a role in changing the situation. More than 5,500 ha in the valley have been redistributed to reform groups. Most of this land came from farms that were larger than 100 ha in size and that probably had been devoted mainly to cattle production. Under the reform groups, which average 5.6 ha per member, the land is now used almost exclusively for crops.

Not only do crops compete with livestock for land, they compete for irrigation water. During the annual dry period, from December through May, green forage becomes scarce in the valley. Many of the large haciendas have developed their own irrigation systems and used these to irrigate some pasture to better carry their herds through the dry period. Initially, some irrigation water in the government irrigation districts was used for these same purposes. Over the past decade, however, the policies of these districts have changed, and low priority is given to requests for water to irrigate pasture -- for that matter, even to requests for irrigating basic grains. Rather, horticultural crops receive first priority.

The importance of precipitation, irrigation water, and pasture management to livestock production in the valley are clear. SRN's 1975 study

on the development of the valley indicated that livestock densities varied from as high as 2.5 head/ha (250 head/km²) in the National Livestock Center (which has a good, year-round water supply and excellent pasture management practices) to as low as 0.57 head/ha in areas at the head of the valley that do not have irrigation (SRN, 1975, p. 126).

Two technologies show promise for overcoming the irrigation-water constraint in livestock-forage production. Ensiling forage in the months when rainfall is abundant permits its carryover to the dry months. Irrigation of a small area of elephant grass (locally known as "king grass") will provide enough forage to carry a relatively large number of animals in the dry period. Both of these practices are taking hold in the valley and are being promoted by the National Livestock Center and the Regional Livestock Department.

The make-up of the livestock herd in the valley is mixed, but the general tendency is toward dual-purpose animals. Catastro's 1982 land-use survey found that 80% of survey farms reported ownership of Brown Swiss, 60% reported Brahmas, and 54% had Holsteins. With the National Livestock Center located in the valley, high-quality genetic material is readily available. However, most herds are a mixture of several different breeds and crosses.

In the long run there is ample scope and need for further development of the livestock industry. It would be unwise to build the entire economy on high-valued horticultural crops since horticultural production and marketing are naturally risky and unstable, whereas livestock tends to be just the opposite. Nevertheless, to coexist with irrigated crop farming, livestock production will need to become more intensive than it has been in the past and thus more economical of its use of land and water. Particularly with the use of improved forage technologies, such as those mentioned above, livestock production can complement crop production quite nicely.

The natural tendency is to concentrate more on milk production as transportation and market access improve and since milk constitutes a more economical form of protein than meat. The Catastro land-use survey found that 22% of the cattle were kept for milk, 25% for meat, and 53% for both purposes (Dirección del Catastro, 1983). Nevertheless, milk accounts for the greater value of product, by far: the 1985 farm survey found that milk constituted 71% of the total value of livestock production in the valley.

The Catastro survey found that 71% of producers sell their milk to "private individuals" whereas only 3% sell to a dairy plant (Leche Sula); 11% reported using milk to make derivative products, presumably cheese; 6% went to family consumption; and 9% was fed to calves (Dirección del Catastro, 1983).

The Comayagua Valley suffers from not having more direct access to a dairy plant, with the closest plant located in San Pedro Sula, a warm drive of 170 km to the north. During the past year or so the Fruta del Sol cooperative has attempted to organize a milk-collection center for

assembling and shipping milk to the Leche Sula plant; reportedly, this has met with mixed results so far.

Currently, the main dairy company in Tegucigalpa bases its product on imported powder and does not purchase fresh milk locally. However, pressure is being brought to bear on this company to shift to a fresh liquid base. If this happens it should constitute a major breakthrough for Comayagua producers and could lead to a major impetus for dairy development in the valley.

Farm Income and Value of Production

How well do the farmers of the valley do in relation to other farmers in Honduras? While there is no current income information, SRN did conduct a national farm survey for the 1979-80 year. With the help of ADAI consultants, the study team tabulated this data to draw a comparison between valley farmers and farmers in Comayagua Department and Honduras as a whole. The results are shown in table 14.

The comparative income figures indicate that for farmers with less than 5 ha of land (67% of all farmers in Honduras and 9% of the land area), the average annual net income from all sources was Lps 373 per farm (Lps 62 per person) in the Comayagua valley. This was 18% lower than the Lps 453 per farm earned on farms of this size in Honduras as a whole. For all farms in the valley, however, the average income in 1979-80 was Lps 8,974, which was 52% greater than the Lps 5,921 average for Honduras as a whole. What this says is that small farms in the valley do slightly worse than Honduran farms as a whole but that medium and larger farms in the valley do substantially better. Income distribution is more skewed in Comayagua than in Honduras as a whole -- a somewhat disturbing distribution pattern that we will come back to in chapter 3 in the discussion of access to land and water.

More recent figures for farm income are not available at the national level, but it is possible to make estimates for the valley by using data collected from SRN's 1985 farm survey. So far, however, these data have only been calculated for gross income and not net income. Table 15 shows the average per-family gross income for the stratified random sample of 729 farm families. The average gross income per family was Lps 9,032, which is less than the average net income figure (Lps 10,580) for the 1979-80 survey. Incomes for the smaller farm sizes are higher than the corresponding figures from 1979-80, as would be expected. However, incomes in the larger sizes (more than 10 ha) are all lower. The SRN income data for 1985 (still available only in draft form) appear to have been tabulated incorrectly. Nevertheless, some of the relationships that are suggested by table 15 seem noteworthy.

The interesting point is that the 1985 data show income composition derived from livestock and crop production and other sources. Crop income represents 42% of the total for the entire sample, whereas livestock income (27%) is in third place after other income (31%). Small farms rely much more on crop income than on livestock income. On a per-hectare basis, however, the value of livestock production on small farms (Lps 205 per hectare of farm area) is higher than the per-hectare value

Table 14. Net farm incomes in Comayagua and Honduras, 1980.

	Farm Size Class						All farm
	< 5 ha	5-10 ha	10-20 ha	20-50 ha	50-100 ha	> 100 ha	
Honduras:							
No. of survey farms	6,968	1,114	699	657	342	368	10,141
Avg. Income (Lps)	453	2,323	4,052	11,137	17,847	103,496	5,921
Dept. of Comayagua:							
No. of survey farms	431	68	37	28	15	28	607
Avg. Income (Lps)	430	3,049	4,941	16,041	17,504	105,040	6,966
Comayagua Valley:							
No. of survey farms	252	31	9	20	10	16	338
Avg. Income (Lps)	373	2,434	6,537	18,074	23,780	137,853	8,974
Comayagua Valley Net Income as a Percent of Net Income in:							
Dept. of Comayagua	87%	80%	132%	113%	136%	131%	129%
Honduras	82%	105%	161%	162%	133%	133%	152%

Source: Department of Statistics and Census, 1979-1980 Farm Survey

Table 15. Gross income of farmers, Comayagua Valley, 1985.

	< 5 ha	5-10 ha	10-20 ha	20-50 ha	50-100 ha	> 100 ha	Total
Gross per family (Lps)							
Total	3,827	7,370	10,443	15,800	28,509	30,028	9,032
Crop income	1,947	3,249	6,396	5,979	7,585	2,128	3,764
Livestock income	454	1,152	1,810	4,327	13,591	24,960	2,429
Other income	1,426	2,968	2,236	5,494	7,333	2,940	2,838
Percentage of total							
Crop income	51	44	61	38	27	7	42
Livestock income	12	16	17	27	48	83	27
Other income	37	40	21	35	26	10	31
Gross per capita (Lps)	625	1,277	1,718	2,899	4,193	5,005	1,505
Gross income per total ha of farm area (Lps)							
Crop	881	432	425	194	104	11	233
Livestock	205	153	120	140	186	125	151
Total	1,086	585	546	334	290	135	384

Source: Analysis of study team based on data from SRN, Department of Sectoral Planning Comayagua Farm Survey, 1985.

Note: This table is based on a sample of 732 farmers; figures for farms with more than 10 ha are too low. Evidently there was a error in tabulating the data.

Table 16. Gross agricultural product, Comayagua Valley, 1985.

	Area	Product	Yield	Value/ Ton	Value/ Area	Total Crop Value
	(ha)	(mt)	(mt/ha)	(Lps/mt)	(Lps/Ha)	(Lps)
Maize	5,565	7,860	1.41	331.8	469	2,607,985
Beans	921	386	.42	1026.8	430	396,032
Rice	557	1,899	3.41	457.4	1,558	868,371
Sorghum	351	371	1.06	243.4	257	90,321
Soybeans	26	30	1.17	725.9	852	21,923
Grain associations	1,905	N/A	N/A	N/A	316	601,952
Sub-total, Basic Grain	9,325				492	4,586,583
Forage crops (guatera)	44	238	5.34	111.3	595	26,445
Tobacco	196	216	1.10	4472.7	4,924	964,301
Tomatoes	1,500	34,625	23.08	237.7	5,488	8,232,015
Onions	375	3,406	9.09	227.4	2,068	774,661
Watermelon	127	1,082	8.54	316.7	2,703	342,661
Cucumbers	129	2,111	16.42	330.3	5,424	697,215
Chile Peppers	138	1,175	8.53	686.7	5,859	807,054
Yuca	11	72	6.32	253.7	1,605	18,234
Cabbage	4	14	3.90	219.9	857	3,176
Sub-total, Vegetables	2,283				4,764	10,875,016
Bananas	117	250	2.14	65.0	139	16,240
Avocados	41	115	2.83	506.2	1,431	58,396
Mangos	38	69	1.84	168.0	309	11,660
Papaya	7	38	5.19	274.8	1,427	10,576
Oranges	7	5	.65	110.1	71	529
Lemons	2	5	2.60	989.0	2,571	4,764
Miscellaneous fruits	59	207	3.49	580.6	2,026	120,454
Coffee	849	730	.86	3096.1	2,662	2,260,538
Coffee assoc. w/ fruits	61	N/A	N/A	N/A	1,338	81,803
Sub-total, Tree Crops	1,182				2,171	2,564,960
Sugarcane	26	53	2.06	904.0	1,861	48,264
TOTAL, All Crops	13,055				1,460	19,065,570
LIVESTOCK PRODUCTION						Total Value
	Total Herd Size	Units of Product				
Cattle	47,888 animals	26,233 offspring				2,141,966
		12,874 1000 bottles				5,636,022
Hogs	2,321 animals	N/A offspring				214,673
Poultry	0 birds	44,509 birds				93,096
		223,175 dozen eggs				465,520
TOTAL, All Livestock Products						8,551,276
TOTAL, CROP and LIVESTOCK VALUE.....Lempiras						27,616,846

(Lps 186) on large farms (50 to 100 ha). Crop-production value per hectare on small farms (Lps 881) is more than eight times as high as the corresponding figure on farms in the larger size category (Lps 104 per ha). In short, small farms depend on crop income and off-farm work, but they are also intensive producers of livestock products, considering their size.

The gross farm production for the entire valley is shown in table 16, which is based on information from the 1985 survey. The total value is Lps 25.5 million, of which 69% is attributable to crop production and 31% to livestock. Within crop production, however, vegetables account for 17% of the total cropped area but 55% of the value of production. Tree crops, with 9% of the cropped area, account for 15% of the value of output. Basic grains, while still accounting for 71% of the crop area, contribute only 25% of the value of crop products.

The data in table 16 imply that the overall value of production in the valley has expanded much more rapidly than the cropped area per se, this resulting from the area in higher-valued vegetables and fruits expanding more rapidly than the area in lower-valued basic grains.

By comparing the 1984-85 data (table 16) to the Halcrow team's estimate of value of production in the 1970-71 crop year (1972, p.19), the relative importance of such crops as tomatoes, cucumbers, and rice to the overall development of the valley becomes clear (see table 17).

Table 17. Changes in value of production in the Comayagua Valley, 1970-1971 to 1984-1985.

	<u>1970-71</u>	<u>1984-85</u>
Total value of production, Lps	3,898,725	27,058,230
Percentage attributable to		
Livestock	43 %	30 %
Basic grains	15 %	17 %
Maize	8 %	11 %
Sorghum	5 %	1 %
Rice	0.08%	3 %
Vegetables	33 %	40 %
Tomatoes	7 %	30 %
Cucumbers	0.3 %	2.6%

Sources: Halcrow, 1972 (p.19) and table 16.

Constraints to Agricultural Development

Earlier studies have identified a number of factors that constrain the further development of the valley's agriculture. The Halcrow team writing in 1972-73 pointed to the need to improve the valley's irrigation infrastructure. That study observed that farmers seemed to be using the

available irrigation resource at a relatively low level. (The use of water resources is discussed at length in chapter 4). Furthermore, the study pointed to the need for increased technical assistance and credit and for improved markets. It particularly singled out the need to develop export markets for horticultural crops in view of the limited capacity of the domestic market to absorb fruits and vegetables (Halcrow, 1972 and 1973).

The more recent CATIE study (1984) echoed most of these same findings. In addition, CATIE pointed to the need for new dryland (secano) technologies to assist the valley's many small farmers in producing basic grains.

Technical Assistance

There are ample signs of technical change and improvement in the valley. New vegetable and grain crops (rice) have been introduced. Judging by the well-stocked chemical stores and chemical advertisements in Comayagua, farmers are using more chemicals and fertilizers. Motorized pumps are in evidence. Trucks haul tomatoes and other crops down the roads. Yet yields are not very high. Tomato and onion yields around the valley are much lower than on demonstration plots. Basic-grain yields are no higher than they were 15 years ago. Why?

Despite many obvious signs of technical advancement, some persisting problems are also evident in the valley. While the area cropped has expanded by some 78% during the past 15 years, the overall intensity of land use in the valley is still relatively low. While farmers interviewed in the 1985 survey reported that 69% of their land was cultivable, only 22% was cultivated. Why?

The SRN has greatly expanded its technical-assistance capabilities and activities. It does research in both basic grains and horticultural crops. It has recently been attempting to do better jobs of fitting its recommended technical practices to farmers' circumstances and of addressing the critical needs identified by farmers themselves. SRN has had good support in this regard from IDRC and CATIE. Exposure of valley farmers to technical assistance has risen (see table 18). For all farms together, technical-assistance contacts increased from 3% in 1974 to 19% in 1985. The change in distribution of contacts among farm sizes is dramatic, with the emphasis having been shifted from large to medium and small farms.

In 1985 the number of farmers with fewer than 5 ha who received technical assistance was only 19%, compared to 27% for farmers in the 5 ha to 10 ha class. Evidently the assistance efforts are not reaching quite as great a proportion of the smallest farmers.

SRN was the agency responsible for the greatest number of farmer contacts -- 53%. BANADESA accounted for 15% and IHMA for 14%.

Table 18. Comparison of technical assistance contacts reported by Comayagua Valley farmers, 1973-74 and 1984-85.

Size of Class	Percentage of farmers in class reporting use of technical assistance	
	1973-74	1984-85
0-10 ha	1.8	19
10 - 50 ha	3.5	27
> 50 ha	20	17
Total	2.8	19

Source: 1974 Agriculture Census as reported in SRN (1975) and SRN/DPS 1985 farm survey.

Agrarian-reform groups reported relatively high use of technical assistance. Of the 48 groups in the valley, 44 (91%) reported having one or more kinds of technical assistance. Of these, 39 reported working with INA and 33 had contact with MRN.

Farmers' cooperatives have also become active in technical assistance. Fruta del Sol employs an agronomist to work with its growers. Between 1982, when the cooperative was officially formed, and 1986-87 the yields of exportable cucumbers produced by the co-op's growers increased from 750 boxes/ha to 1,400 boxes/ha.

The demonstration project farm established in 1986 by FHIA is expected to play an important role in testing and verifying improved techniques for growing export crops. This farm is just getting started, and it is too early to determine how it will operate ultimately. Until now, FHIA has not organized its procedures for outreach and it does not have well-established linkages with other agencies. While data are being collected on the costs of production and on the results of practices being tried on the farm, no attempt has been made to collect comparable data on typical valley farmers to see how they compare or to help understand how applicable FHIA's practices and experiences are to regular farmers. Consequently, there is a limited awareness of prevailing problems and circumstances for farmers. FHIA clearly has the potential to make a real contribution to the development of new and improved export crops for the valley, once procedures to overcome these initial problems are worked out.

Tractor services appear to be limited. Several people pointed to the need for deep plowing, but little of this is done so far. PROMECA does not appear to function well, and private machinery-rental services are not always good. Divesting PROMECA into the private sector could help.

Credit

Obtaining access to sufficient credit is a continuing problem for valley farmers that constrains expanding production and fuller use of available land and water resources. Often, the investment required to use an improved technology can be substantial. For example, growing costs for tomatoes are estimated at Lps 10,800 (\$5,400) per hectare for farmers who employ recommended techniques, whereas normal practices require only Lps 2,800 per hectare (ADAI, 1985, p.50). Credit use has improved somewhat during the past decade (see table 19).

Table 19. Comparison of credit use by valley farmers, 1973-1974 and 1984-1985.

Size of class	Percentage of farmers in class reporting use of credit	
	1973-74	1984-85
0-10 ha	6	11
10-50 ha	17	18
> 50 ha	49	17
Total	9	13

Source: 1974 agricultural census as reported in SRN (1975) and SRN/DPS 1985 farm survey.

While the proportion of farmers using credit did not increase dramatically from 1974 to 1985, the distribution of credit among farms does seem to have shifted, as was the case with technical assistance. Whereas only 6% of farms with fewer than 10 ha were receiving credit in 1974, 11% were receiving credit in 1985. Data for 1985 permit division of this class into two size groups. Whereas 9% of farms with fewer than 5 ha received credit, almost 20% of those in the 5 ha to 10 ha size group received it. Thus, credit use among the smallest farms is still very low while the percentage of large farms (>50 ha) using credit has dropped. Credit use among middle-size farms (5-50 ha) has improved.

BANADESA dominates agricultural credit in the valley and was responsible for 68% of all loans reported by farmers in 1985. 17% reported receiving loans from friends and other sources, while 7% reported dealing with either IHCAFEE or BANCAFE, and only 6% reported working with private banks.

Of the 48 agrarian-reform groups, 23 reported having access to credit; 12 of these reported working with BANADESA, one with a private bank, and 10 with a variety of other sources.

Cooperatives appear to offer hope of improving credit availability for small farmers. Fruta del Sol has been expanding its credit program

with its growers, and CARCOMAL is actively promoting greater use of credit among its members. By acting as intermediaries to package and review loan submissions of individual growers, and by assuming a part of the risk, the cooperatives remove some of the obstacles that banks have in dealing with small farmers. Reportedly, the performance of the portfolios of these co-ops is improving.

BANADESA, the primary agricultural lender, faces tremendous problems in expanding its lending program (see Chapter 4). As a public agency the bank suffers from many pressures that are beyond its control. Much of its portfolio is related to the reform sector, and performance of these loans has been extremely poor. The Comayagua agency of the bank reported that 95% of its loans to the reform sector are in arrears. Of the agency's loans to other farmers, 21% were reported to be in arrears (the national average for the bank is 4%). The higher delinquency rate in Comayagua was attributed to the fact that the bank makes more loans in Comayagua than in other areas.

Marketing

Marketing is one of the factors most frequently cited as an obstacle to development in Comayagua. While there will undoubtedly continue to be marketing problems, several important advances have been made in marketing and much of the groundwork has been laid for future improvement. Also, the problems are different for domestic marketing than for export marketing.

Domestic marketing is ultimately limited by the small size and relatively low income of consumers in the Honduran market. Nevertheless, demand for food in this market is estimated to be growing at 6.85% per year (IRI, 1985), which implies that the demand for vegetables and fruits (which have high income elasticities) is growing much faster.

The complaint is often heard that the farmer is being ruined by the fluctuation of fruit and vegetable prices. ADAI (1985) analyzed the fluctuation of domestic prices for onions, cabbage, and tomatoes and demonstrated that the coefficient of variation for weekly tomato prices was on the order of 16% during 1982-84 (retail level), whereas for onions the coefficient was as high as 33%. Indeed, during its field visit to the Palmerola area the study team saw many farmers with mature crops of onions that were going unpicked because the market price had dropped so much they could not afford to pick them.

Unfortunately, this is the nature of fruit and vegetable markets in most countries. Prices tend to be highly variable from one time of the year to another and from one year to the next. This, coupled with variation in weather and technical conditions, makes vegetable production quite risky. Growers who know the market well and who have good relationships with buyers tend to learn how to operate successfully. It is a rough business for small, poorly financed growers with limited experience.

Another aspect of vegetable markets is that margins tend to be high. This reflects, in part, substantial handling losses and other high costs

of marketing. Accordingly, the farmer receives a small fraction of the price ultimately paid by the consumer.

Some of these obstacles may be overcome through market diversification; for example, by developing processing facilities and export markets. Both have been done with some success in the valley. The Mejores Alimentos processing plant buys about two-thirds of the tomatoes produced in the area and it provides a stable price of Lps 200 per ton for about 6 months of each year. The packing facilities built by Fruta del Sol may be able to take over some of the primary assembly functions for fruits and vegetables grown in the valley, thus letting local farmers earn a larger share of the marketing bill.

Onions offer neither significant processing opportunities nor export possibilities; however, certain varieties of onions continue to be imported during some seasons (ADAI, 1965, p.40; IRI, 1985, p.239), and it appears that these needs can be met by local production if Comayagua growers can learn to produce the right item at the correct time of the year.

In general, Comayagua is extremely well located and has excellent access to the domestic market. A large number of buyers are located in the valley or visit it regularly. Sales of vegetables to the domestic market have expanded regularly and should continue to do so, provided that the valley can continue to expand its output and remain competitive. While domestic marketing of vegetables will require continued attention, this can no longer be cited as a bottleneck to the valley's development.

Export marketing presents different needs than domestic marketing. For one thing, the quality requirements for exportation are much higher than for domestic sales. The valley has been exporting significant amounts of vegetables, especially cucumbers, for a relatively short amount of time and still has many lessons to learn. In comparison to competing producers such as Mexico, Honduras is located a long distance from its main markets in the United States and transportation costs are high. Because the capacities of Comayagua and Honduras are still relatively small, it is difficult to work with a large number of brokers or in multiple markets in the United States.

The number of institutions that have been established to work in the export market is encouraging. This includes not only Fruta del Sol but now more recently the FHIA/FEPROEXAAH Farm and such private entities as Agro Internacional and Rezco.

There is still an urgent need to strengthen these institutions and to support their working together in cooperation with other institutions in the valley. Procedures must be developed for the lessons learned by the FHIA Farm to be transmitted readily to Fruta and SRN and to ensure that the programs of FHIA, SRN's Vegetable Research Station (La Tabacalera), and the new irrigation-research station (CEDA) are complementary.

The building blocks required to improve export marketing all appear to be in place. The problem is how to ensure that they are used as effectively as possible.

CHAPTER 3 RESOURCE AVAILABILITY AND USE

The agriculture and economy of the Comayagua Valley are based on a varied set of resources, including soils and water that will support highly diverse cropping systems. Further, the valley enjoys a substantial complement of infrastructure. These resources are not uniformly distributed, however, and quality varies from zone to zone. Access to these resources and the institutions that regulate their use are important considerations.

This chapter begins with a short discussion of physical infrastructure, including roads and communication facilities. The following section discusses the valley's climate, rainfall, and water resources. Land resources, including soils and soil capabilities, land distribution, and access to land are then discussed. The final section of the chapter examines the valley's irrigation system and irrigation potential, including the existing irrigation infrastructure and the institutions that operate and regulate the use of the irrigation resource.

ROADS AND COMMUNICATION FACILITIES

The valley is approximately 40 km long and 25 km wide and contains 9 municipalities and 88 villages and hamlets. (The full physical area of these municipalities is 2,088 km², counting the surrounding highlands, which lie outside the valley per se). According to the 1983 Catastro study, the valley has a total of 421 km of roads. These are classified as follows:

Paved roads	39 km
Two-lane dirt, all weather	28 km
One-lane dirt, all weather	66 km
Dirt road, dry weather only	288 km

Total	421 km

This averages to 0.2 km of road per km² of surface area, which is 24% higher than the national average. The road system connects all of the municipal centers and most of the secondary towns and hamlets. The main national highway from Tegucigalpa to San Pedro Sula runs north and south through the valley, along the eastern side of the Humuya River. It connects Flores, Villa de San Antonio, and Comayagua. In general, the road network along the eastern sector is the best, and access to the southwestern side is poorer, reflecting the lower population densities and lower levels of agricultural activity in the southwest.

Regular bus service is available between the major towns of the valley. From Ajuterique, for example, a person may take a bus to either La Paz or Comayagua.

The valley roads seem generally adequate in length and number, although many are in rough condition and present access problems for farmers in some areas. There appears to be no mechanism for maintaining local roads once they are built. The roads within the GOH irrigation-project area probably will be cared for by the Department of Hydrological Resources (DRH) from its operating budget. However, this budget does not seem to be adequate to keep the canal systems in proper working order, let alone to maintain roads. The valley would benefit greatly from establishing sources of local funding and maintenance for its roads.

Most of the major towns and villages of the valley are connected to the Canaveral regional electric network, but few farms and rural houses are electrified. The municipalities all have post offices and most have telegraph and telephone offices. Most of the municipalities have some form of piped water system, although many of these, including the system in Comayagua city, are reported to be inadequate for current populations.

Most areas of the valley have reasonably good access to health-care facilities. Comayagua has a well-equipped and -staffed regional hospital, whereas La Paz has a small area hospital (CHAR). Other municipal centers have small clinics known as rural-health centers (CESAR).

CLIMATE AND WATER RESOURCES

Temperature, Humidity, and Precipitation

The valley ranges in altitude from about 500 m to 1,000 m above sea level, with an average elevation of 625 m. Temperatures at this altitude are warm the year-round but seldom too hot or too cold. The mean annual temperature is 24.5°C (76°F), while the average minimum is 16.8°C. In a few areas, the minimum temperatures can reach as low as 5.5°C in January and February, but this is extremely rare and normal conditions support good crop growth during the winter months when crops will not grow in most parts of the United States. The average maximum temperature is 32.2°C, although temperatures can sometimes exceed 37°C (100°F) in April and May (see table 20). Halcrow (1972) and CATIE (1984) contain more detailed information and maps, which show how temperatures vary throughout the valley.

The area is relatively dry during most of the year, with average humidity ranging from an average of 53% in April to a high of 78% in December. Naturally, humidity is lower in the months with lower precipitation. Low humidity is a distinct advantage in the control of plant diseases and funguses known to attack horticultural crops. It offers the same advantage for the control of livestock diseases.

Precipitation varies from month to month and from location to location within the valley. The mean annual rainfall for the valley as a whole is estimated at 995 mm (Halcrow, 1972, Vol. 5, p.23). This varies from 985 mm near Comayagua city in the northeastern sector to 1,250 mm at Lejamaní in the northwest and to 966 mm at Flores in the southwest. The

Table 20. Climate, Comayagua Valley.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean temperatures	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Maximum	28.8	32.1	33.5	34.6	34.7	32.5	32.9	33.4	32.0	31.7	30.7	30.3	32.2
Minimum	14.2	13.8	16.3	16.7	18.1	18.0	18.0	18.0	18.2	17.3	17.3	16.5	16.8
Average	21.2	22.8	24.9	25.5	26.4	25.1	25.5	25.9	25.0	24.5	24.1	23.4	24.5
Relative humidity	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
percent	75	67	57	53	70	74	76	73	77	77	77	78	71
Precipitation	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
mean per month mm	10	11	19	34	110	174	124	160	197	144	39	16	1038
average no.of days	2	3	3	4	9	14	9	13	14	12	6	3	92

Source: CATIE (1984, Tables 1,2 and 3), attributed to Direccion de Recursos Hidricos

distribution of rainfall is bimodal, with peaks attained in June and September and with the annual lows coming in December through February (see tables 20 and 21). The pattern differs from one area to the next; for example, the peaks are more accentuated and the dry period is drier in Ajuterique than in Comayagua or Flores.

Evapotranspiration

Evapotranspiration potential (ETP) represents the amount of moisture required to sustain optimum growth of a full vegetative cover crop. It is a combination of transpiration (the amount that the plant itself takes up) and the amount lost from the soil in the form of normal evaporation. Crops that have only recently been planted and are not yet fully developed normally need only a fraction of the full ETP; many crops do not require as much moisture as a full cover crop. ETP depends on temperature and other factors such as solar radiation, humidity, and wind velocity. ETP for the Comayagua Valley is shown in table 21.

While ETP does vary with the season, in comparison to precipitation it is relatively steady throughout the year and from one year to the next. During the rainy season, normal precipitation exceeds ETP in the 5 months from June through October. Figure 4 compares ETP to rainfall in a normal (average) year. The months during which rainfall is less than ETP constitute the period in which rainfall will not support optimum plant growth. If supplemental moisture -- irrigation -- is not applied, plants will not produce a good crop or, in the extreme, they may die.

In actual practice, supplemental irrigation may be required even more than would appear to be indicated in figure 4 because rainfall, when it does occur in Comayagua, is often so intense that it runs off before the soil can absorb it; thus, not all moisture from the rainfall can be captured and used by plants.

During a low-rainfall year, ETP exceeds rainfall in most if not all months, indicating that supplemental moisture could be required throughout the year. Some plants (for example, grains such as sorghum) may withstand some moisture deficiency without their yields being greatly affected. These are the plants that are naturally adapted to a Comayagua-type climate. Other plants, especially cucumbers and most other vegetables, are extremely sensitive to moisture stress. Supplemental irrigation must be available at all times if these plants are to be grown successfully.

Following Halcrow, table 21 provides some calculations to indicate the kind of deficiency that can be expected between ETP and moisture available from precipitation. The maximum deficiencies are calculated on a month-by-month basis on the assumption that rainfall is at its minimum each month, whereas the minimum deficiencies are calculated by assuming rainfall is at its maximum for the month. The "mean deficiency" is then calculated by averaging the mean and the maximum deficiencies. This indicates that a deficiency of 559 mm/yr can be expected. This is the amount of moisture that would normally have to be made up by irrigation in the course of the year, assuming that there is plant growth requiring moisture at full ETP.

Table 21. Irrigation Water Requirements, Comayagua Valley.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual

Fifty percent probability of rainfall at:millimeters.....												

Comayagua	10	8	8	33	100	130	103	120	160	145	22	8	985
Lejamani	0	0	0	150	90	270	150	80	185	125	15	0	1250
Flores	1	4	5	15	170	180	110	120	190	80	10	2	966

Balance at Comayagua:	-----												
Mean rainfall	11	11	17	34	107	169	114	147	193	131	35	16	985
ETP	81	94	114	115	112	87	96	104	87	76	74	89	1129
Deficiency	70	83	97	81	5	-	-	-	-	-	39	73	448
Minimum rainfall	0	0	0	0	0	12	0	38	67	0	4	0	
Maximum rainfall	75	65	70	124	240	555	534	565	425	318	100	58	
Maximum deficiency	81	94	114	115	112	75	96	66	20	76	70	89	
Minimum deficiency	6	29	44	-	-	-	-	-	-	-	-	31	
Mean deficiency	43.5	61.5	79	57.5	56	37.5	48	33	10	38	35	60	559

Source: Halcrow (1972, Volume 6/1, p.118)

ETP = Evapotranspiration Potential

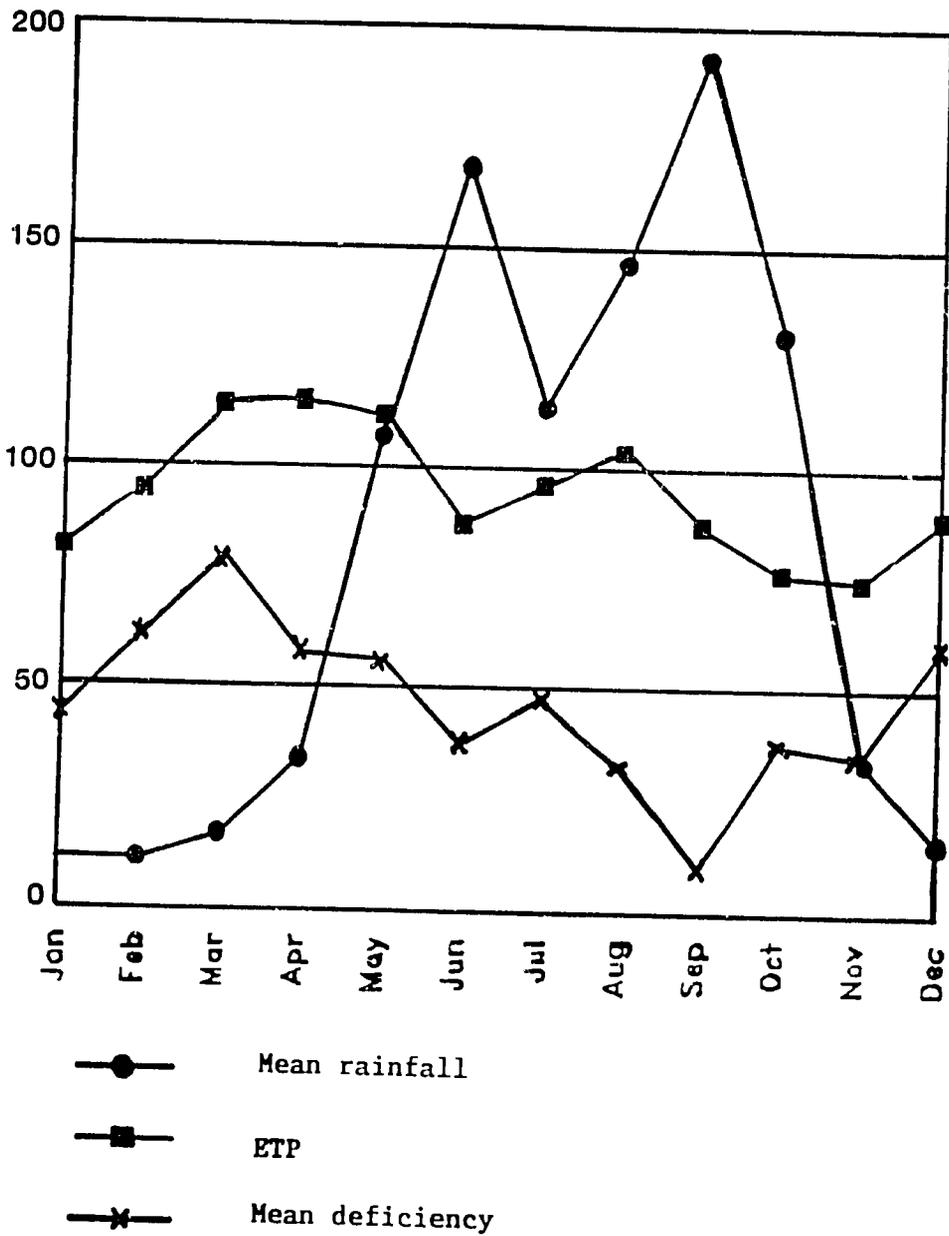


Figure 4. Rainfall and evapotranspiration potential in an average year, Comayagua Valley.

With a deficiency of 559 mm/yr, the per-hectare requirement to support year-round plant growth is $5,590 \text{ m}^3$ of irrigation water. That is, 0.559 m of water equals $10,000 \text{ m}^2/\text{ha}$ equals $5,590 \text{ m}^3$ of water to irrigate a hectare.

Surface-water Availability and Quality

Fortunately many rivers and creeks cross the Comayagua Valley. Not all areas of the valley have equal access to these streams, however, and the flow tends to rise and fall with rainfall. Streamflow is most abundant during the heavy-rainfall period when it is least needed. Some of the valley's smaller streams dry up entirely during the low-rainfall months. Nevertheless, some rivers do have year-round flow; indeed, a dam has been built at El Coyolar on the San José River to store water for use in the dry months.

Table 22 lists the major streams of the valley and shows their average annual flow in m^3 per second. The location of these streams is shown in figure 5. The main stream is known as the Humuya, and the basin that drains the valley is known as the Encantada Basin. The Humuya's main tributaries are the San José Rio (El Coyolar), which contributes 12.7% of the whole basin's flow, and the Selguapa or Taladro, which contributes 18%. The fact that none of the other tributaries accounts for more than 1% or 2% of the flow indicates the extent to which the river system is made up of many small tributaries.

Table 23 shows the probable monthly flows of the Humuya, measured at Las Higueras near Flores in the southern end of the valley, and at La Encantada, north of Comayagua. At La Encantada, the average annual flow is $22.8 \text{ m}^3/\text{sec}$. This amounts to an average 719 million m^3/yr . Following a very simplistic line of analysis, this would be enough water to irrigate 64,300 ha, even allowing for a 50% conveyance loss.

Of course, irrigation water would be needed most during the moisture-deficit months from October to May. Table 23 shows the probable monthly streamflows at Las Higueras and La Encantada. Only 35% of the basin's flow normally occurs during the 7 dry months; this would be enough to irrigate about 22,500 ha in a normal year (50% probability of having at least as much flow), again allowing for 50% conveyance loss. This is about three times the area currently being irrigated in the valley. In a dry year (which corresponds to the 90% lines in table 23), the flow would still be enough to irrigate 10,000 ha from the natural streamflow without storage. This is highly simplistic in the sense that it assumes that 100% of the streamflow could be used for irrigation in the dry months. Of course, this would not be possible and it underscores the desirability of having some storage in the system.

It is also necessary to consider the adequacy of surface water for irrigation in light of downstream needs for the El Cajon hydro-electric project. If the study team's information is correct, the flow of the Encantada basin represents 16% of the flow at El Cajon. Thus, a sharp increase of irrigation in the Comayagua Valley could have an adverse impact on the El Cajon project. Furthermore, irrigation is likely to

Table 22. Catchment and tributary flows, Encantada Basin, Comayagua Valley.

River	Catchment Area ----- sq. km.	Elevation at Gauge Point ----- meters	Mean Flow ----- cubic meters per second	Percent Encanta -----
Left bank -----				
Mura (viejo)	9.5	680	.08	.3
Salada	9.1	660	.05	.2
Punaguara	4.1	640	.02	.0
Tepanguara	15.2	660	.23	1.0
Sicaguara	14.4	660	.17	.7
Cance	26.3	660	.38	1.6
Selguapa (Taladro)	405.5	560	4.10	18.0
Guique	194.0	900	1.35	5.8
Right bank -----				
El Destilladero	14.7	880	.23	1.0
Santa Rosa	18.3	710	.11	.5
San Jose (El Coyolar)	191.5	760	2.90	12.7
Tujuaca	54.9	620	.36	1.6
Canquique	47.8	640	.71	3.1
Chiquito	55.6	560	.87	3.8
Main River -----				
Humuya (Humuya)	326	615	2.80	12
Humuya (Las Higueras)	1093	550	11.80	52
Humuya (La Encantada)	1930	510	22.80	100

Source: Halcrow (1972, Volume 6/I, p.100)

Table 23. Probable monthly flows of the Humuya River at two gauge points.

Percent Probability	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
cubic meters per second.....											
Las Higueras												
90%	.4	.5	.4	.4	.9	2.7	1.8	1.1	5.0	10.9	2.5	
80%	.8	.5	.5	.6	1.3	4.4	3.2	2.5	9.0	14.0	3.1	
50%	1.3	1.1	1.0	.9	5.4	19.0	11.5	6.5	21.0	22.0	5.5	
La Encantada												
90%	2.9	1.6	.9	.6	2.0	15.3	7.2	5.5	9.0	20.0	6.5	4
80%	3.2	1.9	1.5	1.5	6.5	16.8	7.8	6.1	25.0	32.0	9.0	5
50%	4.9	4.0	2.4	2.7	10.0	46.0	21.5	15.0	36.6	51.0	12.0	7

Source: Halcrow (1972, Volume 6/I, p.65)

remove the most water from the system during the drier months, precisely when El Cajon would have the greatest need for water.

Little is known about the quality of surface water in the valley. One agricultural engineer interviewed by the study team indicated that water from the Selguapa River has salinity problems, but this could not be verified. Water quality is a factor that should be verified before major decisions are made about irrigation in the valley.

Groundwater Availability and Quality

The valley's surface waters have usually been adequate for agricultural needs and there has been little reason until now to explore subsurface aquifers. Some farms in the area have drilled wells, but these normally have been used only for domestic purposes and livestock.

The Halcrow team bored several test wells during their work in the valley from 1969 to 1972. Some of these wells yielded substantial sustained flows. One well delivered 12.4 liters/sec. Full particulars are reportedly documented in the Halcrow report (1972, Vol. 6/III), which was not available to the study team for examination.

The Halcrow report (1982, Vol.2) concluded that development of suitable groundwater depended on either penetrating the valley's layer of alluvium, which is 150 meters deep in some areas, on finding natural faults that penetrate the alluvium, or on tapping the gravel fans to be found in some areas.

Recent experiences with drilling wells in the valley have had mixed results. A well was drilled at the FHIA Farm, adjacent to the Humuya River near Las Liconas, and salt water was encountered. However, informants at the site could not confirm the depth of drilling, and it is not clear that a deep aquifer was reached. A well drilled by Agro International near the Fruta del Sol site proved to have limited yield.

The groundwater question merits further study. Groundwater may prove to be a less expensive source for irrigation than surface water in some cases. It would be difficult for many farmers to bear the risks associated with locating groundwater, however, and development of better information by a public body seems to be justified.

LAND RESOURCES

The valley's topography is highly variable. Areas in the valley floor and along major streams tend to be flat, although the terrain is rolling in many of the intermediate zones, and some areas are divided by small canyons and ravines. The soils also vary widely in depth, texture, color, drainage capabilities, access to surface water, and natural fertility. Some lands scarcely support cattle grazing in the rainy season whereas others provide an excellent basis for irrigated agriculture.

Soil Classification and Capabilities

The Halcrow team was evidently the first to study the valley's soils in detail. They surveyed almost 33,000 ha but not the approximately 5,700 ha included within the boundaries of the two government irrigation districts, Flores and Selguapa.

As to distribution of soils within the valley, the Halcrow report noted:

The best agricultural soils are concentrated in the northern and central parts of the valley. These areas coincide with the greatest diversity of soil types. The soils distribution becomes increasingly simple to the south where large areas are covered with essentially similar deposits, although even here the thickness and degree of stoniness...is very variable (1972, Vol.5, p.52).

Based on examination of a large number of individual soil series, Halcrow arrived at the following classification, based on a U.S. Bureau of Reclamation system:

	<u>Area (ha)</u>	<u>Percentage of total</u>
Class 1	9	0.03
Class 2	409	1.24
Class 3	4,397	13.4
Class 4	6,210	18.9
Class 6	<u>21,810</u>	<u>66.4</u>
Total	32,835	100

Classes 1, 2 and 3 (4,815 ha) were considered to be capable of irrigation, although the largest group, class 3, "requires careful handling under irrigation." Class 4 soils (6,210 ha) were thought to be irrigable in some cases, depending on overcoming certain physical impediments, and subject to economic feasibility. While class 6 lands were defined as not being irrigable, they were thought to have limited capabilities for dryland cultivation in some cases.

The Halcrow study also found that some 3,000 ha within the government irrigation districts (Flores, Selguapa, and their extensions) are capable of irrigation. This brings the total of readily irrigable lands (classes 1, 2, and 3 above, plus 3,000 ha in Flores and Selguapa) to 7,815 ha.

A more recent classification of Comayagua Valley soils was conducted by the Dirección del Catastro (1982). This study used a different classification system and produced the following overall classification:

	<u>Area (ha)</u>	<u>Percentage of total</u>
Class I	5,425	14.6
Class II	6,535	17.5
Class III	4,705	12.6
Class IV	6,685	17.9
Class V	625	1.7
Class VI-VIII	<u>13,275</u>	<u>35.7</u>
Total	37,250	100

As in the classification system used by Halcrow, the first four categories are cultivable, with class IV having serious impediments to overcome for successful cultivation.

The Catastro survey did not explicitly deal with the subject of irrigation capability. However, a careful review of their classification system (1982, pp. 83-93) indicates that class I should be irrigable without difficulty, whereas II would require more careful management to irrigate, and class III could only be irrigated after reclamation from alkalinity or by providing expensive stream dikes to prevent flooding.

If it is assumed that all class I and II soils are irrigable, then the total estimated irrigable area is 11,960 ha, which is higher than the Halcrow finding.

In the 1985 farm survey farmers were asked to classify their own lands as to their irrigation and cultivation capabilities. Their responses indicated the following:

	<u>Non-reform Sector (ha)</u>	<u>Agrarian Reform (ha)</u>	<u>Total (ha)</u>
Irrigated	6,474	966	7,440
Irrigable	10,016	1,500	11,516
Cultivated	7,868	1,379	9,247
Cultivable	17,602	3,107	20,709

This indicates that while a total of 7,440 ha is currently being irrigated, farmers think that 11,516 ha could eventually be brought under irrigation (including what they already irrigate). This is quite compatible with the Catastro (1982) soil-study findings, if classes I and II are considered irrigable.

While 9,247 ha are currently being cultivated, farmers think that 20,709 ha are ultimately capable of cultivation (including what is already cultivated). Evidently, farmers are optimistic about the possibility of cultivating soils included in class IV (those having "serious impediments") in the Catastro study.

The 9,247 ha currently cultivated compares with the 12,895 ha that were cropped or planted in 1985 (see table 10). This implies that some 3,648 ha (12,895 - 9,247) were double cropped. In Comayagua Valley, double cropping is very difficult without irrigation.

Land Tenure, Distribution, and Access

Honduras has well-known problems in land distribution as a result of its long-standing system of latifundia. Historically, the Comayagua Valley's pattern of land distribution has been similar to the national pattern, although valley farms tend to be slightly smaller than the national average.

Whereas Honduran farms averaged 13.5 ha in size in 1974, Comayagua farms averaged only 10.5 ha. Table 24 shows the distribution of valley farms in 1974. The highly skewed distribution is evident in that 71% of all farmers owned fewer than 5 ha, but farms in this class constituted only 12% of total farm area. Nationally in 1974, 64% of all farms were fewer than 5 ha, and such farms accounted for only 12% of the total farm area.

How much did this pattern change in the past decade? Agrarian reform was an active program during this period. Table 2^f shows the distribution of farm holdings in 1985 based on the SRN farm survey. There appears to be a problem with the population estimates that were derived from the sample data. Whereas 4,885 farmers were holding 51,199 ha of land according to the 1974 census, the 1985 survey estimated 4,202 farmers on 61,952 ha of land. With population growing in the valley, it does not seem likely that the number of farms has decreased.

Nevertheless, the 1985 data do suggest a more even distribution of holdings than existed in 1974. Whereas 40% of the land (1.3% of the farmers) was in farms of greater than 100 ha in 1974, only 22% of the land (1.6% of farms) was in farms of this size by 1985.

In terms of evening out the distribution of land, agrarian reform has had an obvious impact. Table 25 breaks down the distribution according to agrarian-reform farms and nonreform farms. Most agrarian-reform groups hold their land as a community and not individually. Most groups have from 10 to 20 members, and their average land holdings vary from under 2 ha to almost 10 ha per member. In table 25 they were classified according to average holding per member. Thus, they appear in the 0-5 ha and the 5-10 ha size classes. They account for 9% of all the farmland in the valley and for 23% of all farmers.

Agrarian reform alters land tenure by giving landless people (and small farmers) the right to hold or own (more) land. Table 26 shows tenure arrangements in 1966 and 1974. About 60% of all valley farmers reported owning their land by freehold (private ownership) in 1966, and this figure declined slightly to 55% by 1974. Only 6% to 7% reported renting or leasing their lands. Presumably, very few of the 40% to 45% of farmers who did not have freeholds had title to their lands. Despite agrarian reform, this figure remains high today.

Table 24. Distribution of land holdings, Comayagua Valley, 1973-1974.

	Number of		Percent of	
	Farmers	Area (ha)	Farms	Area
0 - 5 ha	3,478	6,428	71.2%	12.6%
5 - 10 ha	590	4,150	12.1%	8.1%
10 - 20 ha	367	5,127	7.5%	10.0%
20 - 50 ha	291	8,772	6.0%	17.1%
50 - 100 ha	99	6,433	2.0%	12.6%
100 - 500 ha	47	8,188	1.0%	16.0%
> 500 ha	13	12,101	.3%	23.6%
All Farms	4,885	51,199	100%	100%

Source: 1974 Census of Agriculture, as reported in CATIE (1974) and SRN (1975)

Table 25. Distribution of farm holdings, Comayagua Valley, 1984-1985.

Size category	Non-reform Sector				All Farms (Reform and Non-reform Sectors)					
	Estimated		Percent of		Agrarian		Percent of			
	Farms	Area (ha)	Farms	Area	Members	Area (ha)	Farms	Area (ha)	Farms	Area
0 < 5 ha	1,407	3,148	43.7%	5.6%	315	1019	1,722	4,167	41.0%	6.7%
5 - 10 ha	585	4,239	18.2%	7.5%	670	4516	1,255	8,755	29.9%	14.1%
10 - 20 ha	430	6,336	13.4%	11.2%	0	0	430	6,336	10.2%	10.2%
20 - 50 ha	556	17,019	17.3%	30.2%	0	0	556	17,019	13.2%	27.5%
50 - 100 ha	175	12,069	5.4%	21.4%	0	0	175	12,069	4.2%	19.5%
100 - 300 ha	57	10,333	1.8%	18.3%	0	0	57	10,333	1.3%	16.7%
> 300 ha	9	3,272	.3%	5.8%	0	0	9	3,272	.2%	5.3%
All farms	3,217	56,417	100%	100%	985	5,535	4,202	61,952	100%	100%

Source: Based on data from SRN/DFS 1985 farm survey, with adjustments by study team to provide for farms greater than 50 ha in size that were under-represented in the sample.

Table 26. Farm tenure, Comayagua Valley, 1965-1966 and 1973-1974.

		1965-66	
		Republic of Honduras	Comayagua Valley
	percent of all land...	
Freehold		57.6%	60.7%
Ejidal		20.3%	29.9%
National		13.1%	3.1%
Leased national		7.3%	5.9%
Illegally occupied		1.7%	.4%
	Total	100%	100%

Comayagua Valley, 1973-74		
	Area (ha)	Percent of total
Freehold	28,028	55%
National Land	9,903	19%
Rented	3,531	7%
Mixed tenure	9,454	18%
Other	283	1%
	Total	51,199
		100%

Source: 1966 Census of Agriculture (Halcrow, 1972) and 1974 Census of Agriculture, as reported in CATIE (1984)

Table 27 shows tenure arrangements as of 1985. While 48.6% of farmers held their land by virtue of proprietary right or freehold and 9.8% held land through an agrarian reform group, the other 42% held the land either by use right (usufruct) or by merely having occupied it (squatters). Neither of these groups would have clear title to their lands.

In the absence of title, many small farmers find it difficult to obtain credit. While BANADESA has relaxed its requirements on this point to some extent, title can still be an obstacle to obtaining credit.

The 9.8% of farmers who are members of agrarian-reform groups presumably have a more secure right to use their land than squatters or those with established usufruct. They reported that 85% of their lands had been adjudicated, meaning that their right to use the land had been legally verified. Nevertheless, most of these groups hold collective title to the land, although some work it individually. The individual cannot sell his land or use it individually as loan collateral. Thus, finance and most types of investment have to be carried out as a group activity, not individually.

From 1980 to 1984 the Dirección del Catastro carried out a complete cadastral survey of Comayagua Department. The department was among the first nationally to complete such a survey. This survey can provide the basis for securing title to land for many farmers who do not currently have title since the survey data can be used as a basis of land registration through the judicial system. Catastro is already working with the local judiciary to accomplish this.

The actual issuance of title is contingent on the farmer's having more than 5 ha of land, thus precluding a large group of smallholders from securing title. USAID/Honduras is currently involved with the GOH in a policy dialogue aimed at trying to change this law. If accomplished, this should result in greater security for small farmers to obtain credit and in improved incentives for investing in farm improvements such as irrigation.

Another effect of having a completed cadastral survey should be to improve the mechanism for local-government finance. Municipalities receive a portion of the taxes that the central government levies against the land. In most rural areas, as in Comayagua, a large percentage of the land is not registered in the holder's name and no taxes can be levied against it. If the registration of land based on the cadastral survey is fully pursued and maintained, as is the government's current intention, then the local tax base should improve dramatically. This should provide a sharp increase in municipal budgets, which would then be available for maintaining local infrastructure such as roads and water systems. This should have a very beneficial effect on the development of the valley, including its agriculture.

Table 27. Farm tenure and legal status, Comayagua Valley, 1984-1985.

Type of Tenure:	Area (ha)	Percent of total
Own Land	56,103	99.4%
Agrarian Reform	5,535	9.8%
Cash Rent	304	.5%
Share Crop	11	.0%
Total	61,952	100%
Form of Possession:		
Proprietary	30,114	53.4%
Use Right	20,294	36.0%
Agrarian Reform	5,535	9.8%
Occupied	6,001	10.6%
Total	61,944	100%
Legal Origin of Land:		
Private	28,682	50.8%
Ejidal	23,869	42.3%
Agrarian Reform	5,535	9.8%
National	2,918	5.2%
Mixed	946	1.7%
Total	61,950	100%

Source: SRN/DPS 1985 Farm Survey Data, calculations by study team.

N.B. Of 48 agrarian reform groups in the Valley, 25 reported receiving national land, 17 ejidal land, 2 private land, and 3 a mixture of these. They reported that 85 % of their land had been adjudicated. Fourteen groups indicated that they work their land individually, 11 reported working collectively, and 22 use a mixture of individual and collective work organization.

IRRIGATION

Irrigation is not new in the Comayagua Valley. In areas where natural streamflow has been sufficient and where simple ditches and inexpensive diversion structures could be easily established, some form of irrigation has probably been practiced on a limited scale for hundreds of years. In Comayagua many farmers still practice the age-old system of damming up an adjacent stream with simple rockwork to divert it each summer in the drier months, only to have this "dam" washed out when the heavy rains come.

In an area with such varied topography, soils, and streamflows, however, the simple and inexpensive solutions satisfy a small portion of the need. Further progress requires longer canals and more elaborate diversion facilities. Some large farms may be able to justify such investments, but for more elaborate systems to serve the small farmer, some form of group action is required.

In Comayagua, group action probably began when one of the municipalities decided to establish a public irrigation system. Four municipalities (Ajuterique, Lejamaní, La Paz, and Villa de San Antonio) have small systems totaling about 1,000 ha. In the words of Ajuterique's mayor, their system "was established so long ago that nobody remembers when."

As more and more of the water from readily available streams is allocated, it becomes necessary to undertake still larger efforts to bring more land under irrigation. Ultimately, this means lengthy canals and diversion dams. As seasonality becomes the issue, it may be necessary to build storage reservoirs to carry water over from the abundant to the dry months.

As the valley's irrigation needs expanded, the Honduran government entered the picture. In 1954 GOH built the Flores I canal distribution system in the southeastern corner of the valley on the San Jose River. This was the first GOH irrigation project in all of Honduras.

The construction of the El Coyolar Dam and reservoir began in 1956 and ended in 1964; the Flores II distribution system was constructed during the same period to use the water that the dam made available. The Selguapa canal distribution system was constructed in 1956-57 on the Selguapa River in the northwestern quadrant of the valley. It includes a diversion dam at El Taladro but does not contain any provisions for storage. In subsequent years the government made some additions to the Selguapa system, such as the La Paz extension. These were made without increasing the size of the Selguapa canal. In 1978, a smaller system was constructed at San Sebastian in the southern part of the valley.

In all cases, the GOH approach was to install the main and secondary canals and to leave the construction of any tertiary canals and field-distribution facilities to the farmer.

The Halcrow team surveyed all of the irrigation facilities in the Comayagua Valley in 1970. Figure 6 is a map of irrigation development at that time. They found that the two government systems (Flores and

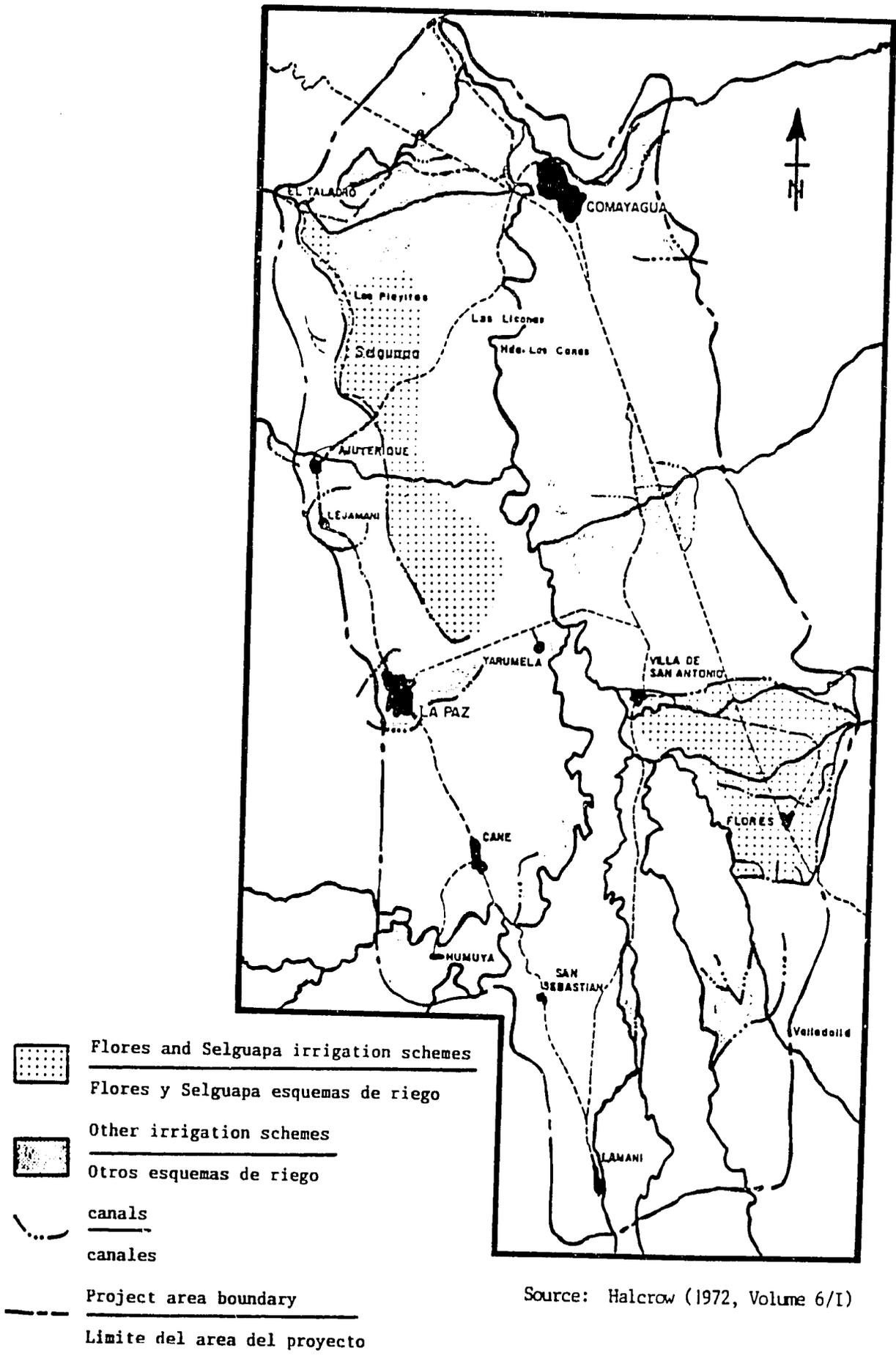


Figure 6. Irrigation areas in the Comayagua Valley.

Selguapa) contained a total of 5,759 ha within their physical boundaries but that only about 1,425 ha were being irrigated annually. At the same time, large haciendas accounted for 1,350 ha of irrigation, while 515 ha were being irrigated by smaller operators pumping from the river. The municipalities accounted for 700 ha of irrigation at that time. Altogether, a total of 3,900 ha were being irrigated in 1970, compared to a total area cropped of 7,835 ha. Irrigation appears to have accounted for about half the area cropped (see table 28).

The Halcrow study attempted to explain the reason for the apparent low level of use of the government systems. While it was not feasible to irrigate all of the land within the command areas of the two government systems, it was thought that about 3,000 ha should be irrigable and that enough water was available to irrigate much more than the 1,425 ha that were being cropped. Among a long list of explaining factors, the following appeared to stand out (Halcrow, 1972, vol. 5):

- tertiary canals and field-level distribution systems had not been installed in many cases, often due to the nonavailability of the required investment funds for many farmers
- some areas had drainage and salinity problems, notably parts of Selguapa
- some canals had never been lined, and this caused substantial conveyance losses
- canal leaks often flooded out access roads, which became impassible and caused severe access problems
- "canaleros" (ditch agents) were often unresponsive to farmers' needs, and it often became necessary for farmers to bribe them to obtain water when it was needed
- the operating budget for the projects was generally inadequate, therefore maintenance and repairs were not sufficient to keep the canals in good working order
- water users did not irrigate at night
- users were poorly trained in proper on-farm water management

Despite the obvious shortcomings that it pointed out, the Halcrow study also noted many positive aspects of the government projects. They enabled smaller farmers to participate in raising higher-valued crops, while reducing risks of production for larger livestock producers.

It seems that at the time of the Halcrow study the large haciendas tended to use their irrigation facilities more to provide forage for livestock during the dry months. The small and medium farmers in the municipality and GOH districts tended to specialize in vegetables and basic grains.

Table 28. Irrigated area, Comayagua Valley, 1970, 1974, and 1985.

	Command	Area Irrigated	Total Irrigated	Cropped	
Flores	2,434	525			
Selguapa	3,325	950	1,425		
Municipio Irrigation Systems:					
Ajuterique	250	200			
Lejamai	250	200			
La Paz	76	50			
Villa de San Antonio	500	250	700		
Private irrigation systems:					
Eleven haciendas	2,100	1,350			
Misc. pumping from rivers	515	515	1,865		

Total irrigated area			3,990		
Total cropped area				7,835	
Ratio of cropped area to irrigated area					1.96

Census of Agriculture, 1974					
Total irrigated area			4,674		
Total cropped area				8,967	
Ratio of cropped area to irrigated area					1.92

SRN/DPS Farm Survey, 1985					
Irrigated area of reported by farmers:					
Non-reform" sector (a)		14,218			
Reform sector (b)		966	15,184		
Area cropped by non-reform sector				12,387	
Area cropped by reform sector				535	
Total irrigated area			15,184		
Total cropped area				12,922	
Ratio of cropped area to irrigated area					.85

The results of the 1974 Census of Agriculture are also shown in table 28. While there was no separate enumeration of area irrigated in the different types of system, the total irrigated was 4,674 ha, which was about 17% higher than the area surveyed by Halcrow. This seemed to indicate a reasonable amount of expansion for the intervening period.

The noteworthy information from the 1974 census is data that indicates that smaller farms are able to participate in irrigation to a higher degree than larger farms (see table 29).

Table 29. Comayagua Valley farmers participating in irrigation according to farm size, 1973-74.

Farm size (ha)	Cultivated Area (ha)	Irrigated Area (ha)	Percentage Irrigated
0-10 ha	1,475	1,041	71
10-50 ha	2,342	1,080	44
50-100 ha	2,149	336	16
100-500 ha	2,923	356	12
>500 ha	<u>7,906</u>	<u>1,862</u>	<u>24</u>
All farms	16,795	4,675	28

Source: 1974 Census of Agriculture as reported in SRN, 1975, p. 113.

Farms of fewer than 10 ha appeared to use irrigation to a far greater extent than larger farms, judging by the percentage of their total cultivated land that is irrigated. Nevertheless, farms of greater than 100 ha, which represent 1.5% of valley farmers and hold 22% of the land area (see table 25) had 47% of the valley's irrigated area in 1974.

Since 1975

In 1975, the SRN produced a preliminary study of the valley entitled "Desarrollo Integral del Valle de Comayagua," which took quite a broad look at the valley's agriculture based on the extensive information from the Halcrow studies and on data from the 1974 census. This study concentrated heavily on the government's irrigation system and further documented the generally low efficiency of operation of the government districts. The study proposed a general overhaul, repair, and expansion of the government projects. It proposed that a dam be constructed on the Selguapa River to provide 9 million m³ of storage for the Selguapa District. This compared with the existing 12.5 million m³ capacity of the El Coyolar Dam. The study also proposed repair of the El Coyolar Dam, noting that the structure was cracked and had been leaking for some time.

The missing element in the 1975 SRN study was information on economic performance of the existing system or on likely performance of the improved system. The problems, needs, or economic performance of the private and municipal systems were not considered.

Despite the obvious problems that the government districts have continued to face with operation and maintenance, irrigation development has proceeded in the valley. GOH built the San Sebastian District system (150 ha) in 1978. A users group that was formed in 1971 requested government funding and finally had their request approved. The Departament de Recursos Hidricos (DRH) made the technical studies, and a private contractor did the construction. Reportedly, many of the shortcomings of the earlier systems were incorporated in the new system.

A new approach was taken in 1982 when a small system of about 60 ha was constructed at Palmerola, on the hillside above the Palmerola military base. In effect this amounted to the rehabilitation and improvement of the water supply for a group of farms in an area that had long had some private irrigation. The project was undertaken by GOH with funds from USAID's Agricultural Sector II project. The concept was different from previous GOH projects in that the completed system was to be turned over to the farmers for their own management, and they were to repay the cost through time. Unfortunately, the plan fell apart when the farmers complained to President Suazo Cordoba that all was not right with the project and he gave it to the farmers, relieving them of their obligation to pay.

For the past several years a resident FAO irrigation specialist has been giving technical assistance to the farmers in the Palmerola project area. They constitute an agrarian-reform group. While some of this assistance has to do with irrigation-system management per se, much of the effort has reportedly been focused on trying to help the 30 to 40 farmers in the project area organize as a cooperative and learn to work together in production, marketing, and irrigation-system management. This process has taken several years and shows no sign of ending.

Aside from government activity in irrigation, the private sector has continued to expand in the valley, but no data are available to determine just how much. Changing technology has given impetus to continued expansion. Above all, plastic pipe has made it easy to convey water across uneven terrain that could not easily be dealt with before. Hardware stores in Comayagua sell such pipe regularly. Its use has gone hand in hand with the wider availability of motor pumps. A half dozen motor pumps belonging to private individuals and to agrarian-reform groups are used even in the Selguapa District to convey water uphill from the main canal. Pumping from the Humuya River and other streams in the valley is becoming more and more common.

The Problem with El Coyolar Dam

As noted above, the El Coyolar Dam has several cracks that have become progressively worse. These were originally discussed in the Halcrow reports in 1972, which said they should be repairable. The 1975 study by SRN proposed that the dam be repaired and enlarged.

In 1982 a group of Japanese engineers visited the dam and declared that it constituted an emergency situation. They recommended that the reservoir be emptied immediately, and Departamento de Recursos Hidricos (DRH) staff carried out the recommendation. The emptying was so abrupt, however, that some landslides occurred in the banks surrounding the reservoir, and resulting stresses also caused part of the access road below the dam to slide away.

The abrupt lowering of the reservoir probably caused unnecessary damage. In the end, DRH decided that the emergency was not as critical as had been suggested and the reservoir was partially refilled. Since that time, the reservoir has been operated at a maximum storage level of 8.5 million m³, rather than the 12.5 million design capacity. According to DRH personnel, this leaves the Flores District short of water in the dry months. The study team was unable to verify this but thought it strange that in Flores, if water is so short, there is still no night irrigation, which is now common practice in the Selguapa District.

In 1985 the Honduran Foundation for Pre-Investment (FOHPRI) financed a technical study of the El Coyolar problem. Lavalin International, the Canadian engineering consultants who carried out the study, proposed a three-phase solution: phase I, urgent rehabilitation measures to cost Lps 2.7 million; phase II, intermediate rehabilitation to cost Lps 6.5 million; and phase III, field studies and preliminary design of a new system to cost Lps 7.3 million. Thus, the total bill would be Lps 16.4 million and would produce only a preliminary design for a new system. The study team was unable to learn just what the new system might consist of or how much land might ultimately be irrigated with it. The original El Coyolar dam, which was designed to irrigate 2,000 ha, has never irrigated half that amount. Assuming that the new system could irrigate 3,000 ha, the preliminary engineering alone would cost Lps 5,300 (\$2,650) per hectare. This seems expensive.

To date, GOH has been unable to decide what to do about Coyolar. Should the dam be enlarged at the same time that it is repaired? How many studies are needed before deciding to go ahead? Engineers continue to be divided on the topic, with some saying that it is really not a serious hazard. Nevertheless, the problem is apparently serious enough that the reservoir can no longer be filled.

Simply stated, two issues are involved with the Coyolar Dam: irrigation and public safety. If safety were the only issue, the dam could just be emptied and abandoned. Since irrigation is obviously also at issue, the question becomes whether continuing to operate the dam at the reduced level constitutes a safety hazard. If not, it may be cost effective to continue to operate at the reduced level indefinitely and to work on more efficient management of the water in the distribution system below.

Current Status of Irrigation in the Valley

As noted above, private irrigation systems have continued to expand, probably at a high rate. The public systems have continued to intensify their use, despite the many operation and maintenance problems they suffer. Table 11 showed that Flores and Selguapa had expanded their

cropped areas by 78% between 1970 and 1986. Most of Flores' growth came in rice; the Selguapa's expansion was in tomatoes and onions. The municipal systems continue to operate, but they have not expanded.

Current data on overall irrigated area are surprising and may be incorrect. Estimates based on the 1985 farm survey indicate that 15,182 ha were irrigated in that year including irrigation in the agrarian-reform sector. Since the government districts have not quite doubled their area irrigated during this time (see table 11) and since the municipalities have not expanded their systems, the private sector would have had to increase about sixfold, which seems quite unlikely. Nevertheless, the private sector probably has been expanding at a high rate.

The government districts have been able to improve their collection of user fees (see table 30), but total fees of about Lps 45,000 per year do not even cover one-quarter of the estimated Lps 200,000 cost of maintaining the GOH system. How can this system be changed to make it pay?

Another real obstacle in the government system is that the local DRH staff in the valley includes no engineering personnel. They badly need a simple engineering capability to be able to make effective repairs and simple system improvements. By getting operation and maintenance procedures set up properly within the district, there would be ample opportunities to save water. This should be a lot cheaper than building new storage facilities and is obviously the first step to solving water shortages.

There is almost no information about farmers' irrigation practices and problems inside or outside the government systems. What are the biggest obstacles and most critical needs? What investment opportunities do farmers have for improving their irrigation-water situation? What kinds of payoffs do such investments offer? How do private irrigation investments compare to options for improving government storage and canal systems? Are there many individual options left, or must a system-wide approach be taken?

The new center for irrigation research and training, CEDA, has a vested interest in finding the answers to questions like these. CEDA can provide technical support to DRH in operating the government system if sound linkages between the two organizations are established.

As discussed in chapter 5, USAID/Honduras is scheduled to begin its new Irrigation Development Project during the coming year. This project has funds that can be used for building small irrigation systems in the valley and to support other irrigation improvements. This project can be used to support the valley's existing irrigation institutions, CEDA and DRH, and to encourage close cooperation between them.

Table 30. History of area irrigated and user fees collected, Flores and Selguapa Districts, various years, 1970-1986.

Year	Area Irrigated		Income from User Fees	
	Flores	Selguapa	Flores	Selguapa
hectaresLempiras....	
1970	526	546	5,513	5,246
1982	1,006	890	17,736	20,804
1983	701	780	12,173	22,175
1984	719	754	10,422	21,197
1986	1,067	854	21,233	24,895

Source: Halcrow, 1973, vol. 6; RUTA, 1985; Annual Report of Regional Office, Department of Hydraulic Resources, 1986.

CHAPTER 4
INSTITUTIONS AND ORGANIZATIONS WITH IMPACT
ON THE VALLEY'S AGRICULTURAL DEVELOPMENT

This chapter reviews institutions and organizations having programs, projects, or activities that have an impact on agricultural development in the Comayagua Valley.

The study team could not get in-depth information on every initiative or activity identified as ongoing in the valley. Nevertheless, each institution, organization, program, or project identified by the study team as relevant to the objective of preparing a profile of development activities under way or planned in the valley is referenced in this chapter. Please see the table of contents to locate material of particular interest (for example, private-sector initiatives as distinct from public-sector activities).

SECRETARIAT OF NATURAL RESOURCES (SRN)

The SRN implements GOH's agricultural policy. Its mandate includes management of natural resources, agricultural research, provision of technical services (for example, technical assistance), training, and promotion of agricultural production. The Comayagua Valley falls within SRN's Regional Directorate No. 2 (West Central Region).

The following are reviewed in connection with the SRN's programs in the valley: the regional directorate, national centers, and national programs.

West Central Regional Directorate (DARCO)

The regional directorate, known as DARCO (Dirección Agrícola Regional Centro Occidente), covers the Department of Comayagua (except Minas de Oro, San José del Potrero, San Luís, and Esquivas) and La Paz and Cane in La Paz Department.

Organization

The key technical units of the regional directorate include

- Regional Planning Unit
- Regional Agricultural Department
- Regional Livestock Department
- Regional Agricultural Mechanization Department
- Regional Water Resources Department
- Regional Renewable Resources Department
- Regional Extension Department

The regional agricultural and livestock departments conduct research on crops and livestock. Research on basic grains (beans, corn, sorghum, rice, soybeans) is conducted at the Playitas experiment station (70 ha),

and vegetable research is conducted at the La Tabacalera experiment station. Both stations are near the regional directorate's headquarters near Comayagua City.

The regional extension department is responsible for operating nine local extension agencies and supervising 28 extension agents. Four of these agencies primarily focus on the valley: Comayagua, Villa de San Antonio, Ajuterique, and La Paz. Table 31 presents selected aspects of the extension program's manpower and resource situation at the agency level in the valley.

Table 31. Current manpower and resource situation of the West Central Regional Directorate extension program, Comayagua Valley.

Agency	Extension Workers	Promo-toras	Auxi-laries	Vehi-cles	Motor Cycles
Comayagua	2	1	0	1	0
La Villa de San Antonio	5	1	1	2	1
Ajuterique	2	1	0	1	1
La Paz	2	2	0	2	0
TOTAL	11	6	1	6	2

Source: Director, Department of Extension, West Central Regional Directorate.

Specific data on the nature, level, and impact of extension activities in the valley were not available. Regionally, the extension department focused primarily on basic grains during 1986. Technical assistance was provided for a total of 4,604 ha, of which 4,029 ha (86%) were planted in basic grains. Beneficiaries of these programs were identified as including 174 groups (1,045 members) in the reformed sector, 29 local agricultural committees (422 members), and 439 independent farmers. The extension program also worked with 32 women's groups (381 members) and 2 youth groups (25 members). Other activities included 74 family gardens and 43 fruit projects, soil-conservation projects, and livestock disease-control projects.

The extension department is implementing a version of farming systems research/extension (FSR/E) methodology in its extension program. Key attention is given to farm-level trials (ensayos), farmer trials (pruebas de agricultor), and demonstration plots (lotes demostrativos), supplemented by other activities. The program content for each agency is based on farm-level surveys designed to elicit farmers' views on agricultural production problems and constraints. This methodology does not appear to take into account or to analyze the type of secondary data that could be useful in identifying trends, problems, and potential constraints.

In view of the importance of water availability as a constraint to increased agricultural production and productivity in the valley (see chapter 3), the Regional Water Resources Department (DRH) plays an important role in the valley's agricultural development. The DRH administers, operates, and maintains the public-sector irrigation systems (Selguapa, Flores, and San Sebastián). DRH also provides technical assistance and training on irrigation management to users and user groups.

Funding

The West Central Regional Directorate receives about 17% of the funding that SRN distributes to all regional directorates; that is, the region receives only slightly more than 1% of the ministry's total funding (SRN, 1986 Annual Report, p. 61). Therefore, the regional directorate has depended on external funding. USAID/Honduras (PL-480 funds), Canada's International Development Research Center (IDRC), and the Proyecto de Investigación y Extensión Agropecuaria of the Inter-American Development Bank (BID) have assisted the directorate in meeting personnel, operating, and material costs.

Even with donor support, declining budgets have made it difficult to hire technical personnel, buy gas for vehicles, etc. Discussions with local officials indicated that three extension agencies lack funds to support agents in the field. A summary of the directorate's manpower situation is provided in table 32. The number of persons employed by the directorate in 1987 (305) is six times the number of persons employed by the directorate in 1975 (62) (MRN, 1975).

The regional directorate is working to improve program performance in operational planning, service delivery, training of technical personnel and farmers, and supervision and evaluation, in accord with an annual operating plan for 1987. This plan also projects activities for 1988-89.

Unlike several other agricultural areas of Honduras, the Comayagua Valley does not have an integrated rural development (DRI) project, but regional directorate representatives expressed an interest in and desire for a DRI-type project.

As mentioned above, the number of persons employed by SRN's West Central Regional Directorate increased from 62 in 1975 to 305 in 1987. This growth in public-sector employment reflects, in part, the commitment of GOH to supporting agricultural development in the Comayagua region. At the same time, however, operational budgets (that is, funds for vehicles, replacement parts, gas, production inputs such as fertilizer used in field work, etc.) have not kept pace with growth in the number of persons employed by the ministry. This is not a problem unique to Honduras but one that is also being faced by governments in other Latin American countries such as Panama.

At the extreme, an agricultural ministry finds itself using most if not all of its scarce resources to cover personnel costs, thereby leaving little or no funds to pay the costs of carrying out its functions such

Table 32. Summary of current manpower situation of SRN's West Central Regional Directorate.

Activity	Agencies										Total	
	A	B	C	D	E	F	G	H	I	J		
Direction											19	19
Research	1	2	1	2		2	2				21	31
Plant	1	1	1	1	1	1					1	7
Health												
U.D.A.											26	26
Extension	3	3	2	5	2	3	7	3	4	10	42	42
Soils					1	1			1	1	4	4
UCOMYJOR	2	2	1	2		2	3			1	13	13
Water Res.		29	18							5	52	52
Livestock		4		1			3		1	24	32	32
RENARE										17	18	18
PROMECA										18	18	18
Workshop										12	12	12
Human Res.										4	1	1
Admin'tion										16	16	16
Planning	1	1								4	6	6
CTTA										8	8	8
Total	8	42	23	11	4	9	15	3	6	184	305	305

Legend:

A	Comayagua	F	San Jerónimo
B	Villa San Antonio	G	Siguatepeque
C	Ajuterique	H	Taulabé
D	La Paz	I	San Luis
E	El Rosario	J	Nivel Central

Source: Secretaría de Recursos Naturales. 1987. Plan Operativo Regional 1987, Dirección Agrícola Regional No. 2, Comayagua.

as research and extension. This situation is aggravated if the public-sector agency's staff is being sustained or increased through direct or indirect donor support. The team was advised that the regional directorate employs a number of persons whose salaries directly or indirectly depend on USAID/Honduras support (PL-480 funds).

Given the limited resources available for operational expenses, steps need to be taken to ensure that priority programs are allocated sufficient nonpersonnel funds to cover essential activities such as on-farm trials. The primary responsibility for dealing with this problem -- one that is really larger than the Comayagua Valley -- lies with the GOH, but USAID/Honduras can help by ensuring that its projects and programs do not contribute to excessive buildup of staff.

National Centers for Research and Training

Agricultural Development Training Center (CEDA)

Donated by the Japanese International Cooperation Agency (JICA), CEDA (Centro de Entrenamiento de Desarrollo Agrícola) is located in the Selguapa irrigation system. It was first opened in 1986. CEDA focuses on irrigation, performing research and providing training to Hondurans and other Latin Americans. The center's activities are divided into research (40%), training (40%), and production (20%). The current technical staff includes 12 Hondurans plus a team of five Japanese irrigation specialists provided by JICA.

CEDA has excellent facilities to support short-term resident training programs. In 1986, it offered a 5-week training course for technical personnel on the planning and design of small irrigation systems. CEDA established demonstration plots on 8.7 ha for beans, soybeans, rice, and sorghum. In 1987, it will offer 12 courses and train about 100 persons. While these courses will primarily be for engineering-oriented specialists, future courses will be offered for extension agents.

USAID/Honduras provides funding support (PL-480 funds) through the SRN budget for the center's Honduran personnel. The center's budget is currently Lps 700,000 provided by GOH and USAID/Honduras (PL-480 funds), plus Lps 300,000 and a five-person technical-assistance team provided by JICA.

The center's director estimated that 10% of the budget could be met through a combination of revenue sources such as selling agricultural products grown on the center's land and renting the center's training facilities to other groups during periods when CEDA does not need them. Another revenue source could be a check-off system on irrigation payments. As noted elsewhere in this report, charges for irrigation water are relatively low; a portion of any increase in water charges could be earmarked to supplement CEDA's budget.

CEDA is currently not conducting any off-site research. As the center develops its on-site research and training programs, the lack of systematic, comparative data on productivity and benefit/cost ratios of the farmer's irrigation, production, and marketing practices soon will become a constraint. This information is essential for designing irrigation research and training programs that are responsive to the problems and constraints facing farmers in the valley. CEDA needs to collaborate more closely with SRN/DRH personnel in such areas as studying and improving the valley's irrigation systems to improve the realism and applicability of the center's research and training programs.

National Livestock Center

The major role of the 25-year-old National Livestock Center is to produce improved breeding animals for sale to livestock producers. The center employs approximately 135 people. It has produced high-quality breeding animals from both beef and dairy purebreds. Also, the center

has developed crossbreeds during the past 5 to 6 years: F₁ female dairy-beef cows as herd starters and F₁ crossbred bulls to upgrade existing herds.

Further, the center is developing management, feeding, and health-care practices replicable down to the small-farm level. Research on management practices is important for finding ways to reduce the adverse effects of the country's climate, particularly in dairy production. The center also has a pastures and feed-production program.

Another center activity is the swine project, which is partially supported by USAID/Honduras PL-480 funds and the UNDP. This project produces breeding animals for sale and distribution throughout the country.

Extension and education are two other important areas of the center's program. The government of Switzerland has provided some support to this center, but continued development of the center's training activities will depend on replacing the Swiss funding, which is scheduled to end in 1988.

Observers familiar with the center's programs indicated that it has favored farmers who do not need subsidies (for example, politically influential clients). The prices that buyers are paying for animals are said not to be high enough to cover the costs of the products and services provided. A review board is needed to set a price scale and to review this scale annually. The scale could be weighted to give resource-poor farmers the opportunity to purchase animals at subsidized prices while resource-rich farmers pay full value.

The center could play a greater role in meeting the livestock needs of the valley, where the dry climate provides an environment in which insects and disease are not great problems for cattle. However, in competition for scarce water, production of vegetables and other high-value crops will always out-compete livestock based on extensive grazing. Further promotion is needed of systems based on silage or high-intensity forages such as elephant grass to conserve water in livestock production. In such systems, dairying is likely to become even more important in the future than at present.

Fondo Ganadero Project

Another way to promote livestock production would be for Valley farmers to participate in the Fondo Ganadero's Small Farmer Livestock Project. Although not currently active in the valley, the project is working in other parts of the country with 23 groups (15 to 20 families per group). The Fondo Ganadero project contracts with independent and reformed-sector farmers to raise dairy cattle. The project gives the farmer cattle, salt, vaccines, and technical assistance, while the farmer provides the infrastructure, feed, and management and repays the debt with a percentage of the milk produced by the cows. When a calf is born, the project places a price on the calf, and the farmer has an option to purchase it. The program has impacted favorably on employment of family labor.

The project was initially given Lps 10 million to make loans for the purchase of cattle. About half of this amount is still available and could be tapped to start the Small Farmer Livestock Project in the valley. An organization such as Cooperativa Fruta del Sol (described below) might have members who would like to participate in this project. The cooperative could play a major role in providing the technical assistance link between the project and the participating farmers.

Aquacultural Station (El Carao)

The El Carao Aquacultural Station (or Estación Acuícola El Carao) is developing a program to provide research and technical assistance on tilapia. During 1986, the center produced 472,129 fry, of which 381,108 were distributed throughout the country. Partial funding support for the El Carao station is provided by USAID/Honduras (PL-480 funds).

The center's resources do not permit further expansion of the fry-production and -distribution program. Apparently, private sector's capability for fry production and distribution needs to be developed. Continued development and expansion of the valley's irrigation systems would increase the potential market for fry and fish production in the valley.

National Programs with Activities in Comayagua Valley

Agricultural Mechanization Program (PROMECA)

PROMECA (Program de Mecanización Agrícola) provides rental of machinery for agricultural services needed by small and medium independent farmers. In 1986, the West Central Region accounted for 14% of PROMECA's activities and 15% of its income. In its diagnosis of the agricultural sector, CONSUPLANE (1985) reported that 45% of all the tractors operated by PROMECA in Honduras in 1984 were in poor condition and that this situation had existed during the preceding 5 years. Further, CONSUPLANE found that PROMECA's expenses were larger than its income.

Study team members heard reports that PROMECA's machinery is poorly maintained or inadequate (for example, unable to deep plow), that services are inefficient (for example, costs are not fully covered nor beneficiaries subsidized), that services are meted out on a political basis (for example, beneficiaries are primarily in the reformed sector), and that the existence of a public-sector machinery pool is a disincentive to the development of a competitive private-sector market for agricultural machinery and services. Possible government divestiture of PROMECA is being considered.

Cropping Systems Project (Honduras)

The Cropping Systems Project (Proyecto Sistemas de Cultivos) began in the Comayagua region in 1978 and has been conducting farm-level research on corn, beans, rice, and soybeans. Farm-level research has been conducted in the valley in Villa de San Antonio and La Paz. During the project's second phase, research focused on evaluation of varieties,

fertilizers, and weed control. Research activities have included both exploratory and farmer trials. Future research activities, according to the the final report on the project's second phase (SRN, 1985), would include work on vegetables and water management.

Partial funding support for this project is provided by the International Development Research Center (IDRC). Technical assistance is provided by the Centro Agronómico Tropical para la Investigación y Enseñanza (CATIE). IDRC funding of this project may end at the completion of the project's current third phase.

The project's second-phase report (SRN, 1985) noted that service delivery in the project's target area had improved in 1984 with the institutionalization of the "proyecto de 'enlace tecnológico'" (ET). The ET concept, initially implemented in Olancho and Danli in 1982, was to establish a technology-development and -transfer system linking research, extension, and other agricultural-support institutions (for example, credit) to more effectively support development of improved technology and its transfer to farmers. Such an approach takes marketing, production, and other constraints into account in designing, implementing, and evaluating farm-level research.

USAID/Honduras representatives indicated that a series of ET training courses were offered in Comayagua with the objective of institutionalizing the concept in the regional directorate's research and extension program. The concept apparently was not successfully institutionalized owing to administrative problems, lack of funds, and change of personnel. This suggests that the regional directorate is yet struggling with the problem of developing an effective working model for linking agricultural research with extension. This is not surprising as agricultural ministries throughout the developing world continue to search for a workable solution to this problem (Chambers and Jiggins, 1986).

Aside from the question of how effectively "enlace tecnológico" has been institutionalized, IDRC and CATIE have assisted the regional directorate's research and extension personnel to develop their capability to carry out farm-level research. The continued development of this capability needs to be supported.

Milk Promotion Project (FOMLECH)

FOMLECH (Proyecto Fomento Lechero) is aimed at developing milk production and contributing to the country's ability to be self-sufficient in milk products. Priority is being given to developing storage facilities in the rural areas and improving traditional processing technology and existing distribution channels. The project is being implemented in the valley by the National Livestock Center and is partially funded by the government of Switzerland through COSUDE. This project could play a role in developing marketing facilities and better access to milk markets, which the valley badly needs.

**OTHER PUBLIC-SECTOR ORGANIZATIONS WITH IMPACT
ON AGRICULTURE IN COMAYAGUA VALLEY**

Instituto Nacional Agrario (INA)

The mandate of the Instituto Nacional Agrario (INA) is to apply the Agrarian Reform Law in the redistribution and adjudication of land, the establishment and organization of "asentamientos campesinos" or agrarian reform groups (ARGs), and the provision of technical assistance for the organization and management of production activities.

INA's regional office for the West Central Region is located in the city of Comayagua. INA has five offices in the valley and employs 51 persons (28 operating personnel and 23 office personnel). Table 33 provides data on the 55 agrarian-reform groups (ARGs) in the valley, their membership, and their areas under ARG status. Representatives of INA's West Central Region office indicated that few farmer groups, if any, are currently active in soliciting "asentamiento" status in the valley.

These data may be compared with those reported by CATIE (1984) and with findings of the 1985 SRN/DRH farmer survey. The CATIE study reported 78 ARGs in the valley and 19 groups that were soliciting "asentamiento" status. Of the 78 ARGs, 59 had 7,619 ha of adjudicated land, of which 5,632 ha (78%) were classified as suitable for producing grains and vegetables. The 1985 SRN survey enumerated 48 reform groups with current membership of 985. These groups possessed a total of 5,535 ha (5.6 ha per member), of which 35% had been adjudicated.

Table 33. Numbers of members and areas of agrarian-reform groups (ARGs), Comayagua Valley.

Municipio	ARGs	Members	Area (ha)	Mmbrs/ARG	Area/ARG (ha)	Area/Mmbr (ha)
Comayagua	27	614	3,581	23	133	5.8
Lamani	7	76	701	11	100	9.1
Villa de San Antonio	10	132	416	13	42	3.2
Lejamani	3	58	164	19	55	2.9
Ajuterique	4	82	132	20	33	1.6
La Paz	3	41	127	14	42	3.0
Humuya	1	12	49	12	49	4.1
TOTAL	55	1,015	5,170	18	94	5.2

Source: Grupos Asentados por El Instituto Nacional Agrario en el Depto. de Comayagua, Región Centro Occidental, Febrero 23/87.

Two factors account for the higher number of ARGs reported in the CATIE study. First, some groups may have dissolved during the 5 years since 1982. Second, the ARGs identified in the CATIE study included some

municipios located outside the valley per se (for example, San Jerónimo, El Rosario, and Siguatepeque).

INA is currently implementing a Small Projects Program (Programa de Pequeños Proyectos). As part of this program, INA administers a line of credit (total of Lps 7 million for Honduras) at 11%. Under this credit line, each reform group makes a maximum of two loans totaling not more than Lps 35,000.

During 1987, INA has loaned approximately Lps 698,182 to 82 ARGs in the West Central Region. But only 12 (15%) of these 82 groups are located in the valley. As shown in table 34, these 12 groups located in Flores (5) and La Paz (7) received Lps 73,945 in loans (slightly over 10% of the total loaned in the region). Loans were made for producing melons, tomatoes, onions, soybeans, rice, and corn. By contrast, the bulk of INA's loans in the region have been made to ARGs in the higher-elevation area for basic grains (corn and rice).

Table 34. INA loans to agrarian-reform groups (ARGs), Flores and La Paz areas, Comayagua Valley, 1987.

	Members	Manzanas Financed	Amount (Lps)	ARGs Crop
<u>Flores</u>				
Comité Femenino Nueva Esperanza de Selguapa	19	3	2,112	melons
San Antonio de la Sabana #2	45	10	7,967	corn
Neptal y Discua	40	10	9,432	melons
		10		corn
Coop. San Isidrio	14	8	3,713	soybeans
Voluntades Unidas	24	1	2,435	tomatoes
<u>La Paz</u>				
Primero de Mayo	28	2	3,452	tomatoes
Primero de Mayo #3	17	22.5	3,095	corn
Trabajo y Paz	28	1	1,888	onions
La Villa #2	6	22.5	15,881	rice
El Misterio	11	11	9,220	rice
Ramón Rosa	10	18	14,426	rice
Comité Fem. 12 de Enero	n.a.	1	324	corn
TOTAL	242	120	73,945	

Source: West Central Regional Office, INA.

The Programa de Pequeños Proyectos also provides technical assistance through an "equipo técnico operativo de campo" (ETOC). The ETOC

provides technical assistance and training in organization, administration, and production planning and implementation.

Most ARGs in the valley are affiliated with a higher-level or umbrella association or federation, as follows:

ANACH	Asociación Nacional de Campesinos de Honduras
FECORAH	Federación Hondureña de Cooperativas de Reforma Agraria
UNC	Unión Nacional de Campesinos
ALCONH	Alianza Campesina de Organizaciones Nacionales de Honduras
Others	CENACH and CNTC

These umbrella organizations lobby on behalf of their member ARGs and collaborate with state organizations such as INA in the adjudication of land. ANACH has also played an active role in organizing regional cooperatives (for example, CARCOMAL described below) that provide agricultural-support services to member ARGs.

Banco Nacional de Desarrollo Agrícola (BANADESA)

BANADESA is the principal source of public-sector agricultural credit in the valley. The bank employs approximately 43 persons, with offices in Comayagua City (28 persons) and La Paz (about 15 persons).

The agricultural-loan portfolio of the bank's Comayagua agency is presented in table 35. Funds for agricultural loans come from various sources including GOH, USAID/Honduras, Inter-American Development Bank, and World Bank. Some of the credit lines are established as a "fondo de fideicomiso" (trust fund) and may only be used for loans meeting certain criteria specified by the source of those funds. Most of the agricultural loans authorized by BANADESA are used to finance crop production (70%) and cattle production (25%).

Over two-thirds (67%) of BANADESA's loan portfolio consists of loans to the "reformed sector." BANADESA has been the principal source of credit for farmers in this sector. Loans are made to groups in the reformed sector at 8% for basic grains, while loans to farmers in the private sector are made at 11%. Bank officials indicated, however, that more than 90% of about 40 agrarian-reform groups (ARGs) that have received BANADESA loans are in default or delinquent. An estimated 30% to 40% of these loans are considered irrecoverable.

Yet government policy has allowed delinquent ARGs to continue obtaining new loans from BANADESA. Bank representatives further indicated that some of the delinquent ARGs may now be obtaining credit through the Instituto Nacional Agrario (INA). This raises the question of whether such loan beneficiaries should first repay the new INA loans or the old BANADESA loans.

Table 35. BANADESA -- Comayagua agency's portfolio of loans outstanding as of March 31, 1987.

<u>Economic Activity</u>	<u>Title</u>	<u>Balance</u>	
REGULAR LOANS			
Consumption (BND)	Commerce	402,921	
Agriculture	Rice	6,685	
Livestock	Cattle feeding	31,920	
Agriculture	Coffee	271,640	
Agriculture	Basic grains	141,171	
Agriculture	Vegetables	75,675	
Agriculture	Sugarcane	14,766	
Commerce (storage)	Consumption	34,381	
Agriculture	Watermelons	500	
Livestock, poultry	Milk	15,733	
Agriculture	Coffee	1,910,550	
Livestock	Milk	5,300	
Agriculture	Other	3,485	
BID			
Livestock	Cow's milk	16,300	
Vegetables		3,300	
Agriculture		6,047	
Other		10,740	
Poultry		108,915	
World Bank			
Livestock	Milk	11,424	
Agriculture	Coffee	163,831	
Livestock	Breeding/coffee	198,629	
INA Funds			
Agriculture	Other	112,808	
Agriculture	Vegetables	20,830	
Agriculture	Tomatoes	101,359	3,668,912
REFORM-SECTOR TRUST ACCOUNTS			
Govt. of Honduras	Agriculture	6,063,020	
Rural Women	Agriculture	103,377	
PCA - BID	Livestock, agr.	192,767	
PRODIVERSA	Agriculture	133,642	
Water Resources	Agriculture	149,762	
Integrated Forestry	Timber prod.	20,437	
Development Forestry			
IHCAFE	Coffee prod.	1,132,600	7,795,605
TOTAL			11,464,517

Source: Comayagua Agency of BANADESA

Honduran farmers or farmer groups borrowing from an institutional source of credit generally must have some form of security or collateral. This could be a land title in the case of farmers who own their land

("dominio pleno"), or a statement of "garantía de ocupación," "constancia de asentamiento," or "título provisional" in the case of farmers operating land under an ejido arrangement in the reformed sector. Many potential beneficiaries cannot access BANADESA credit because they do not have clear title or other certification by INA, they cannot offer adequate collateral, or they fail to meet some other requirement (for example, minimum area of 5 mz).

Some observers maintain that BANADESA has not been adequately capitalized since it was established; thus, the agency really does not have the working capital needed to respond to the credit needs of the agricultural sector. Further, the agency has a very poor record for loan recovery; failure to press for recovery of loans has undoubtedly had a negative effect on the farmer's attitude toward the obligation of repaying loans. In addition to eroding the bank's limited capital, the forgiveness of loans for political reasons will make BANADESA unable to support the development of more commercialized farming in the Comayagua Valley. Measures need to be taken to strengthen BANADESA's performance capability, but this need appears to be national rather than regional in scope.

Instituto Hondureño de Mercadeo Agrícola (IHMA)

IHMA is charged with implementing GOH's policies on commercializing agricultural production. These policies include price guaranties and application of quality-control standards for grains and other products. IHMA also regulates product supply through storage of products in its central and regional silos.

IHMA's regional center in Comayagua city, covers the departments of Comayagua, La Paz, and Intibucá. The regional center buys and sells corn, beans, rice, and sorghum. Generally, the grain that the center purchases in the region is stored in the region. The center's storage capacity is 5,709 mt. Product purchases are shipped elsewhere only if there is demand in another region. However, because of the valley's climate, IHMA transfers its bean inventory to storage facilities in Tegucigalpa.

This organization reportedly lacks sufficient working capital to pay farmers promptly for the grain it purchases. The IHMA representative interviewed indicated that this is no longer a problem and that the farmer can quickly effect payment by taking the IHMA sales receipt to BANADESA.

Generally, IHMA buys grain from farmers who have loans from BANADESA; who receive technical assistance from the SRN, INA, or a special project; or who have small- to medium-size farms but do not receive credit from BANADESA or are not receiving technical assistance from the SRN or INA. Since its activities are limited almost exclusively to basic grains, IHMA plays a very limited role in the agriculture of the valley.

Dirección de Fomento Cooperativo (DIFOCOOP)

DIFOCOOP is responsible for assigning to farmer groups legal status of cooperatives of one type or another (for example, a credit union as distinct from an agricultural cooperative). It has provided technical assistance and training to regional cooperatives such as CARCOMAL in Comayagua. Areas in which assistance and training are provided include organization, administration, and financial management.

From 1982 to 1984 DIFOCOOP was the implementing agency for a project to organize eight subregional service cooperatives and four model co-ops. The project was funded by USAID/Honduras's Agricultural Sector II Project (Model Co-op Development). USAID/Honduras continued to fund the project in 1985, with the objective of improving this agency's organizational and financial structure. Technical assistance was provided by Agricultural Cooperative Development International. The Cooperativa Fruta del Sol in Comayagua was established through this project.

Regional Agricultural Committee (CAR)

The Comité Agrícola Regional is an interagency coordinating body that is chaired by the SRN regional director. This committee meets once a month and brings together the major agencies concerned with agriculture in the valley. These agencies include the Regional Directorate, Instituto Nacional Agrario, Banco Nacional de Desarrollo Agrícola, Instituto Hondureño de Mercadeo Agrícola, Instituto Hondureño del Café, Dirección de Fomento Cooperativo, and the Secretaría de Planificación.

A member of the Regional Agricultural Committee indicated that the committee's greatest need is to develop better mechanisms to coordinate the activities of the various agencies at the field level. The CAR apparently receives little input from the private sector, and there is a problem in obtaining input from the local level Comités Agrícolas. In the long run, a strengthened regional committee could provide a nucleus of better coordination for agricultural development activities in the valley.

Mejores Alimentos de Honduras, S.A. de C.V.

Mejores Alimentos operates a cannery that processes vegetables and fruits (for example, it processes tomatoes into tomato paste, sauce, catsup, and juice). Originally owned and operated as a private business, the firm is now operated by the Corporación Nacional de Inversiones (CONADI), with distribution of capital as follows: CONADI (57%), Comercial e Inversiones Galaxia (38%), and Banco Centroamericano de Integración Económica (BCIE) (5%). The company's packaged products such as canned fruit juices are marketed under the Elite brand. The firm employs 230 permanent workers and 50 to 100 temporary workers, reaching the higher figure (100) during the first 6 months of the year.

Various studies have reported that, because of problems in the region (for example, the high cost of raw materials), the firm is operating at only 30% to 40% of capacity. According to these reports, the plant could process

- 500 mt/day of tomatoes during a 120-day period (November to April); total processing capacity is 60,000 to 70,000 mt/yr
- 18,000 mt/yr of citrus (orange and grapefruit) during 6 months (June to December)
- 16,000 mt/yr of juice (apple, pear, peach, and pineapple) during 6 months (June to December)
- 30,000 mt/yr of vegetables (cucumber, pimientos, garbanzos, snow peas, green beans, asparagus, and others)

Mejores Alimentos has a key role in the valley's current economy. While this firm would appear to buy about two-thirds of the tomatoes produced in the valley, it now has to compete with Alimentos del Valle. The firm is already paying a high price for tomatoes compared to tomato prices in other countries. Financial stability has been a problem. The firm has a tremendous debt (Lps 70 million) built up under past management. It is reported that the current management is performing well and starting to bring down the debt.

While transition of the firm to the private sector will be critical, its future success also will depend on increasing the plant's operating efficiency (that is, reducing per-unit production costs). Success in bringing actual operating levels closer to capacity will depend, in large measure, on the ability of the valley to supply the volume of produce this plant requires.

Agrícola de Honduras, S.A. de C.V.

Agrícola is a wholly owned subsidiary of Mejores Alimentos. It has some 900 mz of irrigated land; about 600 of the 776 mz suitable for the production of annual crops can be used to produce tomatoes. However, due to the necessity of leaving land in fallow, no more than 300 mz can be planted with tomatoes in any one year. The firm has about 2,000 mz more of cultivable land in pasture and forest.

In 1986 (mid-January to mid-May), Agrícola produced and delivered 4,512 mt of tomatoes to Mejores Alimentos for processing. This volume was reported to be 50% of the total tonnage of tomatoes purchased by Mejores Alimentos during the season (Center for Privatization, 1986:27); however, this figure may be in error since other available data indicate that the percentage of tomatoes supplied by local growers is greater than 50%.

The firm employs 37 persons (6 professional, 10 administrative, and 21 field and support personnel). The firm's capital (an estimated Lps 2 million) is distributed as follows: CONADI (76%), Corporación e Inversiones Galaxia (19%), and BCIE (5%).

OTHER DONOR-SUPPORTED PROJECTS WITH IMPACT ON COMAYAGUA VALLEY

USAID/Honduras

Development and Adaptation Unit (UDA)

Located at the SRN's Regional Directorate in Comayagua, UDA (Unidad de Desarrollo y Adaptación) was established as a special project to develop appropriate technology for USAID/Honduras's Rural Technologies Project (PTR). PTR's objective is "to improve the well-being of the rural poor" by increasing the income of small-scale farmers and promoting small-scale industry.

UDA's objective is to develop and adapt appropriate technology (implements, tools, and equipment) that can be used economically by small-scale farmers in hillside agriculture. The unit provides training, technical assistance, and extension activities aimed at equipment manufacturers, SRN extension agents, other institutions, and farmers.

UDA is partially funded by United Kingdom's ODA and by USAID/Honduras PL-480 funds. Technical assistance to UDA has been provided through both funding sources. USAID/Honduras funding to UDA and PTR ends in September 1988. Possible continuation of ODA funding of the project is being explored.

Since UDA emphasizes developing appropriate technology for hillside agriculture, this initiative is not really targeted to the valley's agriculture. However, this project could have technological spin-offs applicable in the valley, and this possibility should not be discounted.

Communication for Technology Transfer in Agriculture (CTTA) Project

The CTTA project is being implemented by the SRN's Agricultural Communication Department (Departamento de Comunicación Agropecuaria) and SRN's regional directorate, where the project has its field office. The project aims to develop, adapt, and institutionalize a communication methodology to support technology transfer in agriculture. The project is working in the Comayagua region in the higher-altitude communities of El Rosario, San Luis, and San Jerónimo. The project's initial work is focusing on developing communication programs to support transfer of soil conservation and bean-production technologies.

During 1987, the CTTA project will conduct some training workshops on communication techniques to support agricultural extension activities. Project activities are to be expanded into the valley and elsewhere in Honduras as the project gains experience in applying its communication methodology.

The project is partially funded by USAID's Bureau of Science and Technology. Technical assistance is being provided by the Academy for Educational Development.

The CTTA project is developing a communication-support capability that could provide a valuable resource for agricultural research and technology transfer in the valley. The project has been identified as a potential collaborator in training and technology-transfer activities to be conducted by the Irrigation Development Project (described below). This potential collaborative link should be developed.

Small-farmer Organization-strengthening Project

This project, which is just getting under way, aims to strengthen the ability of intermediary cooperative groups to function as viable business enterprises. The project will work with five intermediate groups: coffee cooperatives, model cooperatives such as Cooperativa Fruta del Sol (described below), credit units, FECORAH, and ANACH-affiliated cooperatives such as CARCOMAL (described below). Of an estimated 700 rural cooperatives in Honduras, approximately 55 will participate in the project.

Cooperatives that meet specified prequalification criteria will be eligible to receive operational-support funds, technical assistance, and credit. Continued participation in the program will depend on the cooperative's success in implementing various types of organizational and administrative reforms. A USAID/Honduras-funded technical-assistance team is developing an institutional analysis of the Fruta del Sol cooperative to determine whether the cooperative meets the specified prequalification criteria for participation in the project.

The project is partially funded by USAID/Honduras, with technical assistance being provided by the World Council of Credit Unions and Agricultural Cooperative Development International (ACDI).

This project will play a very important role in strengthening regional cooperatives such as Fruta del Sol and CARCOMAL (described below). Such cooperatives provide the key to improving small- to medium-size farmers' access to credit, improved technology, and markets. This project's impact will be enhanced considerably to the extent that project implementation is coordinated with the Irrigation Development Project (described below).

Inter-American Development Bank (IDB)

Rural Roads Project

Completed in 1986, this project (financed by the Inter-American Development Bank, BID 606SF/HO) provided a loan for construction of rural roads in the valley. The loan is to be repaid by GOH in 10 years; GOH must also maintain the roads.

Agricultural Research and Extension Project

This national project (Proyecto de Investigación y Extensión Agropecuaria) was financed by the Inter-American Development Bank (BID 555SF/HO) through a loan of \$4 million. The project began in July 1979 and loan disbursement ended in March 1987. Also, through this project,

the European Economic Community donated \$2.2 million to acquire vehicles and agricultural machinery. The project assisted SRN in several areas such as construction and rehabilitation of buildings and purchase of vehicles.

Approximately 7% of the loan amount directly benefited the valley. Project activities in the valley included construction of the extension agency at La Paz, improvement of the regional directorate's installations at Comayagua, purchase of vehicles, and acquisition of 134 head of cattle (valued at \$350,000).

United Nations

Small-farmer Water-resources Project

The Small-farmer Water resources Project (Proyecto de Recursos Hídricos para Pequeños Agricultores) is providing technical assistance and credit to develop agricultural production in the Palmerola irrigation system. The system itself was built under USAID/Honduras's Agricultural Sector II Project.

Funding for the current project is being provided by USAID/Honduras PL-480 funds. This funding supports technical assistance provided by FAO as well as production-credit loans. Project funding (\$1.5 million for Honduras) is being administered through the UNDP HON/84/004 project. The project is scheduled to end in September 1987; an effort is being made to extend the project through December 1987.

Farmers who visited the Palmerola irrigation system expressed frustration. Some had expected, apparently mistakenly, that a dam was to have been built to make it possible to irrigate a larger area. One farmer spoke of the growing season when most farmers, on the advice of the project's technical-assistance component, planted onions and lost money because their production flooded the market and caused the price of onions to fall.

The study team also learned that a former Honduran president "donated" the system to the farmers of Palmerola, thereby absolving them of their obligation to pay back the cost of building the system. Further, there is little, if any, fiscal responsibility for the operation and maintenance of the system. Because this is a private system, the DRH does not have any responsibility for its operation and maintenance. Thus, it is important that the successes and failures of this project be studied closely as an integral part of developing future irrigation systems in the valley (for example, the irrigation-development project described below).

Incorporation of Farm Women in the Productive Process Project

The Incorporation of Farm Women in the Productive Process Project (Proyecto Incorporación de la Mujer Campesina al Proceso Productivo) is a \$1.2 million FAO project (HON/82/007). The Instituto Nacional Agrario (INA) is implementing the project in Olancho, Choluteca, El Paraíso, Santa Barbara, and Comayagua. The project is helping INA establish a

rotating fund that provides loans to women's groups for productive activities such as swine production, rice production, and retail stores. Loans can range from \$750 to \$12,500. Borrowers who establish positive repayment records are in an improved position to seek larger loans from other lending sources.

This project has developed pig-production activities in the Comayagua region. The project appears to provide an effective mechanism for facilitating the participation of small farmers, particularly female farmers, in livestock production.

Government of Israel

In 1985, the Government of Israel provided an Israeli technical-assistance team that prepared terms of reference for an integrated agricultural development project in the Comayagua Valley. The proposal was never presented to a funding source. Later, the Secretariat of Planning prepared a proposal for a study to assess the feasibility of such a project. This proposal was submitted to USAID/Honduras with a request for funding under the mission's Strategic Planning and Technical Services Project. The request for funding was not approved.

PRIVATE- AND QUASI PRIVATE-SECTOR ORGANIZATIONS

Regional Agricultural Cooperatives

Cooperativa Agropecuaria Regional Comayagua Limitada (CARCOMAL)

CARCOMAL is headquartered in Comayagua city and comprises 24 agrarian-reform groups (ARGs) with a total membership of 355 farmers and some 3,000 ha (CONSUPLANE, 1985). CARCOMAL was formed in 1981 when ANACH played an active role in pulling the various member groups together into a regional cooperative with "personería jurídica," an official status enabling CARCOMAL to borrow funds from BANADESA.

Agricultural production in the individual agrarian-reform groups (ARGs) that belong to CARCOMAL is carried out collectively. Commercial crops include tomatoes, cucumbers, onions, chiles, watermelons, and cante-loupes. Production activities are implemented under the guidance of a "consejo de administración de base." Daily work activities are supervised by a "coordinador de trabajo" and a "junta de vigilancia."

Regional directorate and INA extension personnel provide technical assistance (production plans) to individual ARGs. CARCOMAL administers production-credit loans based on funds that the co-op borrows from BANADESA. The co-op also sells agricultural inputs to its member groups. Bids are obtained from supply houses in Comayagua and inputs are purchased from the dealer(s) offering the lowest prices. In turn, the co-op sells the inputs to its "locales" at a slightly higher price to cover costs.

This cooperative has a contract with Mejores Alimentos. The contract stipulates that the cooperative will deliver a specified quantity of

tomatoes to the processing plant at a stated price with discounts in the case of inferior quality.

USAID/Honduras provides indirect funding support to CARCOMAL via an Operational Program Grant to IADSL (El Instituto Americano para el Sindicalismo Libre). IADSL recently paid Lps 9,000 to FHIA for soil analyses of land held by CARCOMAL's ARGs. Also, USAID/Honduras has provided PL-480 funding to the Dirección de Fomento Cooperativo (DIFOCOCP) which has disbursed funds to support the salaries of CARCOMAL's manager and accountant.

Cooperativa Regional Servicios Agropecuarios "Fruta del Sol"

This cooperative was established in 1983 with funding from USAID/Honduras (Agricultural Sector II Project/Model Co-op Development). Technical assistance was provided by Agricultural Cooperative Development International (ACDI). The cooperative markets various products including industrial tomatoes, cucumbers (for export to the United States during the winter), snow peas, melons, and rice.

The cooperative has a packing house with washing, waxing, grading, and packing equipment and a packing room. The cooperative also provides space for the cold storage warehouse and frozen-food plant awarded and granted by Agro Internacional (described below).

The cooperative has approximately 250 farmers, with some 200 farmers classified as active. Farm sizes of cooperative members vary as follows: 1 to 10 mz, 50% of the members; 10 to 20 mz, 30%; and 20 to 30 mz, 20%. The cooperative is looking for foreign investors to provide capital for expansion of its production, processing, and marketing facilities.

The cooperative is service oriented, providing its members with agricultural support services including production credit, sales of agricultural inputs, technical assistance, packing, marketing, and education in cooperative development. Loans are repaid by deducting the loan amount from the gross value of the produce the farmer sells to the cooperative. Cooperative members can purchase inputs on credit; farmers who are not members must pay cash.

The cooperative employs about 15 persons in technical and administrative positions (1 manager, 4 agronomists, 2 accountants, 3 secretaries, 1 warehouse supervisor, and 3 watchmen) and 25 daily workers for about 100 days per year. The cooperative's processing facilities are underused (for example, the plant could process three times the amount of cucumbers currently being processed), so there is potential for expanded employment.

Major constraints to expanded crop production and marketing include irrigation-water availability and transportation costs. The area of transportation costs has been of such great concern to the cooperative that it dropped its membership in FEPROEXAAH (the Federación Hondureña de Productores y Exportadores Agrícolas y Agroindustriales de Honduras)

because FEPROEXAAH had not been able to improve international transportation rates for Honduran growers.

Proyecto Hortícola Demostrativo-Comayagua -- FHIA/FEPROEXAAH

The Horticultural Demonstration Project started in August 1986 and is being developed by the Fundación Hondureña de Investigación Agrícola (FHIA) and the Federación de Asociaciones de Productos y Exportadores Agropecuarios y Agroindustriales de Honduras (FEPROEXAAH), with funding provided by USAID/Honduras and technical assistance by Louis Berger, Inc.

The demonstration project entails operating a market-oriented research farm (52 ha) that is centrally located in the Comayagua valley near Las Liconas along the Humaya River. Additional land (20 ha) adjacent to the farm has been acquired for expanded crop plantings. Though it was established less than a year ago, FHIA's farm is now conducting adaptive research on tomatoes, cucumbers, squash, okra, melons, rice, and other crops. About 70 to 160 persons, depending on the season, are employed by the farm.

FHIA manages the farm and FEPROEXAAH's Unidad de Comercialización markets the farm's produce. FEPROEXAAH is collaborating with two private-sector firms -- Fruta del Sol and Agro Internacional (discussed further below).

A major research component of this project is to collect economic information on the production and marketing of crops for which Honduras has a comparative advantage in the export market. To this end, the project is collecting data on various cost items, including production, administration and overhead, marketing, and initial investment. This information will be used to develop budgets and profitability estimates by crop and variety, production costs per unit of cultivated area, costs per unit of output, labor, mechanization, and other inputs.

The project plans to provide training in the various production technologies used in growing the crops produced on FHIA's farm. However, the project has not yet been able to develop this training component. Nevertheless, growers have expressed considerable interest in the potential of this project to provide technical assistance for crop diversification. Even farmers from distant places such as Olancho, El Aguán, and other areas have sought assistance from the farm.

FHIA has provided SRN's Tabacalera Research Station personnel with training in horticultural research, but there is no formal plan to coordinate La Tabacalera's horticultural research program with that of FHIA. Project activities during 1987 will focus on cucumbers and tomatoes, but research will also be conducted on other crops.

The demonstration project is not collecting production cost data for private farmers producing and marketing the same crops being evaluated by the project. Such information is needed if the project is to be able to evaluate which technologies will have the greatest adoption potential. The project also has not developed a clear concept of how

its technology is to be transferred to farmers in the valley or elsewhere in Honduras. For example, the team was told that the project had held a field day at the farm but had failed to issue an invitation to the Cooperativa Fruta del Sol, presumably one of the key organizations that project would seek to work through to reach farmers.

The demonstration project needs a clearer concept of how it can most effectively involve the various public- and private-sector concerns that can help the project in developing improved technologies and transferring these technologies to farmers. Also, the research literature would suggest that the project could benefit greatly by seeking ways to more actively involve vegetable and fruit growers in designing, implementing, and evaluating the project's research program (Chambers and Jiggins, 1986).

Private Sector Agribusiness Activities

Alimentos del Valle, S.A. de C.V.

This is the second major cannery established in the valley (the first was Mejores Alimentos). Construction of this plant began in January 1986, and plant start-up began in September to October of the same year. The plant processes tomatoes into paste, sauce, catsup, and juice; and pear- and apple-nectar concentrate imported from Guatemala into nectar (juice). The firm's products are marketed under the Naturas brand.

The company is developing a product line for export to the United States. This line includes prepared foods such as frijol con salchicha. Packaging materials are currently imported but the firm plans to produce its own tin cans beginning with the next tomato crop.

The plant can process 70 t/day for 6 days a week during a 6-month harvesting period. The processing facilities are being expanded to 100 t/day. The firm employs about 90 persons.

Mejores Alimentos has been operating at less than full capacity since its beginning some 10 years ago. It is not clear where the additional raw tomatoes required to operate both plants will come from.

Cultivo Palmerola

This is a subsidiary production operation of Alimentos del Valle. The firm has approximately 100 mz planted in tomatoes.

Agro Internacional

Established in late 1985, Agro Internacional is a wholly owned subsidiary of Seaboard International Corporation. The firm is growing cucumbers and strawberries on its own land (about 200 ha) as well as on some land that it is managing for private investors. The firm's processing facilities are located adjacent to Cooperativa Fruta del Sol. The firm operates its own facilities for quick freezing, cold storage, and transport of harvested product from the field to the plant in refrigerated trailers. Fresh cucumbers are exported to the United States for

the winter market; frozen strawberries, whole and processed, are being exported during much of year. Some 25 persons are employed by the firm permanently and between 500 and 700 persons during the growing season.

Rezco Agro-Industriales S.A.

This firm is using some 100 m² of the Las Cañas cooperative to grow market crops. In 1986, the firm grew melons for export; in 1987, it grew tomatoes. This venture employs Israeli technology and is financed with private U.S. capital.

Masa Rica

A corn flour mill (Masa Rica) is being constructed along the main highway just outside of the city of Comayagua. About 20 people will be employed by the mill.

Private Marketing Agents

Many marketing agents (assemblers, truckers, wholesalers) are active in linking the valley's production capability with the demand for agricultural products in Tegucigalpa, San Pedro Sula, and other markets. Such agents give many farmers an immediate market for their produce. Some of these intermediaries also make cash advances that farmers use to purchase inputs or meet other immediate expenses.

Only a few studies have looked in a systematic way at agricultural marketing in the valley (ADAL, 1985). Marketing is directly affected by the state of development of marketing in the prime markets, Tegucigalpa and San Pedro Sula. The study team heard repeated references during field interviews to the role that a small number of wholesalers (mayoristas or "coyotes") play in setting prices in the Tegucigalpa market. Claims were also made that some of these marketing agents take advantage of Comayagua growers. Data are not available to prove or disprove these contentions. Nevertheless, it appeared to the study team that a relatively large number of small agents are active in the valley's produce markets and that these markets are reasonably efficient.

Agricultural-input Suppliers

Virtually all agricultural-production inputs (fertilizers, herbicides, and pesticides) are imported. The tariff rate is approximately 25% to 30%. Prices of agricultural inputs in Honduras are estimated to be 30% higher than the prices of the same inputs in other Central American countries.

In the city of Comayagua, there are approximately six private retailers, two cooperatives (Fruta del Sol and CARCOMAL), and one public-sector agency (sección de ventas de BANADESA) that sell production inputs. Two input retailers were reported to exist in La Paz, and one person may be selling inputs in La Villa de San Antonio. It was also learned that a

herbicide-formulation plant (Formuladora Mega) now operates in the valley near Comayagua city.

There seems to be no shortage of input suppliers or inputs in the valley. The problem with inputs has to do with national policy, which needs to be evaluated. What GOH is gaining in terms of revenues on the import tariff on agricultural inputs needs to be weighed against what the country's economy is losing because farmers are applying less than the optimal rates of fertilizers and other inputs.

Private Banks

Several private banks have offices in Comayagua city. The study team's time did not permit an extensive evaluation of private credit. However, we did hear many complaints that private banks do not lend to small farmers without collateral, and this is undoubtedly true. An example of a private bank that is active in making agricultural loans to small farmers in the valley is the Banco del Occidente. The branch office of this bank was established in Comayagua city approximately 7 years ago. The bank does not make loans to agrarian-reform groups but only to individual farmers. Interest rates are currently 11%.

A major activity of the bank is to onlend Banco Central funds to 600 to 1,000 coffee growers in USAID/Honduras's Small-farmer Coffee-improvement Project. These clients plant an average of 1 to 2 m² of coffee in the higher elevations.

The bank has also made loans for the construction of silos (10 to 15 clients), reservoirs (for cattle), and irrigation pumps and pipes (4 clients in 1986 but no loans to date in 1987). Farmers who are taking loans for developing irrigation systems are growing high-value crops (tobacco, rice, tomatoes, watermelons, and cantaloupes). These irrigation systems are not being used for pasture.

Approximately 70% of the bank's loan portfolio is invested in agricultural loans. An estimated 45% of this amount is invested in the valley, with between 10% and 20% of the bank's clients being small farmers.

Unlike other private-sector banks, the bank does not require borrowers to offer title to their land as collateral for loans. Collateral is accepted in the form of a claim on the farmer's harvest. The bank has experienced a delinquency rate of 8% to 10%, but the delinquency rate is up in 1987 because of the fall in coffee prices and the consequent problems farmers have had in repaying loans. An estimated 40% of the coffee growers are delinquent on their loans. According to the bank's manager, Cooperativa Fruta del Sol is developing a rice project that will be financed by the bank.

Private Voluntary Organizations (PVOs)

Several PVOs, including Visión Mundial and Plan en Honduras, are active in the valley. Their projects focus on a broad range of problems such as health, water, education, and agriculture. For example, Visión

Mundial has a family-garden project in several communities in the region. Time did not permit contacting Plan en Honduras or other PVOs operating in the valley.

FUTURE PROJECTS INVOLVING THE COMAYAGUA VALLEY

USAID/Honduras

Irrigation Development Project

USAID/Honduras is now launching an irrigation development project that will provide grant (\$8 million) and loan (\$1.6 million) assistance for the construction of approximately 600 small-scale irrigation systems totaling 6,000 ha to 7,000 ha in three areas of the country (San Pedro Sula, Choluteca, and Comayagua). The project includes a large technical-assistance package and will assist in the development of a national irrigation plan.

An estimated 90 small-scale irrigation systems will be built in Comayagua and La Paz. The project will be implemented through the SRN's Directorate of Water Resources, with the support of CEDA. Two lines of credit, one for the construction of irrigation systems and the other for crop production, are included in the project. Training will be provided to both farmers and irrigation technicians. The project will also develop and strengthen irrigation institutions such as local user groups.

This is the single most important USAID/Honduras project scheduled for implementation in the valley. It is essential that this project establish close working relationships with SRN/DRH and CEDA, learn what has been going on in the valley, and study in detail the economics of different options (see chapter 3).

Other irrigation projects are being developed or considered for Honduras. The World Bank has financed development of 600 ha in Juticalpa. Japan is assisting the development of an estimated 16,000 ha to 30,000 ha along the Choluteca River. Canada may support development of an estimated 12,000 ha in Olancho. The expanded irrigation capability in the country as a whole has important implications for using the existing and planned irrigation facilities in the Comayagua Valley.

Natural Resources Management Project

This project does not have any activities in the valley or its watershed, nor does the project have latitude to develop activities in the Comayagua region. However, a new project is being considered for a 1988 start-up which would entail a national focus and could feasibly include support of activities in the valley (for example, reforestation in the valley's watershed).

This project could play a vital role in helping to preserve the valley's watershed, which is reportedly deteriorating. Beyond expanding and

improving the efficiency of irrigation systems in the valley, it seems imperative that a reforestation project be initiated to protect the valley's watershed and its ability to supply water to the valley's irrigation systems. Those who have visited the field are well aware of the streams of smoke coming from fires on the hillsides surrounding the valley. Farmers interviewed in the valley feel that this deforestation process on the hillsides is being translated into reduced streamflow and longer periods of drought in the valley's irrigation systems. Addressing this problem directly would help to insure and protect GOH and USAID/Honduras investments in the valley.

Agricultural Productivity Enhancement Project

This potential project is being considered by the mission. In part, it would be an extension of the natural resources management and PTR projects. However, the project could also provide support for implementing a proposed semi-autonomous national agricultural research and extension agency (Dirección General de Tecnología Agropecuaria). The possibility of including an agricultural education component in the project has also been suggested.

Inter-American Development Bank (BID)

The GOH has submitted a proposal to the Banco Centroamericano de Integración Económica (BCIE), which has submitted a proposal to BID for rehabilitating the main road north from the Puente Río del Hombre in Tegucigalpa to a town just south of Lago de Yojoa. This is the main highway through the valley. No decision has been made yet on this proposal.

BID does not have any irrigation projects in its pipeline. However, the bank feels that the construction and rehabilitation of small-scale irrigation systems, coupled with development of institutional ability to manage these systems can have an immediate impact on agricultural production and productivity in the valley. According to BID, past studies have shown that the valley has great potential for such small-scale irrigation projects. The bank has requested GOH to submit a proposal to address this need, but GOH has not yet developed the proposal.

BID is also interested in soil conservation and is requiring that new projects have a conservation component. Improved efficiency of water use in the valley would certainly contribute to resource conservation and increase the potential area that could be irrigated.

United Nations

FAO is planning a project on forest development (desarrollo forestal) that will include the Comayagua region in its target area. The project will be implemented by the Corporación Hondureña de Desarrollo Forestal (COHDEFOR). This project could have an important impact on protecting the valley's watershed.

DISCUSSION

This chapter reviewed a range of institutions and organizations with programs, projects, and activities that have an impact on the Comayagua Valley's agricultural sector. Generally, public-sector research and extension have focused on the basic grain crops produced by farmers in agrarian-reform groups. Support to the "reformed sector" is also provided by such agencies as INA, BANADESA, and IHMA. INA's Programa de Proyectos Pequeños is providing credit and technical assistance to help farmers in agrarian reform groups move into the production of higher-valued crops such as tomatoes.

In the private sector, entrepreneurs have been active in producing and marketing higher-value crops such as tomatoes, onions, cucumbers, and watermelons for domestic, industrial, and export markets. Their activities have been facilitated by the emergence of private- or quasi-private-sector businesses such as Alimentos del Valle, Cooperativa Fruta del Sol, and Agro Internacional.

As the discussion in this chapter demonstrates, USAID/Honduras and other donors are providing funding and technical support to a wide range of programs and projects in the public sector. Appendix A summarizes the mission's current agricultural and rural development project portfolio. In recent years, USAID/Honduras has placed a greater emphasis on channelling development assistance to private or quasi-private enterprises such as Cooperativa Fruta del Sol, FEPROEXAAH, and FHIA.

USAID/Honduras projects currently active or which anticipate being active in the valley are:

- Irrigation Development Project (developing small-scale irrigation systems)
- Small-farmer Organization-strengthening Project (working with regional cooperatives such as CARCOMAL and Cooperativa Fruta del Sol)
- Agricultural Research Foundation Project and Export Development and Services Project (continuing development of the FHIA-FEPROEXAAH Comayagua Vegetable Demonstration Project)
- Privatization of State-owned Enterprises Project (considering divestiture of Mejores Alimentos)

No other donor is implementing or has plans to develop a major project initiative focused on the Comayagua Valley. At the same time, there are numerous SRN-related programs and projects that are beneficiaries of donor support. However, this support is being provided on a somewhat ad hoc basis, and the resulting programs and projects are not integral components of any master plan for the valley's agricultural development.

While there is no overall plan or strategy, it is clear that a number and variety of development-oriented institutions and organizations are already in place and that additional development activities are planned.

What is most needed is improved coordination of these activities (for example, more effective collaboration between FHIA, SRN, CEDA, and cooperatives such as Fruta del Sol). Improved coordination of these efforts is essential to secure the greatest possible boost to the valley's economic development.

CHAPTER 5 ANALYSIS

This section 1) summarizes progress on agricultural development in the Comayagua Valley, 2) reviews the constraints to increased production and accelerated economic growth in the valley's agricultural sector and potential ways in which current and planned USAID/Honduras projects could address these constraints, and 3) outlines a strategy for mobilizing USAID/Honduras and other resources in support of a more focused program for the valley's agricultural development.

PROGRESS TO DATE

Strategically located in the Honduran economy, the Comayagua Valley has soil, water, human, and organizational resources that need to be marshalled more effectively to achieve sustainable agricultural and economic growth.

The GOH, USAID, and other donors have made significant investments in the valley over the past 30 years. While the full impact of these initiatives has yet to be realized, progress is evident. Benchmarks of progress include

- basic infrastructure is in place (schools, roads, electricity, and communication facilities)
- land distribution has been improved by agrarian reform, and small and medium-size farmers participate in the valley's commercial agriculture
- construction of the Coyolar Dam and of the Flores, Selguapa, San Sebastián, and Palmerola irrigation systems, plus many irrigation systems in the private sector
- increases in the number of Secretaría de Recursos Naturales (SRN) personnel assigned to the regional directorate and providing public-sector research and extension services in the valley
- existence of important SRN national centers for livestock and aquaculture
- recent establishment of the Agricultural Development and Training Center (CEDA) to conduct irrigation research and training
- operation of vegetable- and fruit-processing factories (Mejores Alimentos and Alimentos del Valle)
- existence of market-oriented regional service cooperatives such as Fruta del Sol and CARCOMAL

- installation of the market-oriented Horticultural Demonstration Project farm by the Fundación Hondureña de Investigación Agrícola (FHIA)
- expanding private-sector investment in agricultural production (for example, Rezco), agroindustry (for example, La Masa corn flour mill), and other ventures (for example, Formuladora Mega)

Most of these activities have developed independently, without the benefit of any formal coordination or strategy. Nevertheless, the investments made to date have been accompanied by remarkable changes in the valley's economic performance:

- Overall agricultural production has continued to increase.
- Horticultural production has expanded at a high rate.
- Significant equity benefits have been gained in terms of substantial participation of small- to medium-size farmers in irrigation and horticultural production.
- Off-farm, nonagricultural employment has expanded.
- Markets have improved, providing opportunities for local processing of valley products, expanded domestic markets, and better initial penetration of foreign markets.
- Attitudes and behavior have changed in the private sector, which increasingly demonstrates a willingness to invest in the valley (for example, Alimentos del Valle, and Agro Internacional).

Thus, the valley has developed much of the foundation needed to become a dynamic growth center. But the point of spontaneous or self-sustaining growth has yet to be reached. Some old problems persist and new ones are emerging.

CONSTRAINTS TO GROWTH IN THE VALLEY'S AGRICULTURAL SECTOR

Technical Assistance

Better integration is needed for the programs, projects, and activities of the valley's public- and private-sector research and extension agencies. Key concerns are as follows:

- The FHIA/FEPROEXAAH Demonstration Project has only recently been established and has yet to develop mechanisms to ensure a) that its research program deals with the most serious production and marketing constraints faced by valley farmers and b) that research results are disseminated through the SRN and cooperatives such as Fruta del Sol.
- The CEDA irrigation center is relatively new and needs to develop stronger links with other organizations in the valley. The center

need not have an extension program of its own but should establish close ties with SRN extension personnel (to disseminate research findings related to on-farm water management), DRH personnel (to extend findings on system operation and maintenance), and the Demonstration Project (to cooperate in studies of production technologies for irrigated crops). CEDA also should be encouraged to focus on the special problems of irrigation systems in the Comayagua Valley.

- SRN has been conducting some farm-level research through the IDRC/CATIE cropping-systems project; also, SRN has taken steps to institutionalize farming-systems methodology; but continued development of these initiatives is constrained by the lack of adequate resources to support farm-level research and extension.
- Continued effort is needed to base research and extension activities on the current information about the valley's situation and its farmers' needs.
- The data collected in the 1985 SRN/DPS farm survey needs to be properly analyzed and disseminated to the organizations that need it.

In the short term, USAID/Honduras can attack the research and extension problem through the Agricultural Research Foundation (522-0249) and the Small-farmer Organization-strengthening (522-0252) projects by seeking to build closer links between such organizations as the Demonstration Project, Fruta del Sol, and the SRN's West Central Regional Directorate.

In the longer term, the need for developing and strengthening the public-sector research and extension system will continue. The proposed USAID/Honduras Land Use and Productivity Project (522-0292) may provide mechanisms for addressing this need. In the interim, targeted assistance to strengthen the SRN's Centro Occidente regional directorate serving the valley could be provided through the mission's Strategic Planning and Technical Support (SPATS) Project (522-0269).

Credit and Finance

Use of farm credit is still low, and loan defaults are the rule rather than the exception for credit extended to agrarian-reform groups. Also, some of the valley's important agribusinesses are financially unstable (for example, Mejores Alimentos).

Public-sector organizations such as BANADESA and INA have not had satisfactory records in providing credit to farmers. By contrast, intermediary organizations such as Cooperativa Fruta del Sol and CARCOMAL have had a fairly positive experience with loan recovery. Efforts should be continued or expanded to provide agricultural credit through such intermediary organizations.

USAID/Honduras's Small-farmer Organization-strengthening Project (522-0252) can play a major role in addressing the credit constraint. Improved management of organizations such as CARCOMAL and Cooperativa

Fruta del Sol will lead to improved small-farmer credit programs and greater financial strength for the cooperatives themselves.

Further, USAID/Honduras's Privatization of State-owned Enterprises Project (522-0289) should contribute to strengthening the financial base and management of Mejores Alimentos.

Irrigation and Irrigation Institutions

The institutions for regulating, operating, maintaining, and promoting the continued expansion of the valley's water resources are weak. Key areas of concern are as follows:

- little or no regulation of rights or access to surface and ground water; lack of rules to govern the sharing of available water between public and private systems
- weak organization for operating, maintaining, and improving the public-sector water systems, with the problem being compounded by the fact that user fees provide only about one-fourth of the revenues needed to cover the current operation and maintenance costs
- no economic studies or information to indicate which types of irrigation development offer the highest returns; that is, whether to invest in new systems, improve existing systems, dig wells, build diversion dams, etc.
- no organization providing technical assistance and credit functions to promote the expansion of private irrigation or the development of private-group systems
- apparent decrease in streamflows during the summer months as a result of deforestation in the valley's watershed
- uncertainty about the Coyolar Dam, which is leaking and may constitute a hazard to public safety -- studies have been made of this problem but the GOH has been slow in taking the action necessary to resolve it

These water-related problems, most of which are institutional and organizational, must be resolved if irrigation is to be available for continued expansion of horticultural production in the valley. USAID/Honduras can address most of these constraints through the new Irrigation Development Project (522-0268). The deforestation problem could be tackled through the Natural Resources Management Project (522-0246), Forestry Development Project (522-0246), or amended versions of these projects.

Technical studies of the Coyolar Dam vary in their conclusions on the dam's safety. The GOH has not been able to resolve this issue, perhaps because the various studies have created more confusion than they have provided clarification as to whether repair, expansion, or replacement is needed.

The study team believes that an appropriate GOH authority should appoint a technical committee, including a donor representative, to review the past studies and recommend action. If the committee recommends repairing the dam, then GOH needs to determine how to finance it and establish a timetable for getting the financing and making the repair. Such a rational approach to the problem is not being pursued. USAID/Honduras, perhaps working with another donor (BID or the World Bank), could assist GOH in determining what action, if any, should be taken on the dam.

Production Inputs

Production inputs such as seeds, fertilizers, herbicides, and pesticides are essential for increasing agricultural productivity. Input retailers in the valley appear to be well stocked, although these outlets are mostly concentrated in Comayagua city. Cooperatives such as Fruta del Sol and CARCOMAL are alternative suppliers of inputs to the traditional private-sector dealers and the BANADESA sales office.

Input prices are reported to be 25% to 30% higher in Honduras than in other Central American countries. USAID/Honduras is working with GOH to amend the import-taxation law. An appropriate amendment would lay the basis for a more competitive input supply market, providing both lower prices and more retail outlets.

The privatization of state-owned services such as PROMECA and the concomitant development of a more competitive private-sector market for producing certified seed and providing agricultural machinery services would favorably affect agricultural production. More detailed information on these issues as they relate to the valley would be helpful and could be developed through appropriate studies contracted through the Privatization of State-owned Enterprises Project (522-0289) or the Strategic Planning and Technical Support Project (522-0269).

Marketing

Key areas of concern are as follows:

- The range of horticultural products grown in the valley is limited (mostly tomatoes, onions, and cucumbers). The crops grown should be diversified and the channels should be expanded through which products are marketed, especially for export.
- Freight rates are for international shipping of Honduran products. Avenues for establishing more competitive freight rates need to be explored (for example, with SECOPT).
- The pricing policies and sales handling of the Centro Nacional de Ganaderia are inadequate. Oversight is needed as well as competitive private-sector ventures for producing, selling, and distributing purebred livestock.
- Processor demand for fresh milk is limited. Demand would improve if dairies in Tegucigalpa reduced their use of imported powdered milk

and increased procurement of locally produced milk, signaling the need to establish or expand milk-producing ventures in the valley.

USAID/Honduras could attack these concerns through a coordinated program to focus existing projects on the identified problems and constraints. For example, the Export Development and Services Project (522-0207) might assist FEPROEXAAH in addressing the problem of high transportation costs. The Small-farmer Livestock-improvement Project (522-0209) could provide credit, training, and technical assistance to help remove the livestock- and milk-marketing restraints.

Infrastructure

Local municipalities have limited ability to raise funds (for example, through taxes) to support local construction and maintenance of infrastructure such as roads, drinking-water systems, and irrigation systems. Until now, the land-tax bases of most municipalities have been weak because of confused tenure and limited title registrations. However, a complete cadastral survey has recently been made of the Comayagua Valley, which can be the basis for more complete and up-to-date records of land holding and ownership. If vigorously pursued by municipalities, it could result in an improved tax base and increased tax receipts. A pilot initiative in developing local financing of rural infrastructure could be developed in selected valley municipios as a component of the Irrigation Development Project (for example, working on the rehabilitation or expansion of an existing municipal irrigation system such as in Ajuterique).

PROPOSED STRATEGY FOR STIMULATING AGRICULTURAL DEVELOPMENT IN COMAYAGUA VALLEY

The preceding section identified the major constraints to accelerated agricultural development in the Comayagua Valley and the current and planned USAID/Honduras projects that could be brought to bear on each constraint. Achieving a major impact on agricultural development in the valley, however, will require more than a piecemeal attack on the problem.

Establish a Comayagua Valley Working Group

The first step that USAID/Honduras should take is to establish an in-house working group on the Comayagua Valley comprising the project officers for the mission projects discussed above that have significant activities or impacts in the valley.

The working group should be headed by the director of the mission's Office of Rural Development or his/her designee. This individual would be the group's task coordinator. The group should meet quarterly to review the status of its activities.

Develop a Comayagua Valley Action Plan

The working group's charge would be to develop a mission action plan for the Comayagua Valley. This action plan should identify

- the objectives the mission will seek to achieve in the valley
- the USAID/Honduras projects that will be used to achieve the objectives
- the public- and private-sector organizations, including donors, that will be involved in accomplishing the plan
- a timetable for implementing the plan
- the indicators that will be used to evaluate progress toward meeting the objectives

The present study, known as the Comayagua Valley Assessment, is intended to provide much of the primary documentation for the action plan. In preparing the plan, the mission should take into account the input of other donors and valley representatives, as stated below.

Liaison with Valley Representatives and Donors

The study team recommends that the mission establish liaison with a representative group within the valley. Such a group might be afforded by the existing Comité Agriola Regional (CAR), supplemented by representative private-sector participants (from cooperatives and other agribusinesses). Further, USAID/Honduras should seek input from the more important donor agencies as identified in chapter 4.

Priorities for Action

It is difficult to establish a strict set of priorities among the constraints identified earlier in this chapter. Obviously, some constraints such as the need for improved technical assistance are pervasive and appear to take precedence. The need for improved credit is of almost equal importance, however, because applying improved techniques for irrigated horticultural production normally requires increased use of purchased inputs. The irrigation system is such an essential part of the valley's agriculture and the limitations of this system are so serious that it is difficult to assign a lower priority to irrigation problems.

Nevertheless, identifying priorities for actions within the USAID/Honduras program for the valley is less difficult. While many USAID projects affect the valley, we have seen that three activities stand out in importance. These are the Horticultural Demonstration Project supported through FHIA and FEPROEXAAH, the Small-farmer Organization-strengthening Project, and the Irrigation-development Project. The first of these has been under way for a year, the second is just now becoming operational, and the irrigation project will not become fully active for at least a year. Thus, a natural -- and the study team would

add, logical -- set of priorities already exists within the mission's program.

While the demonstration project has gotten started, the need is still urgent to develop a mechanism for disseminating what is being learned on the demonstration farm to farmers and other technical assistance organizations in the valley. This should be done immediately. Stronger ties must be developed between the project, cooperatives such as Fruta del Sol, SRN research and extension personnel, and the CEDA irrigation center.

As the Small-farmer Organization Project becomes more active, priority should be given to working with Comayagua Valley cooperatives that have the potential for increasing their members' use of credit and technical assistance. Two such organizations, CARCOMAL and Fruta del Sol have been identified in this report. Both have histories of using USAID support.

The Irrigation-development Project will work in several regions of Honduras but should be encouraged to begin work in the Comayagua Valley at the earliest possible date. The construction of additional small-scale projects in the valley will be of obvious benefit. However, the support this project can give to existing valley irrigation institutions will be of even greater value and should be given priority; namely, technical assistance and training for CEDA and the SRN irrigation department (DRH) are badly needed, and these two organizations should be supported in their joint efforts.

Oversight, Monitoring, and Evaluation

The working group's task coordinator should be assigned the responsibility of working with project officers to ensure that the activities of projects impacting on the valley are implemented in a coordinated way within the valley. This responsibility includes oversight, monitoring, and evaluation functions and is not intended to usurp the responsibility or authority of project officers to implement their projects. However, the task coordinator is responsible for providing feedback to the mission on the overall coordination of project activities affecting or being implemented in the valley.

APPENDIX A

SUMMARY OF USAID/HONDURAS PORTFOLIO OF AGRICULTURAL AND RURAL DEVELOPMENT PROJECTS

MARKETING DEVELOPMENT

- Export Development and Services Project (522-0207) to support the development of nontraditional agricultural and agroindustrial exports
- Agricultural-marketing Project (522-0271*) to reduce marketing costs of food crops and livestock products through market interventions centered in the San Pedro Sula area
- Agribusiness Investor-support Project (522-0241*) to support the economic and financial integration of secondary cities with their agricultural hinterlands by assisting small- and medium-size entrepreneurs to develop agroindustrial services in smaller cities

SMALL-FARMER DEVELOPMENT

- Small-farmer Titling Project (522-0173) to facilitate the titling of small-farm holdings and the establishment of titles as collateral for production credit
- Small-farmer Coffee-improvement Project (522-0176) to provide credit and technical assistance to increase coffee production and productivity and develop processing centers
- Small-farmer Livestock-improvement Project (522-0209) to establish new livestock companies and stimulate investments of agroindustry ventures related to the livestock industry
- Rural-technologies Project (522-0157) to assist small producers in accessing appropriate technologies and establishing new small local industries
- Communication for Technology Transfer in Agriculture Project (CTTA) (centrally funded) to develop, adapt, and institutionalize a communication methodology to support agricultural technology transfer

*Not funded in 1987

NATURAL-RESOURCE DEVELOPMENT

- Natural-resources Management Project (522-0168) to improve the farming techniques of hillside farmers while preserving the soil, water, and forest base; and to develop the production and conservation of fuelwood
- Forestry-development Project (522-0246) to increase the country's income from lumber sales and establish more appropriate roles for the public and private sectors
- Irrigation-development Project (522-0268) to construct and develop operational small scale irrigation and drainage systems in grain- and vegetable-production areas
- Rural-trails and Access-road Roads Project (522-0164) to improve market access through constructing and upgrading rural trails and roads

INSTITUTIONAL DEVELOPMENT

- Small-farmer Organization-strengthening Project (522-0252) to support the development of commercial cooperatives and farmer associations
- Agricultural Research Foundation (522-0249) to support continued development of the agricultural research services of the Fundación Hondureña de Investigación Agrícola
- Privatization of State-owned Enterprises Project (522-0289) to reduce the government's fiscal burden and improve efficiency and productivity; includes transfer of Mejores Alimentos to the private sector, development of a private-sector seeds industry, and establishment of mechanized agricultural services to replace the high-cost, low-efficiency services provided by GOH
- Land Use and Productivity Enhancement (522-0292) to expand activities of the Natural-resources Management and Rural Technologies Projects; possibly provide support for the start-up of a proposed semiautonomous agency for agricultural research and extension -- possibly called the Dirección General de Tecnología Agrícola; and possibly support agricultural education
- Strategic Planning and Technical Support (SPATS) (522-0269) to provide a rapid response mechanism for fielding technical assistance to address the rapidly and continuously changing needs of the agricultural sector

Source: USAID/Honduras, May 1986. Agricultural and Rural Development Action Plan (1987-1990).

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